



Research article

Relationships between proactive personality, work locus of control, and vocational satisfaction: the role of level of education

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ABSTRACT

In this study, we examine the relationships between proactive personality, work locus of control, and vocational satisfaction. Moreover, we argue that these relationships vary depending on employees' levels of education (i.e., employees with academic degrees versus without academic degrees). Drawing on Trait Activation Theory, we expected more pronounced relationships of proactive personality and work locus of control with vocational satisfaction for employees with academic degrees. We collected data of $N = 2068$ employees with a broad range of occupational backgrounds to test our assumptions. A partial disaggregation model revealed that both proactive personality and work locus of control were positively related to vocational satisfaction and that these relationships differed depending on the level of education. Regarding the relationship between proactive personality and vocational satisfaction, we only found evidence among employees with academic degrees. Although work locus of control and vocational satisfaction were significantly related among both groups of employees, the relationship was even more pronounced among employees without academic degrees. Consequently, our results underline the importance of taking inter-individual differences, such as the level of education, into consideration when looking at the effects of proactive personality and work locus of control on work-related well-being.

1. Introduction

Being satisfied with one's vocational situation matters both for employees and for employers: Low vocational satisfaction is related to turnover intentions [1], workplace deviant behavior [2], and lower physical health [3], whereas high vocational satisfaction is associated with higher work engagement [4] and better job performance [5,6]. In this study, vocational satisfaction reflects a facet of work-related well-being that is conceptualized as satisfaction with one's job and career.

Today's work environments require employees to constantly deal with new and unknown situations; more than ever, vocational satisfaction tends to depend on the individual's adaptability to those changing environmental demands [7]. There is evidence that individuals scoring high on proactive personality [8,9] and work locus of control (WLOC) [10] are better at adapting to changing requirements, thereby also contributing to their vocational satisfaction (e.g. Ref. [11]). However, the relationships between proactive personality and WLOC with vocational satisfaction may not necessarily be equally strong across different vocational situations. In this

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vein, Frese et al. [12] found inconsistencies regarding the expected positive relationship between proactive personality and vocational satisfaction. Erdogan and Bauer [13] also emphasize the importance of accounting for moderating effects on the relationship of trait factors such as proactive personality with vocational satisfaction. By adopting a person-environment fit perspective, they found that proactive personality was only positively related to vocational satisfaction for employees with high Person-Organisation fit and Person-Job fit (for similar results regarding WLOC, see Ref. [14]; for a discussion, see [15]). Consequently, proactive personality and WLOC may matter more for satisfaction in some vocational situations than in others. Building on Trait Activation Theory [16], we argue that the level of education (i.e., holding an academic degree versus no academic degree) should be a central factor for the effectiveness of both trait factors in promoting vocational satisfaction. Trait Activation Theory suggests that situational cues of the individual environment activate personality traits which in turn make certain work-related cognitions and behaviors more likely to occur. In line with this, graduate jobs and careers usually require individuals to act more autonomously [17], thereby offering more opportunities for the traits proactive personality and WLOC to translate into adaptive behaviors [18].

The present study contributes to the literature by testing whether proactive personality and WLOC are associated with work-related well-being in terms of vocational satisfaction. By testing both factors within an integrative model, we account for possible shared variance of WLOC and proactive personality. Previous research found fairly high correlations for these factors (e.g. Ref. [19]) so that their relationships with vocational satisfaction might decrease (or even disappear) in a mutual model. For instance, the effects of WLOC on satisfaction could be mainly driven by proactive behavior as individuals who feel that they have high internal control (WLOC) over situations might be more likely to take proactive actions to change something for the better, which in turn produces positive effects on vocational satisfaction. In contrast, the feeling of internal control might not have such an impact if not acted on. Hence, we add to theorizing on the incremental validity of both constructs as simultaneous predictors of vocational satisfaction. Furthermore, a central goal of our study is to test whether the relationships of proactive personality and WLOC with vocational satisfaction depend on varying levels of education. By doing so, we advance theorizing on proactive personality and WLOC by clarifying whether their relationships with vocational satisfaction are stable across different levels of education. We also advance Trait Activation Theory [16] by investigating whether the basic assumption of a person-situation interaction can be applied to individual attitudes (i.e., vocational satisfaction) as outcomes. Most research on Trait Activation Theory has investigated behavioral and performance-related outcomes. However it seems plausible that trait activation might also be relevant with regard to individual attitudes (at least through triggering behavioral reactions that lead to [un]favorable outcomes). All analyses and conclusions are based on a large representative sample of $N = 2068$ employees stratified with regard to level of education (academic degree versus no academic degree) and include employees with a broad range of occupational backgrounds.

2. Proactive personality and vocational satisfaction

Proactive personality is the disposition toward taking personal initiative and showing perseverance to influence one's environment [8,9]. It is the behavioral tendency to identify opportunities and to act on them to pursue change. In contrast to individuals with low levels of proactivity, proactive employees are more likely to actively shape their work environments to accomplish personal goals instead of passively waiting for external impulses for action [9].

Research found proactive personality to be related to a wide range of favorable outcomes, like personal skill development [20], acquiring relevant knowledge, reducing uncertainty through feedback-seeking [21], and developing adaptive professional networks [22]. More proactive individuals are also more likely to craft their conditions inside (and outside) work to fit their needs and desires [23,24]. All of these behavioral tendencies can create resources needed to fulfill job requirements and to support career progression, thereby leading to higher work-related well-being [25]. In line with this theorizing, some studies found positive relationships between proactive personality and different facets of vocational satisfaction (e.g. Refs. [11,13,26–30]). Therefore, based on previous findings and theorizing, we suggest.

2.1. Hypothesis 1

Proactive personality is positively related to vocational satisfaction.

3. Work locus of control and vocational satisfaction

WLOC is an individual's belief about control over work-related outcomes [10]. When individuals have an internal control belief, they expect that the results of their actions are contingent on their own behavior or decisions. In contrast, individuals with an external WLOC attribute the same outcome to luck, chance, or others. Individuals with strong internal control beliefs show higher aspirations, tend to be more persistent, and are more responsive to challenges [31].

We expect that WLOC will be related to vocational satisfaction. In general, feelings of autonomy are crucial to the experience of work-related satisfaction [32,33]. As employees with a high internal WLOC see themselves as the agent of their own behavior, they feel and act more autonomously [34]. Hence, individuals with a high internal WLOC are more likely to take actions suited to increasing their vocational satisfaction [10]. There is already some empirical evidence for the relationship between WLOC and vocational satisfaction (e.g., Refs. [35–38]; for a meta-analysis, see Ref. [39]). Consequently, we posit that individuals scoring high on WLOC show increased levels of vocational satisfaction.

3.1. Hypothesis 2

Work locus of control is positively related to vocational satisfaction.

4. Group differences: level of education

Building on Trait Activation Theory [16], we argue that the relationships between proactive personality and WLOC on the one hand and vocational satisfaction on the other hand vary depending on employees' level of education. Trait Activation Theory focuses on the interaction of personality factors with situational characteristics to explain how and when personality traits become determinants of various (work-related) outcomes. It states that contextual cues (e.g., organizational or task characteristics) can trigger trait-based behavior. Regarding work-related situational cues, we expect differences for employees with academic degrees compared to employees without academic degrees. We assume that level of education (i.e., employees with academic degrees compared to employees without academic degrees) can be a proxy for different vocational situations. Jobs and careers typically pursued by college graduates (graduate jobs) are different from those of non-college graduates (non-graduate jobs) [40] regarding their activating potential for the personality traits proactive personality and WLOC. For example, graduate jobs typically require higher levels of skill and innovation but also offer more flexibility, whereas non-graduate jobs are more likely to offer lower to intermediate levels of skill discretion and lower levels of autonomy and decision latitude [41,42]. Furthermore, graduate jobs provide more opportunities for self-determined skill development and career progression [43]. Hence, applying Trait Activation Theory implies that the relationship between proactive personality and WLOC with vocational satisfaction should be particularly pronounced in graduate jobs as these jobs provide specific trait-activating cues, and the high flexibility in these contexts allows the traits to translate into beneficial outcomes (such as adaptive behaviors and perceptions). In contrast, non-graduate jobs with lower flexibility and decision latitude lack the cues to activate proactive personality and WLOC; thus, they are less likely to become drivers of beneficial outcomes. We, therefore, posit that the relationships between proactive personality and WLOC with vocational satisfaction are qualified by level of education and put forward the following hypothesis.

4.1. Hypothesis 3

The positive relationship between (a) proactive personality, and (b) internal WLOC on the one hand, and with vocational satisfaction on the other hand differs as a function of level of education. That is, the relationships between proactive personality and WLOC with vocational satisfaction are more pronounced for employees with academic degrees than for employees without academic degrees.

5. Methods

5.1. Participants and procedure

We analyzed the data of 2068 participants from Germany, including 993 women (48% female), 1072 men (51.8%), and 3 other (0.1%). The mean age was 46.64 years ($SD = 11.43$), ranging from 25 to 65 years. Participants were from diverse professions, organizations, and industries, for example, health services and social services ($n = 318$), financial or legal services ($n = 155$), communication and information technology ($n = 142$), and sales and distribution ($n = 131$). Participants reported working for 8.1 years on average ($SD = 1.59$). We chose to focus on a sample consisting of German employees as the educational system in Germany is clearly structured into two main educational tracks after finishing school, that is, vocational training versus (higher education) academic training. Sampling methods allowed us to collect data equally distributed on two different levels of education (academic degree [$n = 1025$] vs. no academic degree [$n = 1043$]). In more detail, participants with an academic degree can be further divided into 162 participants holding a Master's degree, 65 participants holding a Magister's degree, 585 participants holding a Diploma degree, 156 participants with a state examination, and 57 participants holding a Ph.D. degree.¹ To keep the contrast between groups (individuals with academic degrees and without academic degrees) clear, and to account for the lack of Bachelor's degrees before the year 2000 (see footnote), individuals who finished university after a Bachelor's degree were not included in the sample. The relationship between education and personality traits was expected to be most evident in those individuals who had longer periods of education. A Bachelor's degree takes only a marginally longer time than vocational training, so no pronounced differences in education were expected in this respect.

Data were gathered by an external German online survey company. All participants were provided with information about the study and asked to participate. Those who chose to participate completed the survey online after providing informed consent. This research was conducted in compliance with the principles of the Declaration of Helsinki and the German Psychological Society. Ethical clearance by the institutional review board is not mandatory at the institution where the research was conducted. Because this study only consisted of frequently used scientific questionnaires that did not ask for critical information we decided to not seek ethical

¹ German universities started to introduce Bachelor's and Master's degrees after the implementation of the „Bologna reform” in 1999 [44]. Before that, German universities awarded Diploma and Magister's degrees. After the reform, Master's degrees replaced the Diploma degrees and Magister's degrees in Germany, and thus Diploma degrees and Magister's degrees are both equivalent to the new Master's degrees [45] (please note that there was no equivalent of Bachelor's degrees before the Bologna reform).

approval.

5.2. Measures

5.2.1. Proactive personality

We assessed proactive personality with a frequently used tool by Frese et al. [12] consisting of seven items (sample items: “I quickly seize opportunities to achieve my goals”, “When opportunities arise to create something, I take advantage of them”). All items were answered on a 5-point scale, ranging from 1 (does not apply to me) to 5 (completely applies to me). The internal consistency was 0.88 (for Cronbach’s alpha and McDonald’s omega).

5.2.2. Work locus of control

We assessed work locus of control (WLOC) with the German translation of the Work Locus of Control Scale. This is a well-validated measure to capture WLOC and was introduced by Spector [10]. It consists of 16 items (sample items: “A job is what you make of it”, “In most jobs, people can pretty much accomplish whatever they set out to accomplish”). All items were answered on a 6-point scale, ranging from 1 (disagree very much) to 6 (agree very much). The internal consistency was 0.86 (Cronbach’s alpha) and 0.85 (McDonald’s omega).

5.2.3. Vocational satisfaction

We operationalized vocational satisfaction as a composite variable comprising general job satisfaction and career satisfaction. We did so because previous research that measured both constructs points to conceptual and statistical overlaps as it found remarkably high correlations (e.g. Refs. [46,47]). Job satisfaction was assessed using a German short adaptation [48] of the Job Descriptive Index by Smith et al. [49]. We used a subscale that captures general job satisfaction consisting of five items (sample items: Overall, my job is ... “... satisfying”; “... pleasant”). All items were answered on a 12-point scale ranging from 0 (does not apply to me) to 11 (completely applies to me). The internal consistency was 0.87 (Cronbach’s alpha) and 0.86 (McDonald’s omega). Career satisfaction was assessed with the German version of the Career Satisfaction Scale [50], a commonly used instrument to measure general career satisfaction consisting of five items (sample items: “I am satisfied with the success I have achieved in my career”; “I am satisfied with the progress I have made towards meeting my overall career goals”). All items were answered on a 5-point scale ranging from 1 (does not apply to me) to 5 (completely applies to me). The internal consistency was 0.91 (for Cronbach’s alpha and McDonald’s omega).

5.2.4. Level of education

Level of education was coded as a dichotomous categorical variable where all participants holding a Master’s degree (or equivalent) or higher (Ph.D.) were coded with 1 (academic degree), and all other participants were coded with 2 (no academic degree). Depending on the field of study and date of graduation, participants could hold a Diploma degree, a Magister’s degree or the state examination as

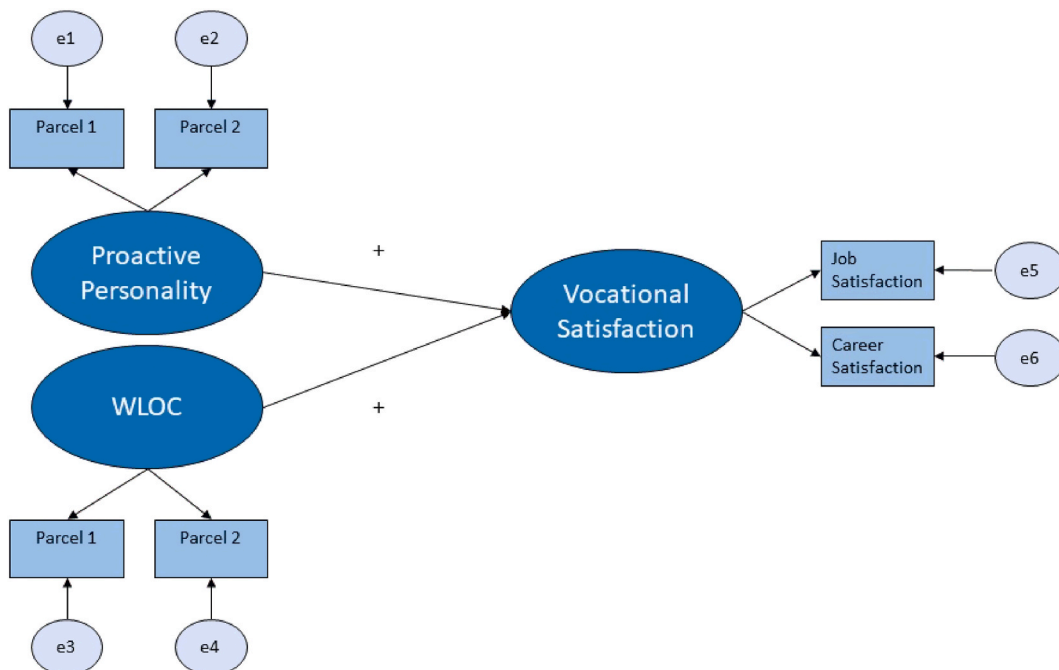


Fig. 1. Our study model. WLOC = Work locus of control.

equivalent to a Master's degree as all require a five-year study program.

5.3. Statistical analyses

To test our hypotheses we applied structural equation modeling (SEM) based on the maximum likelihood estimation method using the lavaan package [51] in RStudio 2022.02.3 [52]. We report unstandardized values.

We conducted SEM analyses using a partial disaggregation model as proposed by Bagozzi and Edwards [53]. Particularly, we created parcels of items that were used as indicators of the latent variables (cf [54]). Item-parceling decreases biases arising from non-normal distributed variables. Above that, it can create more reliable measurement models (by decreasing measurement error) as compared to using a strictly item-based approach [55]. Two parcels for each construct were formed. As WLOC consists of positive and negative worded items, and as negatively worded items can increase measurement error due to unusual responses, we coupled all reverse-coded items to the first and all remaining items to the second item-parcel (cf. [56]). Proactive personality only consists of positively worded items. Hence, we allocated the items to one of two item-parcels after inspecting their factor loadings. Based on conceptual assumptions and on their factor loadings, we included vocational satisfaction as a latent variable in the model with mean values of job satisfaction and career satisfaction as two separate indicators [54] (see Fig. 1).

We inspected the model fit of our SEM-analyses – including the structural paths. Model fit was evaluated using the χ^2 -goodness-of-fit statistic, the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). By convention, values greater than 0.90 are considered as indicating a good fit for relative fit-indices [57]. In addition, the Root Mean Square Error of Approximation (RMSEA) is presented with values up to .08 indicating an acceptable fit of the model to the data [58]. We found that our model fitted well to the data: $\chi^2(6) = 70.58$, CFI = 0.98, TLI = 0.96, RMSEA = 0.07. Further analyses that support the validity of our factorial structure can be found in the supplemental material.

To test for differences across levels of education, we conducted multi-group analyses. This was done by comparing the fit of the different models consisting of all path coefficients. We tested whether the relationships differ significantly across the two levels of education. The unconstrained model (i.e., all path coefficients can vary freely across the levels of education) was compared to a set of constrained models (i.e., path coefficients were constrained equal across the levels of education). To test the models against each other we used χ^2 -difference tests [59]. We also present the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) as two further model selection criteria. The lower an AIC and BIC score is, the better the model fits the data [60].

6. Results

6.1. Hypotheses tests

Means, standard deviations, and zero-order correlations are presented in Table 1 and Table 2.

Our analyses revealed that proactive personality was positively related to vocational satisfaction (estimate = 0.19, $SE = 0.08$, $p = .023$) – supporting Hypothesis 1. The same applies to the relationship between work locus of control (WLOC) and vocational satisfaction as we found both variables to be positively related (estimate = 3.20, $SE = 0.25$, $p < .001$). Hence, Hypothesis 2 was also supported.

6.2. Testing differences for levels of education

A central aim of this study was to test for differences in the magnitude of the relationships of proactive personality and WLOC with vocational satisfaction across two different levels of education. Specifically, we argue that the relationship between proactive personality and vocational satisfaction (Hypothesis 3a) and the relationship between WLOC and vocational satisfaction (Hypothesis 3b) is more pronounced when holding an academic degree versus not holding an academic degree. To test these hypotheses, we conducted multi-group analyses.

As a precondition of group comparisons, measurement invariance across levels of education should be given [61]. Therefore, three levels of measurement invariance were investigated by conducting a sequence of multi-group CFAs: The first model was to test the equivalence of the factor structure, whereas the second model tested the equivalence of factor loadings (metric invariance), and the third model tested the equivalence of intercepts (scalar invariance). All models were compared by χ^2 -difference tests. The comparison of the first versus the second model ($\Delta\chi^2 = 46.71$; $df = 30$; $p = .027$) as well as the second versus the third model ($\Delta\chi^2 = 84.22$; $df = 25$; $p < .001$) revealed a significant decrease in model fit, pointing to weak invariance (equal factor loadings and intercepts) across groups (we will come back to this finding in the theoretical implications). However, Byrne et al. [62] argue that partial invariance is sufficient to compare relationships across groups. Partial invariance is given if at least two indicators per construct (i.e., loadings for partial metric invariance and loadings plus intercepts for partial scalar invariance) are equal across groups. Thus, we proceeded with testing for partial invariance by successive removal of constraints on factor loadings (Model 2) and intercepts (Model 3). The comparison of the adapted models (that consisted of at least two constrained indicators per construct) confirmed partial metric and scalar invariance between Model 1 and Model 2 ($\Delta\chi^2 = 36.88$; $df = 28$; $p = .122$), and between Model 2 and Model 3 ($\Delta\chi^2 = 26.55$; $df = 18$; $p = .088$).

² In the supplementary material, we report additional analyses that were conducted to test the robustness of our results.

Table 1
Zero-order correlations of all study variables.

Variable	1	2	3	4	5	6
1. Proactive personality						
2. WLOC ^a	.19***					
3. Level of education ^b	.02	.00				
4. Job satisfaction	.24***	.56***	-.06*			
5. Career satisfaction	.33***	.46***	-.06**	.60***		
6. Age	.11***	-.01	.00	.06**	.09***	
7. Gender ^c	.05*	.02	.08***	-.02	-.04	-.03

Note. N = 2068; ^a WLOC = Work locus of control; ^b 1 = Academic degree, 2 = No academic degree; ^c 1 = Male, 2 = Female; * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

Table 2
Means and standard deviations for the study sample.

	Combined sample		No academic degree		Academic degree	
	Means	SD	Means	SD	Means	SD
Proactive personality	3.86	0.63	3.88	0.66	3.85	0.60
WLOC	3.84	0.68	3.84	0.70	3.83	0.66
Job satisfaction	7.14	1.87	7.04	1.95	7.24	1.77
Career satisfaction	3.57	0.84	3.52	0.85	3.62	0.82
Age	46.64	11.43	46.68	11.13	46.59	11.72

Notes. WLOC = Work locus of control. $N_{\text{Combined}} = 2068$; $N_{\text{Academic degree}} = 1025$; $N_{\text{No academic degree}} = 1043$.

Consequently, preconditions to conduct latent multi-group analyses to test Hypotheses 3a and 3b were given.

We conducted multi-group analyses and compared a model which allows the structural paths to vary across groups (Model 1) with models that included equality constraints. To test Hypothesis 3a, stating that the relationship between proactive personality and vocational satisfaction depends on the level of education, we compared Model 1 with a model constraining the relationship between proactive personality and vocational satisfaction to be equal across groups (Model 2). Model 2 showed a significant decrease in model fit as indicated by χ^2 -difference testing ($\Delta\chi^2 = 9.57$; $df = 1$; $p < .001$), thereby pointing to differences across levels of education. Looking at the path estimates, the relationship between proactive personality and vocational satisfaction is only significant for employees with academic degrees (estimate = 0.45, $SE = 0.10$, $p < .001$) whereas there was no such relationship for individuals without academic degrees (estimate = -0.06, $SE = 0.14$, $p = .683$).

To test Hypothesis 3b, we compared Model 1 (without equality constraints) with a model constraining the relationship between WLOC and vocational satisfaction to be equal across groups (Model 3). χ^2 -difference tests revealed that Model 1 fits better to the data, $\Delta\chi^2 = 9.52$; $df = 1$; $p = .002$. Although WLOC showed a positive relationship with vocational satisfaction for employees with academic degrees (estimate = 2.46, $SE = 0.25$, $p < .001$) this relationship was more pronounced in employees without academic degrees (estimate = 3.99, $SE = 0.49$, $p < .001$). As these effects point in the opposite direction to what we had expected, Hypothesis 3b has to be rejected. All results of the multi-group analyses are displayed in Table 3.²

7. Discussion

Are proactive personality and work locus of control (WLOC) both indicative of vocational satisfaction (i.e., satisfaction with one’s job and career) and are these relationships similar for employees with different levels of education? In a large-scale representative study, we aimed to explore the relationships between proactive personality, WLOC, and vocational satisfaction, thereby testing whether the magnitudes of the effects are stable across two levels of education (i.e., holding an academic degree vs. no academic degree). We used level of education as a proxy for different job conditions since employees with academic degrees usually find themselves working in different job situations (graduate jobs) compared to employees without an academic degree (non-graduate jobs). In line with our hypotheses, we found support for the assumption that proactive personality and WLOC are both independently related to vocational satisfaction. In addition, we found that the relationship between proactive personality and vocational satisfaction varied across levels of education. Only employees with academic degrees showed a positive relationship between proactive personality and vocational satisfaction when examining the relationship separately for both groups. We also found that—contrary to our predictions—the positive relationship between WLOC and vocational satisfaction was more pronounced in employees without academic degrees.

7.1. Theoretical implications

Our study adds to the literature on proactive personality and WLOC by testing whether they are distinct factors that shape

Table 3
Test for group differences: Model comparisons and regression weights.

	Model fits					$\Delta\chi^2$	p	Group		Weight		
	χ^2	df	AIC	BIC						B	SE	p
Model 1: No constraints	77.35	12	28.726	28.963			Academic degree	Propers	0.45	.10	<.001	
								WLOC	2.46	.25	<.001	
								No academic degree	Propers	−0.06	.14	.683
								WLOC	3.99	.49	<.001	
Model 2: Proactive personality – vocational satisfaction path constrained	86.91	13	28.734	28.965	9.57	<.001	Academic degree	Propers	0.25	.08	.002	
								WLOC	2.75	.28	<.001	
								No academic degree	Propers	0.25	.08	.002
								WLOC	3.48	.37	<.001	
Model 3: WLOC – vocational satisfaction path constrained	86.87	13	28.734	28.965	9.52	<.002	Academic degree	Propers	0.34	.11	.002	
								WLOC	3.13	.24	<.001	
								No academic degree	Propers	0.09	.11	.387
								WLOC	3.13	.24	<.001	

Notes. AIC = Akaike's information criterion; BIC = Bayesian information criterion; WLOC = Work locus of control; $N_{\text{Academic degree}} = 1025$; $N_{\text{No academic degree}} = 1043$.

vocational satisfaction. In line with previous research, we found that both were independently related to vocational satisfaction, thereby supporting the incremental validity of these constructs.

Additionally, our results challenge the assumption that proactive personality should be seen as generally beneficial given that—depending on the level of education—there are differences in how it is related to vocational satisfaction. In line with our hypothesis, the relationship between proactive personality and vocational satisfaction was only evident for individuals with academic degrees (accounting for level of education). This is in line with Trait Activation Theory [16], stating that person-situation interactions are crucial to explain behavioral and perceptual processes important for employee satisfaction. In line with this theory, proactive personality is likely to manifest in more vocational satisfaction for individuals with a high level of education. This is likely because graduate jobs typically offer more flexibility and decision latitude and signal that proactive initiative is valued by the organizational environment. Hence, proactive efforts can lead to greater success in approaching job and career objectives, thereby increasing vocational satisfaction. Our findings also tentatively support the existence of an initiative paradox [13,63]: On the one hand, proactive initiative in employees is usually seen as something positive that is highly appreciated by organizations and leaders. On the other hand, this might not be the case for employees without academic degrees, as our data show no relationship with vocational satisfaction for this group. Hence, proactive initiative might not always be valued and rewarded (and sometimes even punished) in non-graduate job situations.

Although we found group differences regarding the relationship between WLOC and vocational satisfaction, these findings did not align with our a priori theoretical considerations. WLOC and vocational satisfaction were more strongly related to each other in employees without academic degrees. A post-hoc explanation could be that high internal control beliefs might be particularly helpful in contexts with lower levels of external control. In this vein, non-graduate jobs and careers (compared to graduate jobs and careers) often offer lower control which is crucial to preserve work-related well-being [17]. Therefore, a high internal control belief might be especially helpful in employees without academic degrees as it can serve as a compensatory personal resource for a lack of external control [64]. That being said, our results still suggest that WLOC is beneficial for employees across both levels of education, although the magnitude of this effect was different.

Finally, although we found partial measurement invariance across levels of education, our analyses revealed that strict measurement invariance was not given. This is, per se, interesting as it points to differences in how employees with varying levels of education interpret questions on proactive personality and WLOC, as well as on vocational satisfaction. Participants might also have different implicit representations of underlying latent factors [65]. Researchers should keep this in mind when drawing conclusions about how variables might be related across different levels of education.

8. Strengths, limitations, and future research

There are both strengths and limitations in our study. The large sample size and the equal distribution of participants on the two different levels of education can be regarded as a strength of this study. As a limitation, due to our data's cross-sectional nature, we could not fully exclude the possibility of reversed effects or third-variable influences [66]. While the relative stability of personality traits (cf. [67]) makes reversed causation unlikely, the possibility of third variable causation remains.

More generally, future research might build on our findings by further exploring the relationships of proactive personality and WLOC with vocational satisfaction. For example, it is worthwhile to extend knowledge regarding further situational (boundary) conditions that limit the extent to which proactive personality and WLOC are related to vocational satisfaction. Beyond that, more

research about specific conditions and cues related to level of education and how they trigger (positive) outcomes is needed to gain a deeper understanding of how level of education is particularly influential for group differences in these relationships.

9. Conclusions

We conducted a large-scale investigation of the relationships between proactive personality, WLOC, and vocational satisfaction. A central aim of our study was to test for differences in these relationships across levels of education. Our analyses show positive relationships between proactive personality and WLOC with vocational satisfaction. However, multi-group analyses showed that the relationship between proactive personality and vocational satisfaction could be found only in individuals with academic degrees. In contrast, WLOC was more pronounced for individuals without academic degrees. Hence, our study shows the need to differentiate between different individual conditions when looking at the outcomes of proactive personality and WLOC and how they influence work-related well-being.

Declaration

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Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no competing interests.

Additional information

No additional information is available for this paper.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.heliyon.2023.e13283>.

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