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Perceived social support, attachment representations, and academic risk-taking in higher education

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Abstract
Academic risk-taking (ART) refers to the students' tendency to engage in challenging learning tasks for which there is uncertainty about the correctness of the outcome, and which carry the risk of making an error visible. Since coping with such an outcome can be considered a stressful event, we ask whether students' perception of the availability of social support is related to their ART. The analyses are based on a sample of 341 German university students. Structural equation models revealed positive associations between perceived social support from fellow students and ART in peer situations, as well as between perceived social support from university teachers and ART in seminar courses. Furthermore, positive associations between ART and secure attachment representations were observed. The findings are discussed with respect to the role of the perception of social support in learning in higher education settings.

Keywords Academic risk-taking · Learning from errors · Perceived social support · Attachment · Higher education

1 Introduction

The acquisition of academic skills is increasingly characterized by more than simply reproducing existing factual knowledge. Instead, learning tasks are often characterized by aspects such as complexity, ambivalence and multi-perspectivity (e.g., Prieler et al., 2022). Therefore, seeking out learning situations that require constructive handling of uncertainty can be considered a target dimension of learning and teaching. Building on previous work by Margaret Clifford (1991) and current conceptualiza-

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tions (e.g., Abercrombie, Carbonneau et al., 2022; Beghetto, 2009; Dachner et al., 2017; Hübner & Pfost, 2023), we define academic risk-taking (ART) as a specific form of student engagement characterized by uncertainty regarding the correctness of one's contributions and the outcome of the learning situation. Students who engage in ART run the risk of making errors for the sake of learning. This may result in negative feedback from others, including their fellow students and teachers. For instance, students may try out new solutions and share them in a seminar, ask their peers for feedback on their intellectual work, or choose difficult learning tasks based on curiosity. Thus, ART carries a strong social risk component because if errors become apparent, others may perceive the student as less intelligent or competent (Hübner & Pfost, 2023). Consequently, it is hardly surprising that learners have substantial reservations about actively demonstrating ART (Teagarden et al., 2018), even though students and teachers generally consider it desirable (Ravert & Schneller, 2019; Teagarden et al., 2018). Therefore, identifying variables associated with university students' engagement in ART is of high relevance.

After a brief review of the literature on variables associated with ART and its role in learning, this study addresses the important question of whether the perception of social support and students' attachment representations are associated with ART. Furthermore, we will explore the extent to which the association between students' attachment representations and ART is mediated by the perception of social support from peers and university teachers. Unlike previous conceptualizations (e.g., Beghetto, 2009; Clifford, 1988), this study understands ART as a construct that distinguishes between social contexts due to varying social norms and roles. Therefore, ART in the seminar context is differentiated from ART in the peers-only context, in which instructors are absent (Hübner & Pfost, 2023, 2024).

1.1 Learning and academic risk-taking

Engaging in ART means leaving the path of one's secure knowledge to become actively engaged in a process of exploration and problem-solving. In analogy to Piaget's theory of cognitive development (Ginsburg & Opper, 1991; Piaget, 1964), engaging in ART offers good opportunities for mental schema development through experiencing a state of cognitive disequilibrium and subsequent regulatory efforts. Engaging in cognitively challenging learning tasks provides good preconditions for modifying cognitive structures. New information may not integrate conflict-free with existing mental structures (confusion), which may lead to changes in mental schema and learning (see also Lodge et al., 2018, for more details on optimal task difficulty).

Aside from its direct cognitive effects outlined above, ART is expected to be beneficial for learning by increasing effort and motivation. For example, relying on a challenge-hindrance framework of stress, Travis et al. (2020) provided evidence that students in higher education settings show better learning outcomes, including better grades and fewer uncompleted courses, when they report higher levels of challenge stress. Challenge stress refers to stressors that are evaluated as surmountable or manageable during the process of secondary appraisal and that offer an opportunity for individual growth. Given that ART has been shown to be associated with internal control beliefs (Akbay & Delibalta, 2020; Fischer et al., 2026), it is highly likely that

ART will result in experiencing challenge stress. Finally, the occurrence and detection of errors themselves offer rich possibilities for learning. Errors during the learning process enable identification of knowledge gaps and underlying critical cognitive misconceptions, which learners can subsequently correct (Zhang & Fiorella, 2023). Additionally, by making errors, students learn what to avoid in order to prevent further errors This process is often referred to as the acquisition of negative knowledge (Gartmeier & Schüttelkopf, 2012). In summary, positive learning outcomes, including competence gain, are associated with being engaged in ART (Hübner & Pfost, 2025; Özbay & Köksal, 2021). Thus, ART can be discussed within the framework of positive risks (Duell & Steinberg, 2019).

1.2 Variables associated with university students' engagement in ART

Research on academic risk-taking dates back to the 1980 s (e.g., Clifford, 1988), and several variables associated with ART among university students have been identified to date. Looking first at the institutional level, we find that a high level of reproduction orientation among university teachers is negatively related to ART (Hübner & Pfost, 2024). Thus, the more lecturers emphasized aspects such as memorization of factual knowledge, the less inclined students were to engage in ART. Furthermore, empirical studies have shown that the perception of a high level of autonomy granted by university teachers, high expectations for student performance, and a high self-rated course quality are associated with a greater willingness to take academic risks (Dachner et al., 2017; Hübner & Pfost, 2023).

Second, when we consider the empirical work on associated variables at the student level, a greater willingness to take academic risks in their studies and to choose particularly challenging learning tasks was found among students with better previous school grades (Hübner & Pfost, 2025), higher self-efficacy beliefs (Dachner et al., 2017), higher mastery-approach goals (Abercrombie, Bang et al., 2022; Dachner et al., 2017; Hübner & Pfost, 2023, 2024), lower performance-avoidance goals (Abercrombie, Bang et al., 2022; Hübner & Pfost, 2023, 2024), higher need for cognition (Abercrombie, Bang et al., 2022; Abercrombie, Carbonneau et al., 2022; Tan et al., 2017), an internal locus of control (Akbay & Delibalta, 2020; Fischer et al., 2026), or when students process information in a state of global precedence — that is, when they prefer to perceive information in a more holistic way, focusing on the big picture rather than the details (Tan et al., 2017). By contrast, students took fewer academic risks when they anticipated negative emotions after making errors while learning (Hübner & Pfost, 2022). No relationship was found between ART and family educational background, and inconsistent gender differences were observed (Hübner & Pfost, 2025). So far, the role of perceived social support in learning has not been considered, even though it is likely highly relevant to ART, as will be shown next.

1.3 Perceived social support

Students act and learn within social contexts, including teachers and fellow students. According to the current literature, perceived social support is defined as the perception and evaluation of supportive behaviors and resources from relevant others within

an individual's social network, which are appraised either to mitigate negative outcomes of distress or to enhance the learner's functioning (Malecki & Demaray, 2003; Rautanen et al., 2021; Sommer & Fydrich, 1991). In brief, perceived social support describes a person's belief that they can expect help and support from others when needed (Sarason et al., 1990).

According to the conceptual framework by House (1981), different forms of social support should be distinguished based on the criteria of sources of support and the content of supportive acts. In higher education settings, potential sources of social support, for example, may include university professionals, such as teachers and academic advisors, parents, friends and partners, or fellow students. With regard to the second criterion, the content of supportive behavior, emotional support – which includes aspects such as empathy and familiarity with the individual – is to be differentiated from instrumental and informational support (House, 1981). The latter includes direct supportive actions by others or information on how to cope with the learning situation.

In school settings, the empirical results of Rautanen et al. (2021) indicated that, despite the positive correlations between perceived social support from teachers, peers, and guardians with each other, all three sources of perceived social support explain an independent proportion of variance in students' school engagement. In higher education settings, Xerri et al. (2018) provided evidence that student engagement in academic activities is predicted by stronger student-student as well as teacher-student relationships. Moreover, McLean et al. (2023) found that university students who perceive more social support feel less stressed. These findings support the idea that both sources of social support make independent contributions to the prediction of students' learning behavior. Furthermore, regarding university students' academic achievement, the meta-analysis by Richardson et al. (2012) revealed a small but significant positive correlation ($r = .08$) with social support. In sum, the perception of social support has been shown to be relevant to learning in higher education, as indicated by higher levels of academic engagement and higher academic success.

1.4 Perceived social support and academic risk-taking

From a theoretical perspective, students' engagement in ART may be considered a stressful event. When students take academic risks, they are faced with challenging learning tasks. These tasks are accompanied by uncertainty regarding the correctness of the outcome and involve the risk that an error becomes visible, which may cause others to perceive the person as less competent or intelligent (Beghetto, 2009; Hübner & Pfost, 2023). Thus, in the event of an error, such an occurrence may be accompanied by the threat of negative affect such as anger and frustration, and the need to cope with this stressful event (Tulis et al., 2016).

The perception of availability of help and social support from relevant others is considered to facilitate coping with stressful events in general (e.g., Thoits, 1986), as well as in the specific case of dealing with errors when learning (Lauzier & Mercier, 2018; Steuer et al., 2013). As beliefs about errors, particularly on the affective dimension describing the emergence of emotions following errors while learning, have shown to be predictive for ART (Hübner & Pfost, 2022), we may assume that

the perception of social support, which can mitigate such negative emotions, positively affects students' willingness to take academic risks. Consequently, a positive relationship between the perception of social support and ART should be observed.

Furthermore, since ART has been shown to differ between different social situations (seminar situations, with teachers and peers present; out-of-seminar situations, only with peers present; Hübner & Pfost, 2023, 2024), we may assume that perceived social support from fellow students relates positively to both ART situations. Since teachers are not present in out-of-seminar learning situations, such as informal study groups, the perception of social support from university teachers may only relate to ART in seminar situations.

1.5 Adult attachment representations

Another perspective on the role of perceived social support for ART and learning in higher education arises from attachment theory (Bretherton, 1992; Salter Ainsworth & Bowlby, 1991). In short, attachment theory posits that young children form close emotional bonds with a primary caregiver for the sake of survival. These emotional bonds influence the development of a relatively enduring and stable mental representation of the self, important others, and the relationship between the two. This representation has been labeled the internal working model (Hazan & Shaver, 1994; Pietromonaco & Barrett Feldman, 2000). This working model subsequently guides an individual's interpretation of the environment, acceptance of the self, and subsequent social relationships. It also includes representations of the accessibility and responsiveness of important others, for example, in times of stress and uncertainty. Observations of child-caregiver interactions have allowed for distinguishing at least three infant attachment patterns that reflect these interpersonal experiences (Hazan & Shaver, 1994; Salter Ainsworth, 1985): Securely attached infants, whose working model is that the caregiver is responsive and accessible. These children have confidence in their mother's availability and can therefore use her as a base to explore their environment. Insecurely-avoidant attached infants, whose working model is that the primary caregiver is unresponsive and rejecting. And insecure-ambivalent attached infants, whose working model is that the primary caregiver is uncertainly accessible and inconsistently responsive.

Although internal working models become more complex and sophisticated with age, and such attachment representations become more abstract, one of the fundamental ideas of attachment theory is that mental representations developed in childhood exhibit a high degree of stability over time (Pietromonaco & Barrett Feldman, 2000). Therefore, early representations of oneself and one's relationships with relevant others tend to persist into adulthood, even as social partners and their functions change (Hazan & Shaver, 1994; Waters & Cummings, 2000). Still, in adults, secure attachment representations, which are based on the assumption of the consistent availability of relevant partners in an individual's social network, may support the exploration of new or uncertain environments. For example, securely attached people may appraise stressful events more positively and consider themselves more efficacious (Shaver & Mikulincer, 2009). Furthermore, the relevant social network may broaden with age. Regarding higher education, Lopez (1997), for example,

has shown that student-professor relationships can be classified into different styles, which are described with reference to attachment theory. Moreover, a secure student-professor relationship style was related to variables such as feelings of involvement in the broader university community (Lopez, 1997).

1.6 Adult attachment representations, perceived social support, and learning in higher education

In general, adult attachment representations affect the perception of social bonds with relevant others and situations structured by social interactions (Collins & Feeney, 2004). This includes learning arrangements in higher education settings. In these settings, learners interact with university teachers or fellow students and peers, and these interactions are also shaped by the students' underlying expectations and beliefs about interpersonal relationships.

Unsurprisingly, empirical studies have shown that children and adolescents with a working model of secure relationships do better in school and achieve better school grades (e.g., Aviezer et al., 2002; Jacobsen & Hofmann, 1997). Likewise, better university grades were observed for young adults with secure adult attachment styles (Kurland & Siegel, 2020), although research findings in this aspect tend to be heterogeneous (Beauchamp et al., 2016; Fass & Tubman, 2002). Furthermore, university students who scored higher on secure attachment representations indicated a greater perception of availability of social support from friends and family, and were more likely to seek social support in stressful situations, such as challenging learning situations (Ognibene & Collins, 1998). Additionally, attachment anxiety and avoidant attachment orientations, both manifestations of insecure attachment representations, were associated with lower instrumental and socio-emotional functioning in group work in university students (Lavy, 2017). Finally, avoidant attachment representations have shown to be related to lower levels of exploratory behavior, including intellectual exploration, among university students, and this effect was mediated by individual differences in perceived social support (Wu & Yang, 2012).

In sum, attachment representations were found to be relevant to the perception of social support and learning in higher education. In stressful learning situations especially, interindividual differences in attachment representations shall guide how students perceive and evaluate the availability of social support from others, such as university teachers or fellow students. Attachment representations offer an interpretive framework for the challenges we face and the support we anticipate receiving (Collins & Feeney, 2004). Therefore, besides possible objective differences in social support, students with insecure attachment representations may interpret potentially negative events, such as sharing an inadequate or erroneous idea during a group discussion, as more threatening and may evaluate their options of social support as less helpful or available. ART encompasses dealing with uncertainty, which may include unintentional outcomes and errors, and it is part of social learning interactions, either with peers or with peers and teachers present. Therefore, mental representations reflecting higher attachment security may be related to a higher level of perceived social support from others, as well as a higher probability to engage in ART.

1.7 Research questions

In this study, two overarching research questions and three hypotheses are addressed. Furthermore, a mediator model is explored. First, we ask whether the perception of social support from university teachers and fellow students is related to students' ART behavior. Thereby, two hypotheses will be tested: Hypothesis 1 assumes that perceived social support from fellow students is positively associated with ART in both peer as well as seminar situations. Hypothesis 2 assumes that perceived support from university teachers is positively associated with ART in seminar situations. An association between perceived support from university teachers and ART in peer situations is not expected. Then, in the second part of the study, we ask whether general representations of attachment security are associated with students' ART. Therefore, hypothesis 3 assumes that secure attachment representations are positively associated with ART in both peer and seminar situations. Furthermore, due to the expectation of a positive relationship between attachment security and the perception of social support, we will explore whether the relationship between attachment representation and ART is mediated by the perception of social support. Additionally, to control for the potential confounding effect of academic success, current grade point average (GPA) will further be considered. Hypotheses one through three were preregistered prior to data generation and analyses (see https://doi.org/10.23668/psycharchives.16306 for the preregistration). The exploratory research question on the mediator model was also preregistered.

2 Methods

2.1 Design and sample description

This study addressed students enrolled in German higher education institutions. It was designed as an online survey using LimeSurvey. Data were collected from April 29 to July 2, 2025. Study participation was anonymous, voluntary, and required informed consent. Prior to conducting the study, power analyses were performed using G*Power (Faul et al., 2007) based on the following parameters: $r = .20$, $\alpha = .05$ two-sided test, and test power = 90–95%. Therefore, sample sizes of at least 255 respectively 314 participants were considered desirable. The sample recruitment strategy included two parts. First, students were invited to participate through different courses and mailing lists, and $n = 65$ students from the authors' university completed the survey. Due to the faculty's focus, most students were enrolled in teacher training, pedagogy, or psychology programs. Second, students were recruited via the access panel provider Bilendi, with 428 students completing the survey or being screened out before survey completion. Procedures for detecting careless responding have developed considerably, and their application has become an important topic in practical survey research (Ward & Meade, 2023). Particularly, attention checks, such as instructed response items, have shown effective in identifying inattentive or careless responding (e.g., Gummer et al., 2021; Shamon & Berning, 2020). Furthermore, procedures such as the consideration of response times or invariable responses are

recommended (Ward & Meade, 2023). To guarantee high data quality, we applied a three-step data screening strategy. First, we used an instructed response item ("When you read this statement, please select the answer totally agree to show that you are paying attention." [English translation]). This item was placed in the back part (page 9 of 10) of the questionnaire and kept visually unobtrusive (e.g., no quotation marks were used). A hundred and twenty-seven students (25.8%) were removed or screened out because they did not select the "totally agree" answer to this attention check item. Second, a minimum response time of two seconds per item (190 s in total) was assumed (see Ward & Meade, 2023). Therefore, an additional six students (1.6%) were removed. Third, scale invariance at the respondent level was assessed by calculating the standard deviation of the scales (mostly Likert-scales) presented on one page of the survey. Careless responding (i.e., straightlining) was assumed if a respondent answered more than one scale without variability. Further, 19 students (5.3%) were removed based on this criterion. Steps one and two of the screening procedure were planned before data collection, although the exact minimum time limit was not determined in advance. Step three was not planned in advance. Therefore, a total of $n = 341$ students' data were available for analyses. The students were, on average, $Md = 24$ years old (Q1-Q3: 21–28 years) and in their $Md = 4$th semester of studies (Q1-Q3: 2nd−8th semester). The proportion of female students was 62.1%. The majority of students (60.7%) were enrolled in a Bachelor's program. Another 26.4% were aiming for a Master's degree, 9.4% were aiming to take a state examination, and 3.5% were aiming for a different degree. The largest fields of study were pedagogy and psychology (20.5%), teacher education (16.1%), economics (10.3%), natural sciences (8.8%), technology and engineering (7.0%), computer science (7.0%), and life sciences including medicine (6.5%).

2.2 Materials

2.2.1 Academic risk-taking

Students' ART was assessed using the two-dimensional ART scale by Hübner and Pfost (2023; see Hübner & Pfost, 2024, for a replication of the two-dimensional scale structure). On this scale, students rate their personal propensity to engage in challenging learning tasks, which are characterized by a certain risk of failure. Furthermore, it is assumed that students' engagement in these learning tasks differs depending on their social role and the people present, as well as depending on the descriptive and injunctive social norms, e.g., with regard to psychological safety, which are shaped by the respective reference groups (see Legros & Cislaghi, 2020; Newman et al., 2017). Consequently, the ART seminar group-dimension includes situations in which teachers and fellow students are present (six items; example item: *To participate in seminar discussions even on difficult topics*). Students rated the likelihood of the described behavior on a five-point Likert scale (1 = *very unlikely* to 5 = *very likely*). The ART peers-dimension refers to situations in which only fellow students are present (four items; example item: *To ask fellow students to proofread my written work, even though I am unsure about its quality*). Confirmatory factor analysis with a Tau-congeneric measurement model (Steyer & Eid, 2001) supports this two-dimensional

structure well ($\chi^2 = 79.08$, $df = 34$; RMSEA = .062; CFI = .962; SRMR = .050). Standardized factor loadings range from $\lambda = .62$ to .84. The correlation of the two latent ART dimensions is $r = .48$.

2.2.2 Perceived social support

In this study, perceived social support denotes the students' belief in the availability of help from relevant others, especially in stressful learning situations. Following suggestions on the structure of social support by House (1981), our applied measure of perceived social support distinguishes two sources of support: university teachers and fellow students. Furthermore, two types of content of supportive acts are considered: emotional support, which encompasses aspects such as empathy and trust, and instrumental-informational support, which encompasses behavior that directly aims to help the person or aims to provide information to cope with the learning situation. Twelve items developed by the study's authors were used, half of which were related to university teachers and half of which were related to fellow students (see Appendix A). Six statements were written in a positive way (example item: *I am confident that my lecturers will support me in word and deed with difficult learning tasks*.), and six statements were written in a negative way (example item: *I'm worried that my fellow students don't understand my emotional state when I have difficulties with my learning tasks.*). Participants rated the statements on a five-point Likert scale from 1 = *totally disagree* to 5 = *totally agree*. For the analyses, negative items were inverted so that higher scale values indicate better social support. Confirmatory factor analysis with a Tau-congeneric measurement model showed signs of an acceptable fit for a model assuming a two-dimensional structure (support from university teachers versus support from fellow students; $\chi^2 = 115.47$, $df = 46$; RMSEA = .067; CFI = .960; SRMR = .043). Since three items in each dimension were written negatively, a method factor (MF) that does not correlate with the latent social support variables was included in this estimated model to correct for shared variance due to item polarity (Eid, 2000; see Fig. 1).

2.2.3 Attachment representations

Students' attachment representations were assessed using an adapted German translation of the Adult Attachment Scale (AAS; Collins & Read, 1990; Schmidt et al., 2004). The scale addresses attitudes toward attachment representations in general and with close social partners across three dimensions. The closeness subscale addresses the degree to which one feels comfortable with closeness to others and contains five items. Due to negative item wording, items were inverted for analyses. The dependency subscale measures the extent to which a person trusts that others can be depended on to be available when needed, as well as the extent to which the person feels he or she can rely on them. This subscale contains five items. Three of the items were worded negatively and inverted for analyses. Finally, the anxiety subscale describes the extent to which a person fears being unloved or abandoned by important others. In this study, four items were used. Due to unclear wording, one item from the scale translation by Schmidt et al. (2004) was not used in the

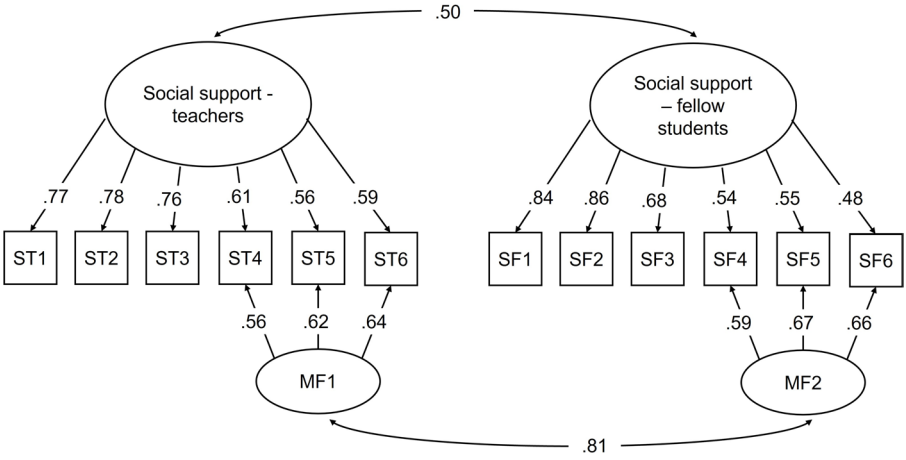

Fig. 1 Tau-congeneric measurement model for perceived social support by university teachers and fellow students. The figure shows standardized parameter estimates. All depicted estimates were significant ($p \leq .05$)

questionnaire. All anxiety subscale items were inverted, meaning higher scale values indicate lower anxiety. Participants rated the statements on a five-point Likert scale ranging from 1 = *not true at all* to 5 = *totally agree*. Secure attachment representations are characterized by high scores on the closeness, dependency, and inverted anxiety subscales. Confirmatory factor analysis supported a model that assumes a second-order latent secure attachment factor, which is based on three first-order latent factors ($\chi^2 = 180.48$, $df = 73$; RMSEA = .066; CFI = .937; SRMR = .050; three pairs of error variances, each within one construct, were allowed to covary; see Fig. 2 – top model). To reduce the number of estimated parameters in later SEM models, this measurement model was collapsed into a simpler one. We calculated manifest mean scores for the three attachment subscales and estimated a latent secure attachment variable based on these three manifest subscales, assuming an essentially Tau-equivalent measurement model (Steyer & Eid, 2001). The model fit was good ($\chi^2 = 2.00$, $df = 2$; RMSEA = .000; CFI = 1.000; SRMR = .044; see Fig. 2 – bottom model). Higher values indicate secure attachment representations.

2.2.4 Academic achievement

Academic achievement was assessed by asking students for their current grade point average (GPA). The responses were recorded in the following categories: 1 = *1.0 to 1.5*, 2 = *1.6 to 2.0*, etc. In the German education system, higher grades indicate less academic success.

2.3 Procedure

First, we calculated descriptive statistics and zero-order correlations for manifest scale scores. Next, we estimated structural equation models with latent variables using Mplus (Muthén & Muthén, 1998–2017). In our first model, we tested whether

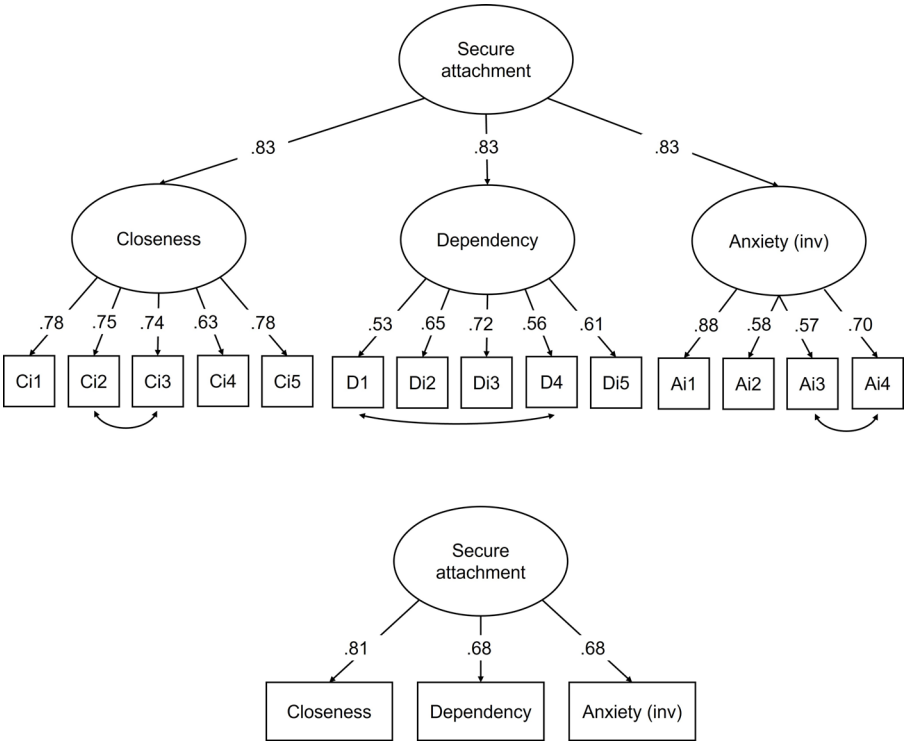

Fig. 2 The top model shows estimates for a second-order latent secure attachment factor, which is based on three first-order latent attachment factors. The bottom model shows estimates for a latent secure attachment variable based on three manifest attachment scales (essentially Tau-equivalent measurement model). The figure shows standardized parameter estimates. All depicted estimates were significant ($p \leq .05$)

perceived social support from university teachers and fellow students predicts ART in seminar group settings and peer settings. In our second model, we tested whether secure attachment representation predicts ART in seminar group and peer settings. And finally, in our third model, we tested whether secure attachment representation further predicts perceived social support from teachers and fellow students, and whether indirect effects of secure attachment representation on ART via perceived social support can be found. All models were tested both without and with control for students' GPAs. This was done by including GPA as a predictor variable for the endogenous variables (ART in Models 1 and 2; ART and perceived social support in Model 3) within the structural equation models. Global model fit was evaluated using common fit indices and criteria: $\chi^2 < 3df$; RMSEA $\leq .08$; CFI $\geq .95$; SRMR $\leq .10$ (Schermelleh-Engel et al., 2003). Missing data were handled using FIML, and standard errors were corrected for non-normality using the MLR estimator. Furthermore, indirect effects were tested by calculating 95% confidence intervals based on

a bootstrapping procedure with 5,000 replications and using the ML estimator.[1] The selection of variables and covariates was preregistered. The applied statistical procedure was not preregistered.

3 Results

3.1 Descriptives and correlations

Descriptive statistics and correlations for the manifest scale scores are presented in Table 1. First, the arithmetic mean score of ART in peer situations exceeded that in seminar group situations, and the perceived social support from fellow students exceeded that from university teachers. Second, the correlations revealed positive relationships between ART in seminar group situations, perceived social support from university teachers, as well as secure attachment representations. No relationship was observed with perceived social support from fellow students or students' GPA. ART in peer situations was positively associated with perceived social support from both interaction partners: university teachers as well as fellow students. Furthermore, a positive association with secure attachment representations was observed. Finally, ART in peer situations was negatively correlated with students' GPA, indicating that more ART in peer situations was associated with higher academic success.

3.2 Structural equation models – ART and perceived social support

In our first latent variable model, ART was jointly predicted by the perceived social support of university teachers and fellow students (see Table 2, Model 1 A). Fit indices indicated an acceptable global model fit. ART in seminar group situations was predicted by perceived social support from university teachers, but not by perceived social support from fellow students. Conversely, ART in peer situations was positively predicted by perceived social support from fellow students but not from university teachers. A further consideration of students' GPA as a predictor of ART in seminar group and peer situations (Table 2, Model 1B) did not change the direction of associations and patterns of significance between perceived social support and ART.

3.3 Structural equation models – ART and attachment representation

In our second latent variable model, ART was predicted by secure attachment representation (see Table 2, Model 2 A). Fit indices indicated an acceptable global model fit. Secure attachment representation significantly predicted ART in both, seminar and peer group situations. Students with more secure attachment representation, indicated by closeness, dependency, and low anxiety, showed more ART behavior. Coef-

[1] The Mplus input and output files for the estimated structural equation models are available on https://doi.org/10.23668/psycharchives.21916 (input files), and https://doi.org/10.23668/psycharchives.21915 (output files). A minimal dataset is available on https://doi.org/10.23668/psycharchives.21917.

Table 1 Descriptive statistics and correlations of manifest scale scores

					1	2	3	4	5	6	7	8	9
		n	M (SD)	α	*r*	*r*	*r*	*r*	*r*	*r*	*r*	*r*	*r*
1	ART – seminar group	340	2.80 (0.92)	.88	(-)	.43**	.30**	.06	.13*	.21**	.17**	.20**	−.07
2	ART – peers	340	3.47 (0.88)	.77		(-)	.32**	.48**	.19**	.35**	.20**	.30**	−.12*
3	Support - teachers	341	3.21 (0.86)	.86			(-)	.48**	.11*	.39**	.34**	.33**	−.04
4	Support – fellow students	341	3.74 (0.85)	.87				(-)	.27**	.52**	.33**	.44**	−.12*
5	AAS - closeness	341	3.47 (0.98)	.86					(-)	.53**	.49**	.83**	.03
6	AAS - dependency	340	3.43 (0.83)	.76						(-)	.57**	.83**	−.14*
7	AAS – anxiety (inv)	341	3.33 (1.03)	.81							(-)	.82**	−.02
8	Secure attachment	340	3.42 (0.78)	.89								(-)	−.04
9	GPA	321	2.74 (1.20)	(-)									(-)

ART Academic risk-taking, *AAS* Adult attachment scale, *GPA* Grade point average, whereby higher grades indicate less academic success; Secure attachment=manifest mean score of all items of the three AAS subscales; *α* Cronbach's alpha.

* $p \leq .05$.

** $p \leq .01$.

Table 2 Latent variable models – ART, perceived social support, and secure attachment representation

Dependent variable	Predictor variable	Model 1A :Model 1Aβ	Model 1B :Model 1Bβ	Model 2A :Model 2Aβ	Model 2B :Model 2Bβ
ART - seminar group					
	Support - teachers	.45**	.45**		
	Support - students	−.09	−.10		
	Secure attachment			.25**	.24**
	GPA		−.07		−.06
ART - peers					
	Support - teachers	.12	.13		
	Support - students	.60**	.59**		
	Secure attachment			.42**	.41**
	GPA		−.06		−.09
Fit indices					
	χ^2	322.28	357.94	109.75	139.53
	df	196	214	64	74
	RMSEA	.043	.044	.046	.051
	CFI	.962	.957	.969	.957
	SRMR	.051	.051	.048	.050

ß Standardized regression coefficient, *ART* Academic risk-taking, *GPA* Grade point average, whereby higher grades indicate less academic success.

*$p \leq .05$; ** $p \leq .01$.

ficients changed minimally when students' GPA was included as a control variable (Model 2B).

3.4 Mediator model – ART, perceived social support, and attachment representation

Finally, our aim was to explore the relationships between secure attachment representation, perceived social support, and academic risk-taking within a joint latent variable model (see Fig. 3). We assumed that attachment representations would predict perceived social support from university teachers and fellow students. Thus, we sought to determine whether perceived social support mediates the relationship between secure attachment representation and ART. The model was estimated again without (Model 3 A) and while controlling for students' GPA (Model 3B). Global fit indices showed signs of acceptable fit for both models, with the exception of the CFI, which just failed this criterion (Model 3 A: χ^2=461.43, *df*=260, RMSEA = .048, CFI = .946, SRMR = .063; Model 3B: χ^2=503.13, *df*=280, RMSEA = .048, CFI = .941, SRMR = .062). The results showed that a secure attachment representation predicted both perceived social support from university teachers and from fellow students. Perceived social support from university teachers positively predicted ART within seminars. However, perceived social support from fellow students negatively predicted ART in seminars, albeit with a smaller effect size. Finally, secure attachment representation directly predicted ART within seminars. ART within peer groups was positively predicted by perceived social support from fellow students, but not by

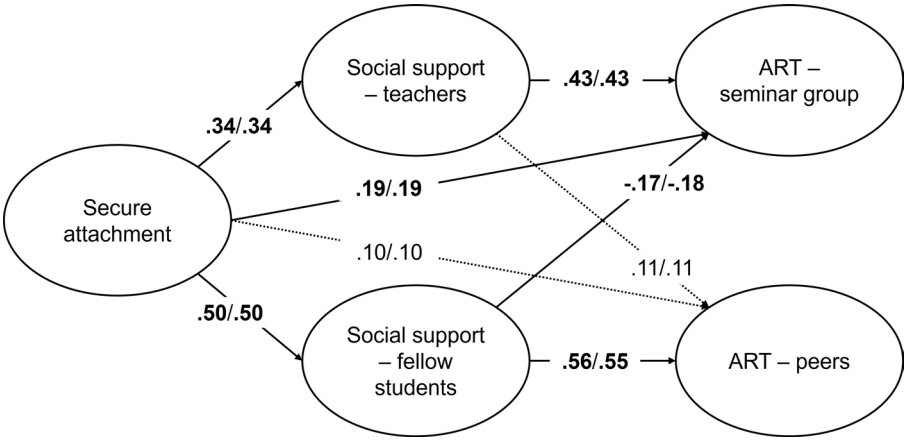

Fig. 3 Estimated structure model on the relationships between attachment representation, perceived social support and ART without (Model 3 A)/while controlling for GPA (Model 3B). The figure shows standardized parameter estimates. Bold coefficients were statistically significant ($p \leq .05$). Explained variance of latent variables without/while controlling for GPA: R^2(Social support – teachers) = 11.7%/11.7%; R^2(Social support – fellow students) = 25.4%/25.9%; R^2(ART – seminar group) = 19.8%/20.2%; R^2(ART – peers) = 45.7%/46.1%

perceived support from university teachers or by secure attachment representation. Three indirect effects were statistically significant. First, ART within seminars was positively predicted by secure attachment representation via perceived support from university teachers (excluding controls: β = .15, 95% *CI* [.08; .22]; including controls: β = .15, 95% *CI* [.08; .23]). Second, ART within seminars was negatively predicted by a secure attachment representation via perceived support from fellow students (excluding controls: β = −.09, 95% *CI* [−.18; −.01]; including controls: β = −.09, 95% *CI* [−.18; −.01]). In sum, both indirect effects on ART within seminars leveled out (excluding controls: β = .06, 95% *CI* [−.04; .16]; including controls: β = .06, 95% *CI* [−.04; .15]), whereas the total effect (direct plus indirect effects) of secure attachment representation for ART within seminars remained significant (excluding controls: β = .25, 95% *CI* [.09; .39]; including controls: β = .24, 95% *CI* [.09; .39]). Third, ART within peer groups was positively predicted by secure attachment representations via perceived support from fellow students (excluding controls: β = .28, 95% *CI* [.18; .40]; including controls: β = .27, 95% *CI* [.18; .39]).

4 Discussion

Academic risk-taking denotes the students' tendency to engage in challenging learning tasks characterized by uncertainty and the risk of making errors (Abercrombie, Carbonneau et al., 2022; Beghetto, 2009; Clifford, 1991; Hübner & Pfost, 2023). Since perceiving an error while learning can be considered a stressful event requiring different coping actions (Tulis et al., 2016), social support is seen as an important resource for coping with stressful events (Thoits, 1986). For example, social support can provide direct help with problem solving or help to regulate emotions, such as by

offering alternative views on the situation. Additionally, students avoid ART when the potential affective costs caused by errors are high (Hübner & Pfost, 2022). Accordingly, hypothesis 1 assumed that perceived social support from fellow students is positively associated with ART in both peer and seminar situations. This hypothesis was partially supported by our empirical data. Correlations of manifest scale scores, as well as regression analyses with latent variables, revealed positive relationships between the perception of support from fellow students and ART in peer situations. Therefore, the more students perceived that they could rely on the support of their fellow students, the more willing they were to take academic risks in learning situations with their peers. However, contrary to hypothesis 1, we did not observe positive correlations nor positive regression coefficients for the relationship between perceived support from fellow students and ART in seminar situations, which are characterized by the simultaneous presence of peers and the university teacher. In the joint model of predicting ART with attachment representation and social support, even a slightly negative effect occurred, which could be interpreted as a suppressor-type effect.

Hypothesis 2 assumed that perceived support from university teachers is positively associated with ART in seminar situations. This assumption was supported by the empirical data analyzed. Students engaged more in ART within seminars when they perceived their teachers to be more supportive.

These two results highlight the following facts: First, despite shared variance, for example due to motivational characteristics such as goal orientations (Hübner & Pfost, 2024), students' ART in different contexts (peer vs. seminar situations) needs to be differentiated and is consequently predicted by different context variables. Second, learners differ in their perception of social support from fellow students and teachers, which aligns with a specific regulation of their learning behavior. The notion that various sources of support, particularly teachers and fellow students, play different roles in learning and coping with stressful situations has already been addressed in studies of school-aged children (Hoferichter et al., 2022; Hombrados-Mendieta et al., 2012; Wentzel et al., 2010). However, this topic has received less attention in higher education research. For example, McLean et al. (2023) provided evidence of a negative relationship between a sum indicator of perceived social support from family, friends, or relevant others and perceived stress. Furthermore, Xerri et al. (2018) have shown that relationship quality between university teachers and students, as well as the relationship quality among students, both predict student engagement. In contrast, the associations observed in this study were more specific. Perceived support from university teachers was related to ART in seminar settings. Perceived support from fellow students showed to be related to ART in peer group settings. This finding supports the simple conclusion that social support from interaction partners present during specific academic risk interactions outweighs the importance of perceived social support from more distant individuals. Interestingly, perceived support from fellow students was not positively associated with ART in seminar situations. In parts, the conditional association was even negative, indicating a suppressor-type effect. We believe that many students had the implicit expectation that the types of learning activities in seminars are more determined by teachers than by students. Consequently, perceived support from fellow students tends to be of negligible importance in encouraging students to take academic risks in seminars.

It is an interesting, albeit speculative, question as to whether this picture would also have emerged in universities in other countries, such as Great Britain or the United States. For example, a first qualitative study shows that, compared to British tutors, German tutors tend to use more teacher-centered and less student-centered approaches (Hecht & Kahrens, 2021). This, in turn, might result in a greater reliance on teacher support for ART in seminar settings in Germany. Furthermore, differences in error orientation were observed across countries, with U.S. employees reporting higher error orientation, including error risk-taking, than German employees (Zotzmann et al., 2019). Therefore, cultural context may also be relevant to academic risk-taking. Germany, compared to Great Britain or the United States, has a culture characterized by high uncertainty avoidance (Hofstede et al., 2010). Since this is expected to result in a more negative attitude towards errors and a greater focus on error prevention (Gelfand et al., 2011), German students may also exhibit lower levels of academic risk-taking. However, due to a lack of empirical research, these conclusions remain hypothetical, yet they are important to address in future research.

In our third hypothesis, we assumed to observe positive associations between secure attachment representations and students' ART. This assumption found broad support in our empirical data. Correlations based on manifest scale scores, as well as structural equation models without and with controls for academic success, supported this positive relationship for both dimensions – ART in seminar settings and ART in peer settings. This finding is congruent with previous studies that have demonstrated the crucial role of adult attachment representations for group interactions and functioning (Rom & Mikulincer, 2003), including study groups (Lavy, 2017), but also stress and coping in university students (Ognibene & Collins, 1998). Furthermore, our findings indicate that this relationship was partially mediated by the perception of social support from teachers and fellow students. Students with a more secure attachment representation held the assumption that they can rely more on support from their teachers and fellow students while studying, which had shown to be associated with taking more academic risks in seminar as well as in peer situations. This aligns with previous research indicating that secure attachment representations are related to one's perception of social support, including that from teachers and peers (Ognibene & Collins, 1998; Sarason et al., 1990). On the one hand, reflecting a bottom-up process, a higher perception of social support by securely attached individuals may correspond to objective differences in support received, e.g. receiving more constructive, and at the same time, appreciative feedback when an obstacle or error occurred while learning. On the other hand, in the sense of a top-down process, a higher perception of social support by securely attached individuals may simply be a consequence of subjective perceptions and appraisals of objective social resources against the backdrop of individual differences in the working model that provides interpretive filters for objective information (Collins & Feeney, 2004). Although both mechanisms may explain the observed mediator effect of attachment representation on ART, neither objective social support nor temporal ordering of the variables was measured in this study, so this explanation remains purely interpretative. Furthermore, the cross-sectional study design does not allow for the drawing of causal conclusions about this mediator effect. It is important to note that due to the aforementioned suppressor-type effect, a negative indirect effect of secure attachment

representation on ART in seminar settings via social support from fellow students was observed. However, as the total effect between secure attachment representation and ART in seminar settings is still positive, this negative indirect effect should not be interpreted in isolation or independent of other variables in the model.

4.1 Limitations

First, due to the cross-sectional study design, this study does not allow for the drawing of causal inferences, and mediation analyses reflect statistical, not causal, mediation. From a mere theoretical perspective (e.g., Sarason et al., 1990), it seems plausible to assume that attachment representations have the potential to affect the perception of social support and ART. However, particularly regarding the relationship between perceived social support and ART, both directions of influence (perceived social support affects ART versus experiences in ART affect perceptions of social support) tend to be equally reasonable. Additionally, we did not address intraindividual variability in ART in this study since our focus was on trait-like components. Therefore, an experimental study design aiming to manipulate the perception of social support and to analyze its consequences for ART, which may include a separation of situation specific and trait-like variance, would be a desideratum for future research.

Second, as previously mentioned, it would be interesting to determine whether the perception of social support from teachers and fellow students in higher education is attributable to objective differences in social support or interpretive differences of equal objective facts (see Collins & Feeney, 2004). Observational studies may provide a clearer picture of this. In addition, it would be interesting to identify which specific facets of social support are most relevant to ART and whether other sources of social support, such as parents or romantic partners, are also relevant. Concerning the instruments used, the social support scales lack external validation, and the study relies exclusively on self-report measures, which might lead to common methods variance. Furthermore, attachment representation was modeled as a latent variable, with the three attachment scales operating as manifest indicators. This was done to avoid having too many estimated parameters in the structural equation models. However, this approach may have reduced measurement precision.

Third, because of the sample recruitment strategy, the composition of study participants was not representative of all students in higher education in Germany. For example, women and teacher education students were overrepresented. Additionally, the proportion of participants who were excluded or screened out was substantial, and one exclusion criterion (straightlining) was not preregistered. Finally, GPA is just one indicator of academic achievement. Although grades are the objective currency of academic success, the GPA should not be set equal to individual perceptions of academic success.

4.2 Conclusion

Although taking academic risks, in the sense of engaging in particularly challenging learning tasks with the potential for making errors, have shown useful and desirable for studying at a university (Hübner & Pfost, 2025; Ravert & Schneller, 2019), many

students avoid such risks (Teagarden et al., 2018). Therefore, identifying variables that relate to ART may be an important first step toward the broader goal of encouraging students to take academic risks. In this study, we addressed students' perception of social support and attachment representations. Both variables proved to be related to ART. However, given the current state of research and the correlational design of this study, no statements can be made about the causal status of these variables. Consequently, all practical implications are merely suggestions that require further empirical testing. Taking this constraint into account, we think it is worthwhile for universities and their staff to invest sufficient resources and adapt didactic procedures to provide adequate support to students facing challenges in their learning. University teachers' social support has been shown to be adaptive for students' learning with regard to manifold criteria, such as student engagement (Xerri et al., 2018), course satisfaction (Farr-Wharton et al., 2018), or study interest and reduced dropout (Farr-Wharton et al., 2018; Wild et al., 2024). Therefore, ART may not be the only aspect that could benefit from improving these resources. Accompanying scientific research on such an intervention measure could ultimately provide further insight into the causal relationships between these variables.

Appendix

Items for the scales of perceived social support from university teachers/fellow students (in the survey presented as separate items) – English translation.

Introduction: In the following section of our questionnaire, we are interested in your perception of aspects of social support at the university. For each statement, please indicate the extent to which you agree with it.

I am confident that ….

1. my lecturers/fellow students will support me in word and deed with difficult learning tasks.
2. my lecturers/fellow students will offer me advice and practical support when I fail an exam.
3. my lecturers/fellow students can put themselves in my emotional position when I encounter difficulties in my studies.

I am worried that ….

4. I will not receive any support from my lecturers/fellow students in dealing with practical challenges during my studies.
5. my lecturers/fellow students don't take me seriously when I have difficulties in my studies.
6. my lecturers/fellow students don't understand my emotional state when I have difficulties with my learning tasks.

Response options range from 1 = *totally disagree* to 5 = *totally agree*. Items 4 to 6 were inverted so that higher values indicate higher perceived social support.

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Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose and no competing interests to declare.

Informed consent Before presenting the questionnaire, respondents were given some context information about the purpose of the study and contact details in case they had any questions or concerns. Reading and accepting this information was required to start the survey.

Research involving human and animal rights For the purpose of this study, survey data was collected. Prior to participating, all potential respondents were thoroughly informed about their rights and privacy regulations. Participation was voluntary, and respondents could quit at any time.

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