Received: 31 August 2023 | Accepted: 5 January 2024

DOI: 10.1002/jad.12293

RESEARCH ARTICLE

Foundation for PSA WILEY

Adolescents' effort in vocational education and training and upper secondary general education: Analyses of stability, determinants, and group differences

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Funding information

State Secretariat for Education, Research and Innovation, Grant/Award Numbers: 1315000504, 1315001772; Fachhochschule Nordwestschweiz FHNW

Abstract

Introduction: The effort adolescents make determines the risk for dropping out of vocational education and training (VET) early and their chances of graduating upper secondary education. Studies have shown that adolescents' efforts decrease during the transition to upper secondary general education and increases for the transition to VET. In this study, we examined adolescent self-efficacy in lower secondary education, adolescent-instructor relationship (AIR) in VET and general education, and perceived person–environment fit (PEF) as predictors of adolescent effort.

Method: We calculated two longitudinal multigroup structural equation models. Group 1 comprised 1266 (mean age in $T_1 = 15.7$ years; female: 44%) lower secondary education graduates who moved on to VET with two learning contexts, company and vocational school in Switzerland. Group 2 included 517 (mean age in $T_1 = 15.7$ years; female: 44%) lower secondary education graduates who moved on to upper secondary general education and thus stayed in a school. Adolescents' survey data was collected in 2016 and 2017.

Results: Self-efficacy in lower secondary education and AIR in upper secondary education indirectly predicted effort in upper secondary education via PEF, controlling for effort in lower secondary education. Findings were similar for general education and vocational school. However, the effects differed between company and general education (moderation). The positive effect of AIR on PEF was statistically significantly weaker for adolescents in general education than for adolescents in VET and their company learning context.

Conclusion: We discuss strategies to enhance adolescents' efforts in upper secondary education.

KEYWORDS

adolescent–teacher relationship, general education, motivation, person–environment fit, transition, vocational education and training

1 | INTRODUCTION

In upper secondary education, motivation to perform well in learning contexts, such as schools and workplaces, correlates positively with achievement (Carbonaro, 2005) and is an important prerequisite to receive a diploma (Cabus & de Witte, 2016). Bandura (1988) defined motivation as the physiological activation and cognitive guidance of behavior. A relevant cognitive aspect of motivation is effort, which describes the readiness to engage in achievement situations (Lehrl & Richter, 2012). High effort is indicated by the willingness to invest efficiently in task processing and exert a self-controlled behavior

(Kührt et al., 2023). There is evidence for a continuous decline in adolescents' effort from lower secondary education to upper secondary general education (hereinafter general education; Neuenschwander et al., 2012; Schiefele, 2009) among adolescents who remain in school. This finding is important, as a decline in effort and engagement can lead to school drop-out (Englund et al., 2008; Janosz et al., 2008).

Compared to adolescents who remain in school, a different pattern has been found with adolescents who transition from school to dual vocational education and training (VET) with two learning contexts, company and vocational school. VET is accredited as a formalized work and educational setting at the upper secondary level (Stalder & Nägele, 2011). For instance, Neuenschwander et al. (2012), Becker et al. (2017), Basler and Kriesi (2019), and Korpershoek et al. (2020) have shown an increase in adolescents' motivational beliefs (e.g., effort and goal orientations) after the transition from lower secondary education to VET. Studies on the determinants of adolescents' effort such as characteristics of learning contexts in upper secondary education (i.e., VET and general education) provide explanations for these divergent developmental patterns (Basler & Kriesi, 2019). However, there is little evidence on whether the increase in adolescents' effort is influenced by characteristics of learning contexts (e.g., adolescent–instructor relationships AIR) after transitioning to upper secondary.

The Social Cognitive Career Theory (SCCT; Lent & Brown, 2008; Lent et al., 1994) offers a well-established approach to analyze transition situations and thus, to analyze divergent changes of effort. It can explain adolescent's effort during school-to-school and school-to-work transitions. According to SCCT, adolescent's self-efficacy and supportive proximal context characteristics, such as AIR affect adolescents' effort and adjustment to a new context. High self-efficacy indicates high agency that helps adolescents dealing with tasks in new learning contexts (Lent et al., 2008). Adolescents with high self-efficacy expect to successfully accomplish tasks in new learning contexts and therefore, they are more willing to invest in their respective tasks. Endedijk et al. (2022) describe AIR with aspects such as friendliness, closeness, support, and conflict. Combining these aspects, AIR is considered as good, if adolescents perceive instructors as supportive and competent. A good AIR supports adolescents to adjust to new contexts and thus, to work hard to reach their goals.

In line with Lent et al. (2002), we consider perceived person-environment fit (PEF) as an outcome of the interaction between individual beliefs and environmental conditions, more specifically between adolescent self-efficacy and contextual adolescent-instructor relationship. Both individuals' self-efficacy and contextual AIR contribute to establish a situated match between individuals' needs and goals and the contextual requirements, resulting in a high PEF (Eccles et al., 1993; Neuenschwander & Hofmann, 2021).

PEF theory was developed to explain changes in motivation during school transitions (Eccles & Wigfield, 2020; Eccles et al., 1993). On concept level, it corresponds well to SCCT. In line with SCCT, PEF theory assumes that the interaction between contextual support and individual needs and goals shapes individual development (Eccles & Roeser, 2009). It proposes that adolescents' effort is high in learning contexts that fit their needs. In line with SCCT and PEF theory, we assume that self-efficacy and AIR support PEF and effort. Thus, in the transition to upper secondary education, the effects of prior self-efficacy and AIR on adolescent effort can be explained via PEF.

To the best of our knowledge, no studies have explored the mediating effect of PEF to predict effort during the transition to upper secondary education. Additionally, there is no evidence about the extent to which prior self-efficacy and AIR determine efforts' divergent developmental pathways during the transition to general education and to the two learning contexts in VET, company, and vocational school. Thus, the questions arise: To what extent do adolescents' self-efficacy before the transition and AIR in upper secondary education affect their effort in VET learning contexts (company, vocational school) compared to general education? Additionally, to what extent are these effects mediated by PEF?

It is important to gain more knowledge of adolescents' effort for the transition to upper secondary education with its two trajectories, VET and general education. First, examining the determinant factors for effort in the transition to VET (in which effort increases) could provide information on how to prevent decreasing effort in general education. VET has characteristics that foster student effort (Neuenschwander et al., 2012).

Second, evidence for the mediating role of PEF for the effects of AIR and self-efficacy on effort in upper secondary education produces options to increase adolescent effort. A good AIR could contribute to a good PEF. Additionally, students with high self-efficacy can proactively contribute to a high PEF. Findings for various contexts give evidence to support adolescents' PEF and increase adolescent effort.

Third, PEF has been examined in work contexts (Kristof-Brown et al., 2005) and career decision theories (e.g., Holland, 1997) but rarely in educational and VET contexts (Neuenschwander & Hofmann, 2021). Evidence on the role of PEF shows a new approach to gain a better understanding of effort in school-to-work transitions.

1.1 | Transition to VET and general education in Switzerland

After ninth grade in lower secondary education, about 80% of adolescents in Switzerland move directly to upper secondary education. Adolescents are, on average, between 15 and 16 years old. Two of the most chosen tracks in upper secondary education are VET (about 53% of adolescents) and general education (e.g., gymnasium, upper secondary specialized school,

about 27% per year; Babel & Lagana, 2016). The remaining adolescents enter a bridge year course or dropout of the educational system. VET can be completed either full-time in a vocational school or as a dual VET. Dual VET consists of two learning contexts: Adolescents work 3–4 days a week as apprentices in a company and attend a vocational school the remaining days. The present analysis focuses on dual VET only. In general education, adolescents attend a gymnasium or an upper secondary specialized school that ends with a baccalaureate. Their education occurs entirely within the learning context of their school.

1.2 | Self-efficacy and effort

In line with Bandura (1988), the SCCT of work satisfaction (Lent & Brown, 2008) postulates that support from proximal contexts influences adolescents' self-efficacy and outcome expectations, which influence adolescents' activities to follow their career goals in turn. When adolescents attain their goals, their work satisfaction and well-being increase. Many studies supported this theory (Brown & Lent, 2019; Sheu et al., 2020). It provides a framework to explain the divergent developmental patterns of effort during the transition to upper secondary education and thus is used in this study.

The SCCT postulates that self-efficacy fosters goal progress via effort. Highly self-efficacious individuals show more effort than individuals low in self-efficacy. Vasalampi et al. (2012) and Niittylahti et al. (2019) reported correlations between competence beliefs, self-efficacy, and academic effort in high school. Thus, self-efficacy before the transition positively affects adolescents' effort after transition in all three learning contexts (general education, vocational school, and company).

1.3 | Adolescent–instructor relationships and effort

SCCT postulates that a supportive environment, such as good AIR promotes adolescents' adjustment to the work context and thus increases adolescents' well-being (Lent & Brown, 2008). In line with these theoretical assumptions, many qualitative and quantitative findings showed positive correlations between AIR and adolescents' effort in work and educational contexts (Niittylahti et al., 2019; Roeser et al., 1996; Roorda et al., 2011; van Uden et al., 2014; Wentzel, 1998; Zimmer-Gembeck et al., 2006). This relationship is bidirectional: Effortful individuals are more engaged in establishing good relationships with people from their social context, and good relationships contribute to an encouraging environment that motivates individuals to work hard (Furrer & Skinner, 2003).

1.4 | Person–environment fit as mediator

A high level of perceived PEF indicates a strong adjustment of individual needs and competences to the learning context (e.g., school and family) in adolescents' perspective (Eccles et al., 1993). PEF theory assumes that adolescents are able to develop their potential and learn effortfully in a context that fits their emotional, cognitive, and social needs. A learning context that addresses adolescents' needs effectively fosters individual effort. During the transition to high school, learning contexts change and address adolescents' needs less effectively (Eccles et al., 1993; Neuenschwander, 2017). Eccles et al. (1993) assumed that social relationships in high school are weaker than in elementary schools. Thus, PEF and effort decrease during the transition to high school (Eccles et al., 1993).

PEF results from individual agency to shape environments in line with individual needs and goals (Eccles & Roeser, 2009). The PEF theory assumes that adolescents with high self-efficacy are more competent and willing to adjust to new contexts and, thus, to establish a higher PEF and to increase their effort. Additionally, good AIR strengthens adolescents' beliefs in fitting their social context and thus increase effort because good relationships support a feeling of relatedness, autonomy, and fulfilled individual needs (Alley, 2019; Zimmer-Gembeck et al., 2006). Thus, PEF mediates the effects of self-efficacy and AIR on adolescent effort (Zhao et al., 2010).

Few studies have examined these theoretical assumptions. Zimmer-Gembeck et al. (2006) reported positive correlations between AIR, PEF and engagement in high school. Neuenschwander and Hofmann (2021) found positive effects of self-efficacy before the transition on perceived PEF after the transition. Findeisen et al. (2022) reported correlations between PEF in VET and persistent intention to finish the training. Kristof-Brown et al. (2005) summarized findings on the association between PEF and effort in work context. The association between PEF and effort is bidirectional over time: High effort increases PEF and high PEF fosters effort.

1.5 | Differences in predicting effort between learning contexts

The model to predict adolescent effort is expected to work for general education and VET's learning contexts. However, learning contexts moderate the effects of AIR on PEF and effort. In general education, adolescents interact with a variety of teachers. Each teacher is in charge of one or two subjects (Wolter et al., 2023). The main teacher is responsible for their students' needs and usually spends little time with each adolescent and rarely interacts with them. Thus, the AIR can be considered weak. For the same reasons, the effects of AIR on PEF and effort can be assumed to be weak.

In contrast, adolescents in VET in learning context company daily interact with their instructors. These instructors shape adolescents' work context by defining norms and daily routines and providing feedback (Cooper-Thomas et al., 2014). To cooperate efficiently and establish a good working climate, adolescents and instructors in companies pursue establishing good relationships with each other (Masdonati & Lamamra, 2009). These relationships can be assumed to influence adolescents' PEF at work and, thus, effort in a company.

Similar to general education, adolescents in VET in the vocational school context are taught by several teachers in various school subjects. Their main teacher cares for students' individual needs but spends little time with each adolescent per week and rarely interacts with them (Stalder & Nägele, 2011). Thus, the effect of AIR on PEF and effort in vocational school is assumed to be weak, similar to that in general education.

1.6 | Hypotheses

To summarize, the following hypotheses will be tested.

(1) Predicting effort: Effort in upper secondary education is positively influenced by self-efficacy in lower secondary education. The effect is fully mediated by PEF (H1a). Effort in upper secondary education is positively influenced by AIR. This effect is partially mediated by PEF (H1b).
(2) Differences between learning contexts: We assume stronger direct effects of AIR on PEF and on effort for adolescents in VET in learning context company than for adolescents in general education (H2a). We do not expect effect-size differences between adolescents in VET in vocational school and adolescents in general education (H2b).

2 | MATERIALS AND METHODS

2.1 | Participants

We tested the hypotheses using data from the multiwave project WiSel ("Effects of Tracking"). The study provided representative data of four large German speaking Swiss Cantons. Adolescents filled out questionnaires at different points during their school career. Randomly selected schools with adolescents in Grades 5 and 6 (Waves 1 and 2) were asked to participate. In Wave 3 (in fall 2013), 1515 7th graders participated. From those adolescents, 698 adolescents agreed to participate in Wave 4 (in spring 2016) again (last year of lower secondary education, i.e., 9th grade). In Wave 4, a supplementary sample of 1678 participants was included consisting of adolescents in 9th grade from randomly selected schools in the same four cantons (T_1; $N = 2376$ adolescents). All adolescents in Wave 4 were contacted again in their first year of upper secondary education (Wave 5, in 2017, T_2; $N = 808$). The T_2 sample consisted of T_1 participants exclusively. The response rate at T_2 was 34%. For our analyses, we selected adolescents in W4 who chose to enter VET ($n = 1266$; mean age at $T_1 = 15.7$ years; age range at $T_1 = 14–17$ years; age range at $T_2 = 15–18$ years; female: 44%) or who moved to general education ($n = 517$, mean age in $T_1 = 15.6$ years; age range at $T_1 = 14–17$ years; age range at $T_2 = 15–18$ years; female: 67%). Adolescents moving to a bridge year were excluded from the analysis ($N = 488$) because this subsample does not contribute to the testing of the hypotheses. The selected sample allowed to compare the transition from lower secondary education to general education and to VET.

In total, 662 of these adolescents (VET: $n = 393$; general education: $n = 269$) participated at T_1 and T_2; 1122 adolescents (VET: $n = 873$; general education: $n = 248$) only participated in T_1. For the VET sample and the general education sample separately, we compared missing response patterns between adolescents who participated in both T_1 and T_2 and adolescents who only participated in T_1 by conducting t tests with SPSS 25 for all T_1 items used in the study. In the VET sample, there were no response biases except for effort in lower secondary education (effort T_1), $t(1,259) = 2.23$, $p = .026$, Cohen's $d = .14$. In the general education sample, response biases only occurred for effort in lower secondary education (effort T_1), $t(503) = 2.34$, $p = .020$, Cohen's $d = .21$. Small effect sizes indicate that missing response patterns do not vary between the waves of data collection in a relevant way.

2.2 | Procedure

Adolescents filled out online questionnaires in their classrooms during school (T_1) or at home (T_2). At T_1, teachers supervised the surveys after having received a detailed manual. At T_2, participants received personalized passwords to access the online survey. Participants at T_1 did not receive any incentives. All participants received an unconditional incentive (voucher) of CHF 10.- before T_2. Members of the research team called all T_1 participants who had not completed the T_2 questionnaire after 10 days.

The study was conducted according to and in line with the guidelines of the research ethics board of the affiliated university. The guidelines require formal approval of proposed research if certain criteria (e.g., health studies) are fulfilled. The present study did not fulfill the criteria and thus did not require formal approval from the board. At T_1, school principals, teachers, and parents were asked for their written informed consent. At T_2, all adolescents were asked for their informed consent. All participants voluntarily participated in the study. Adolescents who refused to participate did not fill out the questionnaires.

2.3 | Instruments

2.3.1 | Self-efficacy T_1

We assessed adolescents' self-efficacy in the last year of lower secondary education (self-efficacy T_1). The construct consisted of six items (e.g., "If something opposes me, I can find the means and ways to get what I want."). The response scale ranged from 1 (*not true at all*) to 6 (*totally true*). Items originated from Schwarzer and Jerusalem (1995). Their 10-item scale showed Cronbach's α estimates between .78 and .79. In our sample, the mean value was 4.3 (SD = 0.7, α = .85; VET sample: M = 4.4, SD = 0.7, α = .87, general education sample: M = 4.3, SD = 0.6, α = .81).

2.3.2 | Effort T_1

We assessed adolescents' effort T_1 in the last year of lower secondary education with four items (e.g., "I am really hardworking at school."; Neuenschwander et al., 2013; Schmidt et al., 1998). The response scale ranged from 1 (*not true at all*) to 6 (*totally true*). The mean value was 4.3 (SD = 1.0, α = .89; VET sample: M = 4.2, SD = 1.0, α = .89, general education sample: M = 4.4, SD = 0.9, α = .90).

2.3.3 | Effort T_2

We assessed adolescents' effort in upper secondary education (effort T_2) with the same four items used to measure effort T_1. The item wording was adapted to match adolescents' learning contexts (e.g., vocational school T_2: "I am really hardworking at vocational school."; training company T_2: "I am really hardworking in my training company."; general education T_2: "I am really hardworking at school."). For effort in vocational school T_2, the mean value was 4.4 (SD = 0.9, α = .88); for effort in training company T_2, the mean value was 5.1 (SD = 0.7, α = .88); and for effort in general education T_2, the mean value was 4.4 (SD = 0.9, α = .89).

2.3.4 | Person–environment fit T_2

Adolescents' perceived PEF between person and the upper secondary educational environment was assessed with five items (e.g., "My current career situation corresponds with my personal interests." Neuenschwander & Gerber, 2014). The response scale ranged from 1 (*not true at all*) to 6 (*totally true*). Previous use of the scale showed Cronbach's α estimates between .85 (Neuenschwander & Hofmann, 2021) and .88 (Neuenschwander & Gerber, 2014). In the present sample, the mean value was 5.1 (SD = 0.8, α = .85; VET sample: M = 5.1, SD = 0.8, α = .84, general education sample: M = 5.1, SD = 0.7, α = .86).

2.3.5 | Adolescent–instructor relationships T_2

Items to measure AIR (e.g., teacher and workplace trainer) in upper secondary education were adjusted to match adolescents' learning contexts (Neuenschwander et al., 2003). The concept was assessed with five items (e.g., company T_2: "I am very satisfied with my workplace trainer."). In vocational school T_2 and general education T_2, the item wording was similar (e.g., "I am very satisfied with my class teacher"). In general education and in vocational school, adolescents only rated the

relationship to their class (i.e., main) teacher. Adolescents rated the items on a response scale ranging from 1 (*not true at all*) to 6 (*totally true*); vocational school T_2: $M = 4.3$ (SD = 1.1, $\alpha = .90$); company T_2: $M = 4.8$ (SD = 0.9, $\alpha = .87$); general education T_2: $M = 4.5$ (SD = 1.0, $\alpha = .88$). Previous use of the scale in elementary school contexts showed a Cronbach's α value of .84 (Neuenschwander, 2006).

2.4 | Analytical procedure

We first compared the means of study variables between waves of data collection and learning contexts using *t* tests and calculated correlations in SPSS 24 (Table 1).

The analytical model was tested using structural equation modeling (SEM) with multigroup comparison between adolescents in VET and adolescents in general education. Two models were tested. The first SEM compared the situations of adolescents in general education and those in vocational school. The second SEM compared the situations of general education adolescents with those of VET apprentices in training companies.

Both SEMs were tested in Mplus 8.1. In simultaneous confirmatory factor analyses (SCFA), all measurement models were tested for configural invariance. We controlled for longitudinal metric invariance between the waves of measurement for effort, for the total sample, and for adolescents in VET and adolescents in general education separately. In the SCFA, we then controlled for metric invariance between adolescents in VET and adolescents in general education. In the full SEM, measurement models from the invariance tests were applied, and paths were specified in accordance with the proposed analytical model. In all SEM models, the longitudinal effect of effort in lower secondary education on effort in upper secondary education is controlled for.

The missing pattern was at random (Graham, 2009). To address missing values, data were imputed five times for adolescents in VET and adolescents in general education separately in NORM 2.03 (Schafer, 1997). In NORM, we rounded to the nearest observed value to obtain values similar to the ones in the observed data set. *t* tests and SEM were computed with the same imputed datasets. All results refer to the combined test for all imputed datasets.

We used the χ^2 statistics, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residuals (SRMR) as indicators for the model fit. As large samples often lead to statistically significant χ^2 values, we based our decision on the other criteria. A CFI value greater than or equal to 0.95 indicates an acceptable fit. As for the RMSEA and SRMR, values lower than or equal to 0.08 and 0.10, respectively, are considered indications of acceptable fit (Schermelleh-Engel et al., 2003). The SEM was modified when indices' values did not meet these criteria. We used the Wald test to control for metric invariances and test paths for differences between adolescents in VET and adolescents in general education. All results are reported with one-tailed *p* values.

3 | RESULTS

3.1 | Descriptives

Correlations are presented in the appendix (Table 1). Descriptives and differences in study variables among adolescents in VET and adolescents in general education are reported in Table 1.

TABLE 1 Group differences in study variables between adolescents in VET and adolescents in general education.

	VET			General education						95% CI of difference		
	M	SD	*N*	*M*	SD	*N*	*T*	*df*	*p*	Lower	Upper	Cohen's *d*
Effort T_1	4.17	0.96	1268	4.39	0.92	517	−4.31	5091	.001	−0.31	−0.12	.23
Self-efficacy T_1	4.41	0.75	1268	4.29	0.68	517	3.15	567	.002	0.05	0.20	.18
PEF T_2	5.00	0.81	1268	5.12	0.76	517	−1.32	7	.232	−0.33	0.10	.15
AIR T_2 (VS/GE)	4.30	1.14	1268	4.58	1.07	517	−2.47	8	.040	−0.54	−0.02	.25
AIR (TC/GE)	4.83	0.91	1268	4.58	1.07	517	3.35	16	.004	0.10	0.41	.33
Effort T_2 (VS/GE)	4.27	0.93	1268	4.30	0.92	517	−0.48	15	.641	−0.18	0.11	.03
Effort T_2 (TC/GE)	4.92	0.71	1268	4.30	0.92	517	10.52	24	.001	0.50	0.74	.75

Note: T_1 = last year of lower secondary education, T_2 = end of first year in upper secondary education; *p* values are two-tailed.

Abbreviations: CI, confidence interval; GE, general education; SD, standard deviation; TC, Training company; VS, vocational school.

3.2 | Effort in company and general education

Findings on analyses of invariance are presented in the appendix. The SEM with multigroup comparison between adolescents in VET (learning context: company; Group 1, n_1) and adolescents in general education (Group 2, n_2) fit the data well, $\chi^2(192, n_1 = 1268, n_2 = 517) = 824.41$, $p < .001$, CFI = 0.95, RMSEA = 0.06, SRMR = 0.05 (Figure 1).

Adolescents' self-efficacy in lower secondary education statistically significantly positively predicted PEF in upper secondary education (Group 1: $\beta = .12$, $p = .028$; Group 2: $\beta = .15$, $p = .033$). PEF had a statistically significant positive effect on effort in upper secondary education (Group 1: $\beta = .46$, $p < .001$; Group 2: $\beta = .15$, $p = .034$). Self-efficacy indirectly positively influenced effort in upper secondary education via PEF (Group 1: $B_{ind} = 0.10$, $p < .001$, Group 2: $B_{ind} = 0.16$, $p < .001$; H1a supported).

In both groups, effort T_2 was statistically significantly directly and positively predicted by positive relationships with instructors (Group 1: $\beta = .16$, $p = .013$; Group 2: $\beta = .19$, $p < .01$), which also had a statistically significant positive effect on the PEF (Group 1: $\beta = .41$, $p < .001$; Group 2: $\beta = .14$, $p = .048$).

The indirect effect of AIR on effort T_2 via PEF was statistically significant and positive for adolescents in VET but statistically insignificant for adolescents in general education (Group 1: $B_{ind} = 0.186$, $p < .001$; Group 2: $B_{ind} = 0.02$, $p = .116$; H1b partly supported). For both groups, the total effect of AIR on effort T_2 was statistically significantly positive (Group 1: $B_{tot} = 0.34$, $p < .001$, Group 2: $B_{tot} = 0.21$, $p < .001$).

The Wald test showed statistically significant differences in structural parameters in the first SEM between the two groups, $\Delta\chi^2(8) = 57.04$, $p < .001$. Three paths differed statistically significantly: from effort T_1 to effort T_2 (Group 1: $\beta = .23$, $p < .01$, Group 2: $\beta = .60$, $p < .001$), from effort T_1 to AIR T_2 (Group 1: $\beta = .16$, $p < .05$, Group 2: $\beta = .12$, $p > .05$), and from AIR T_2 to PEF T_2 (Group 1: $\beta = .41$, $p < .001$, Group 2: $\beta = .14$, $p < .05$). After removing the restrictions for those paths, the Wald test results were not statistically significant, $\Delta\chi^2(5) = 4.86$, $p = .433$ (H2a supported).

3.3 | Effort in vocational school and general education

In the second SEM with multigroup comparison between adolescents in VET (learning context: vocational school; Group 1, n_1) and adolescents in general education (Group 2, n_2), the model fit the data well, $\chi^2(192, n_1 = 1268, n_2 = 517) = 816.85$, $p < .001$, CFI = 0.95, RMSEA = 0.06, SRMR = 0.05 (Figure 2).

For adolescents in vocational school, self-efficacy T_1 did not statistically significant predict PEF (Group 1: $\beta = .07$, $p = .157$; in contrast to Group 2: $\beta = .15$, $p = .032$). Self-efficacy indirectly positively influenced effort in general education and VET via PEF (Group 1: $B_{ind} = .10$, $p < .001$; Group 2: $B_{ind} = .16$, $p < .001$, H1a partly supported).

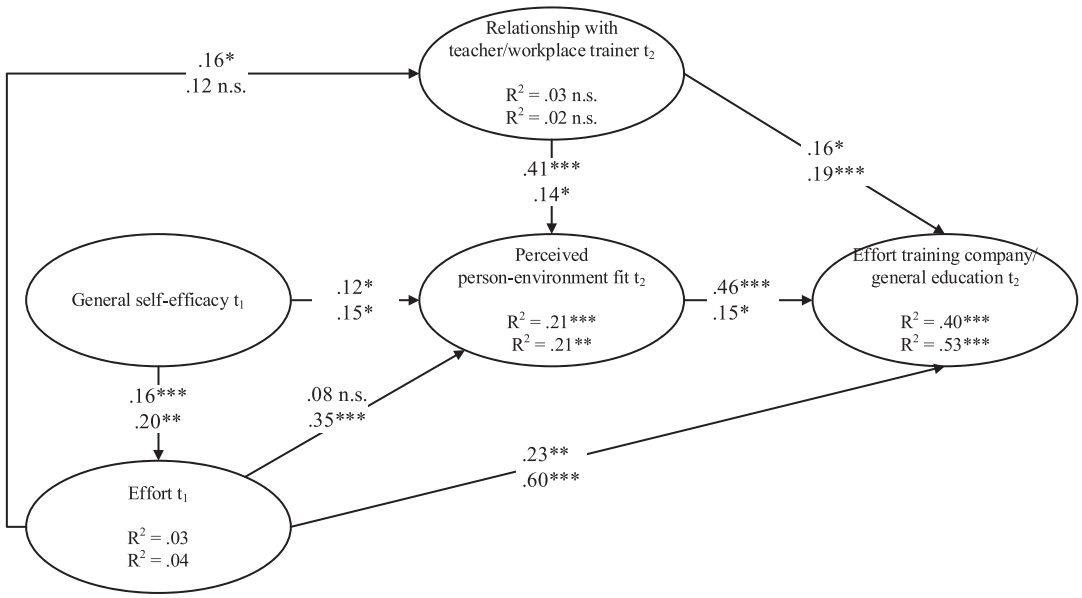

FIGURE 1 Effects on adolescents' effort in training company and general education. Standardized coefficients; T_1 = last year of lower secondary education, T_2 = end of first year in upper secondary education; upper values: company, lower values: general education. *$p < .05$ (one-tailed), **$p < .01$ (one-tailed), ***$p < .001$ (one-tailed); n.s., nonsignificant.

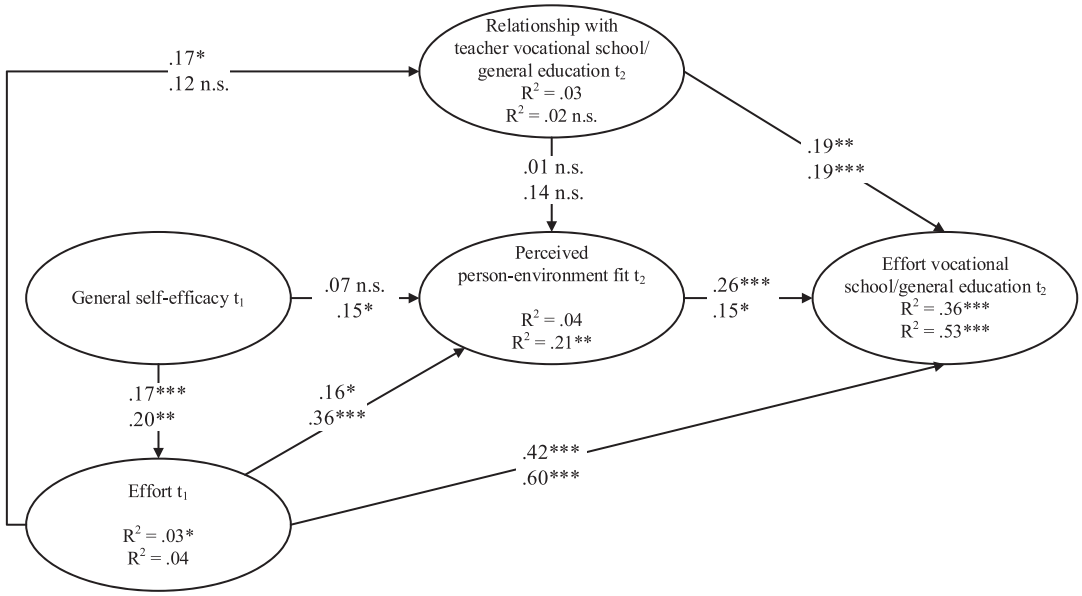

FIGURE 2 Effects on adolescents' effort in vocational school and general education. Standardized coefficients; T_1 = last year of lower secondary education, T_2 = end of first year in upper secondary education; upper values: vocational school, lower values: general education. $^*p < .05$ (one-tailed), $^{**}p < .01$ (one-tailed), $^{***}p < .001$ (one-tailed); n.s., nonsignificant.

Adolescents' effort in vocational school was statistically significantly positively influenced by PEF (Group 1: $\beta = .26$, $p < .001$; Group 2: $\beta = .15$, $p = .034$) and by AIR (Group 1: $\beta = .19$, $p < .01$; Group 2: $\beta = .19$, $p < .001$; total effect: Group 1: $B_{tot} = .13$, $p = .018$; Group 2: $B_{tot} = .15$, $p < .001$).

AIR in vocational school did not predict PEF (Group 1: $\beta = .01$, $p = .412$: Group 2: $\beta = .14$, $p = .052$). PEF did not mediate the effect of AIR on effort (Group 1: $B_{nd} = .00$, $p = .423$; Group 2: $B_{ind} = .02$, $p = .115$, H1b partly rejected).

The Wald test showed no statistically significant differences between the two groups, $\chi^2(8) = 13.36$, $p = 1.00$ (H2b supported).

4 | DISCUSSION

Adolescent effort is an important concept to explain adolescents' careers (Cabus & de Witte, 2016). In line with SCCT, we assumed that self-efficacy before the transition from lower to upper secondary education and AIR after the transition affect adolescents' effort, mediated by PEF. Findings partially supported this model. It explains divergent changes in adolescents' effort in the transition to VET and general education. Our findings also support combining SCCT with the PEF theory.

After transitioning to a new learning context, adolescents with high self-efficacy actively shape their environment to follow their goals (Bandura, 1977), enhancing their effort. In line with newcomer research, adolescents with high self-efficacy moving to a company can proactively cope with the new professional tasks, social relationships, and daily routines (Kammeyer-Mueller & Wanberg, 2003), enabling them to actively establish a high PEF and enhance their efforts. The presented findings show that adolescents moving on to VET have higher self-efficacy and thus show higher levels of effort after transitioning than adolescents moving on to general education. These findings support Lent and Brown's (2008) SCCT and Eccles et al.'s (1993) PEF theory.

Findings show that AIR decreases during the transition to general education and increase during the transition to the company. AIR affects effort in all three learning contexts. Therefore, adolescents who transition to general education have lower effort levels than adolescents in VET in their training companies. In line with prior research, the findings show the important role of AIR in shaping effort (Zimmer-Gembeck et al., 2006). However, this might be a novelty effect that decreases over time, leading to a deterioration of AIR during VET (Nägele & Neuenschwander, 2016).

The effect of AIR on effort is partially mediated by PEF (Zimmer-Gembeck et al., 2006). Although this effect was found for the company context, the effect of AIR on PEF was lower for general education. This second effect could not be replicated in the analyses comparing the school contexts. In Swiss upper secondary schools, main instructors only have a few interactions with individual adolescents per week. Thus, in this academic learning context, AIR only weakly correlates with the PEF. This is in line with Eccles et al. (1993), who proposed that close relationships with teachers in personalized contexts increase PEF but that AIR are more distant in higher education.

Motivation has a high temporal stability in school and work contexts (Tuominen et al., 2020). Our findings show that the stability of effort is weaker in transitioning to a company than in general education. Transitioning to a company is associated with new social relationships, tasks, and daily routines that weaken the stability of effort. In contrast, the learning context in general education is similar to that in lower secondary education. Thus, the determinants of effort remain similar, and adolescent effort is stable.

The analyses also suggest that effort in lower secondary education has a stronger effect on AIR for adolescents in VET in training companies than for adolescents in general education. Company instructors regard high levels of effort as an important precondition for their collaboration with adolescents and for establishing good relationships with them (Neuenschwander & Wismer, 2010). In contrast, in general education, effort is not a precondition for teachers to cooperate because graduation from general education only requires sufficient achievement level (Wolter et al., 2023).

5 | LIMITATIONS

The present study has several limitations. Adolescents' relationship to only one teacher (the main classroom teacher) was included in the study. Future research should allow adolescents to indicate their relationships with a variety of teachers to improve concept validity. Additionally, AIR was assessed only by adolescent reports, because the study design did not allow for collecting complementary instructor data after transition. Adolescents and instructors may have divergent views on their relationships (Wubbels et al., 2016). Future studies may assess AIR from both perspectives to improve item accuracy.

Another limitation concerns the number of measurements in the study. The study design only allowed testing the mediation effects by two times of measurement. Ideally, predictors, mediators and outcomes are measured at three different time points. Future studies should use this more elaborated design.

6 | CONCLUSIONS

Findings showed the effects of AIR and self-efficacy on person–environment fit. Future studies should investigate the inverse effects and whether person–environment fit can increase AIR and self-efficacy. Additionally, findings indicate that learning contexts that fit adolescents' needs promote their efforts. Future studies should more thoroughly investigate the individual–context interaction that increases person-environment fit. To explicitly include indicators of person–environment fit in transition situations can lead to a better understanding of the adjustment processes in school transitions. The extent to which learning contexts address adolescents' social, emotional, and cognitive needs can be interpreted as an indicator of the learning context's quality (Eccles et al., 1993). Thus, training instructors in various learning contexts should include strategies on how to establish a high PEF.

Supporting adolescents' self-efficacy in lower secondary education helps them to adjust to new learning contexts after transitioning to general education or a company in VET. In line with SCCT, self-efficacy can be enforced by modeling, encouragement, and feedback (Lent & Brown, 2008). After transitioning to upper secondary education, instructors can increase adolescents' self-efficacy by letting them make the experience to influence their new learning context (Bandura, 1988).

Findings indicate an approach to counterbalance the tendency of decreasing effort for adolescents in general education. This helps them to adjust to the new learning context and thus, to increase their effort. Perceived AIR is associated with high effort in vocational school, company, and general education. Li et al. (2022) reported that one way to improve AIR in school is to use teaching strategies that engage students in the content. Another strategy is to dedicate short periods for teacher interactions with individual adolescents (e.g., during school events or school breaks). Additionally, teachers should organize their classrooms in a way that fits with the adolescents' needs and competences (Eccles et al., 1993). This includes creating sufficient time for individual interactions with the students. Companies in VET offer a model to organize AIR in upper secondary education. Strategies to enhance adolescents' effort help reduce their risk of dropping out of education and enhance their chances of graduating at the upper secondary level.

AUTHOR CONTRIBUTIONS

All authors contributed to the conception and research design of the paper. The funding was acquired by MN. Data collection was conceptualized and supervised by MN. Data preparation and analysis were performed by LR. The first draft of the manuscript was written by MN. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

ACKNOWLEDGMENTS

The author(s) disclosed receipt of the following financial support for the research and/or authorship of this article: This study was supported by the State Secretariat for Education, Research and Innovation (Grant ID: 1315000504 and Grant ID: 1315001772). Open access funding provided by Fachhochschule Nordwestschweiz FHNW.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Swissubase at https://www.swissubase.ch/en, reference numbers 11063 and 12206.

ETHICS STATEMENT

The study was conducted according to and in line with the guidelines of the research ethics board of the affiliated university. The guidelines require formal approval of proposed research if certain criteria (e.g., health studies) are fulfilled. The present study did not fulfill the criteria and thus did not require formal approval from the board. School principals, teachers, and parents were asked for their written informed consent. All participants voluntarily participated in the study.

CODE AVAILABILITY

Code is provided by the first author upon request. https://forsbase.unil.ch/project/study-public-list/?csrfmiddlewaretoken=qJxueAdA2SAI3RJ3b2Ph54GCQlwF3FvWQBqgf61pMtKlvCVPZVNBCWNv9URCvsK6&q=wisel&ds_topic_id=-1&language_id=-1&discipline_id=-1&method_instrument_id=-1&financing_id=-1&study_type_id=-1&from_date=&to_date=&search=Suchen&show_hide=0.

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SUPPORTING INFORMATION

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How to cite this article: Neuenschwander, M. P., Ramseier, L., & Hofmann, J. (2024). Adolescents' effort in vocational education and training and upper secondary general education: Analyses of stability, determinants, and group differences. *Journal of Adolescence*, 1–12. https://doi.org/10.1002/jad.12293