The Role of Feedback Self-Efficacy in Student Feedback Engagement

Mona Bassleer[a], Stijn Schelfhout[a,b], Lot Fonteyne[c], Wouter Duyck[a,d], Nicolas Dirix[a]

[a]Department of Experimental Psychology, Ghent University, 9000 Ghent, Belgium; [b]Department of Work, Organization and Society, Ghent University, 9000 Ghent, Belgium; [c]Department of Educational Affairs, Sint-Pietersnieuwstraat 33, Ghent University, 9000 Ghent, Belgium; [d]The Accreditation Organization of the Netherlands and Flanders (NVAO), 2514 JG Den Haag, The Netherlands.

*Mona Bassleer

Address: Department of Experimental Psychology, Ghent University, Henri Dunantlaan 2, 9000 Ghent, Belgium

Email: mona.bassleer@ugent.be

CRediT author statement:

Mona Bassleer: Conceptualization, Methodology, Validation, Formal Analysis, Data Curation, Writing – Original Draft, Review & Editing, Visualization. **Stijn Schelfhout:** Conceptualization, Methodology, Formal Analysis, Writing – Review & Editing. **Lot Fonteyne:** Conceptualization, Methodology, Validation, Investigation, Data Curation, Writing – Review & Editing. **Wouter Duyck:** Conceptualization, Funding Acquisition, Methodology, Writing – Review & Editing, Supervision. **Nicolas Dirix:** Conceptualization, Methodology, Formal Analysis, Writing – Review & Editing, Supervision.

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Abstract

Educational feedback research is shifting from feedback provision to feedback reception, but more theory-based studies on student feedback engagement are still needed for targeted interventions. In higher education, promoting feedback engagement can streamline study trajectories and reduce fail and dropout rates. This study focused on first-year university students (N = 392) receiving feedback on their program-specific validated academic achievement prediction, based on various background/(non-)cognitive variables, along with remediation and competence training recommendations. Using a Theory of Planned Behavior model, we analyzed students' intentional (IFE) and behavioral (BFE) feedback engagement, as well as their feedback self-efficacy (FSE) and received feedback. Results show IFE positively influences BFE, while FSE positively affects IFE. Feedback indicating a higher chance of study success increases FSE. IFE fully mediates the relationship between FSE and BFE, and FSE between students' received feedback and IFE. We discuss directing educational interventions towards enhancing FSE to promote student feedback engagement.

Keywords: feedback engagement; feedback self-efficacy; Theory of Planned Behavior; higher education

The Role of Feedback Self-Efficacy in Student Feedback Engagement

Making a higher education study choice that is feasible and aligns with one's vocational interests is challenging for students, especially in open-access higher education systems with a wide range of study choice. Indeed, among the full-time students enrolling in a bachelor's program, 12% to 16% drop out after one year (OECD, 2022) and first-year fail rates can increase to 60% (Schelfhout, Wille, et al., 2022), entailing costs for students, parents and society (OECD, 2022). Therefore, society and students are likely to benefit from adequate support from the beginning of the higher education journey. This support includes feedback on estimated (first-year) academic success, with recommendations for actions that students can undertake to improve their higher education chances. Noteworthy, such feedback surpasses the typical research focus on feedback related to a specific competence, as elucidated by meta-analyses (Kluger & DeNisi, 1996; Wisniewski et al., 2020).

Feedback has become a cornerstone of educational practice and policy (Hattie & Timperley, 2007; Panadero, 2023). Well-established meta-analyses state the importance of seeing feedback as a multifaced concept, encompassing various forms with distinct effects on diverse student outcomes (Kluger & DeNisi, 1996; Wisniewski et al., 2020). Until lately, feedback effectiveness research predominantly concentrated on identifying key attributes of feedback *provision* (e.g., regarding the feedback type and source) (Wisniewski et al., 2020). More recently, however, literature has expanded its focus beyond the act of providing feedback to include the previously overlooked dimension of feedback *reception* (Lipnevich et al., 2023; Xiaomeng & Ravindran, 2024). Feedback reception no longer views feedback as passively provided information, but rather as an active process in which students seek out and engage with feedback (Boud & Molloy, 2013; Lipnevich & Panadero, 2021). Such a shift is necessary, as previous studies consistently demonstrate student dissatisfaction with received

feedback, which can prove detrimental to their engagement (e.g., Van der Kleij & Lipnevich, 2020).

As such, feedback engagement highlights the learner's co-responsibility in the feedback process (Dann, 2017; Winstone et al., 2019), as this engagement plays a vital role in closing the so-called feedback gap (Adams et al., 2020; Carless, 2019). The feedback gap occurs when provided feedback is not picked up or properly acted upon by the student (Ajjawi & Boud, 2017; Van der Kleij & Lipnevich, 2020). Some studies already started to close this gap by describing the variables and processes that determine feedback engagement (e.g., Lipnevich & Panadero, 2021). However, literature still calls for more empirical understanding of student feedback engagement, its determinants, and its underlying mechanisms (i.e., related to how and why feedback works) to refine educational practices within this realm (Panadero & Lipnevich, 2022; Winstone & Nash, 2023). As an example, Panadero (2023) advises to focus on student characteristics as possible determinants, hereby recognizing the feedback agent as central to the feedback process. More specifically, students' higher education journey can be enhanced by pinpointing factors that determine student feedback engagement and unraveling its mechanisms, allowing for a more targeted approach. As an example, feedback self-efficacy (FSE) is a promising target for research and practical interventions (Winstone et al., 2019) as self-efficacy is a part of a student's feedback orientation (Linderbaum & Levy, 2010). Indeed, especially those students at risk of low predicted study success should be reached and encouraged to engage with the feedback they receive. Ultimately, (first-year) fail and drop-out rates can be reduced, benefiting both students and society (OECD, 2022; Schelfhout, Bassleer, et al., 2022).

The present study addresses the need for more theory-based empirical research on determinants and underlying mechanisms related to student feedback engagement (Panadero, 2023; Winstone & Nash, 2023). For this purpose, we consider the Theory of Planned

Behavior (TPB) (Ajzen, 1991, 2012) to examine student feedback engagement within the higher education context. Indeed, the TPB specifically predicts and explains diverse behaviors by emphasizing the role of behavioral intention (e.g., active engagement with feedback), influenced by perceived behavioral control (PBC; e.g., student characteristics like self-efficacy). For a meta-analysis on the TPB and PBC, we refer to Hirschey and colleagues (2020). In contrast to other existing feedback models (Lipnevich & Panadero, 2021), the TPB is in fact broadly recognized as a consistent and robust theoretical model. Hence, the TPB has become widely spread in fields like business and public environmental health (Bosnjak et al., 2020), and more recently also within educational contexts (e.g., Opoku et al., 2021). In educational context, the theory supports both contemporary educational research in general (Kennedy & Zhu, 2025; Knauder & Koschmieder, 2019), as well as more specific research regarding self-efficacy in undergraduate students (Pfundt & Peterson, 2024) and feedback in kindergarten (Dangis et al., 2023). As a concrete example and in line with the more recent focus on active feedback reception (Xiaomeng & Ravindran, 2024), recent studies already use the TPB to explain the information seeking behavior of students (Barber & Anderson, 2025).

Using a TPB-based model in a higher education context, the present study thus researches how feedback leads to student feedback engagement, as we monitor the mediating role of FSE (see also Figure 1). This approach offers insights into student characteristics as determinants of student feedback engagement and its underlying mechanisms that can be targeted in educational interventions aimed at promoting student feedback engagement (Ajjawi & Boud, 2017; Winstone et al., 2019). Consequently, students (at-risk of failure) are enabled to receive more tailored support during their higher education journey, which can eventually facilitate their study careers.

Feedback

Feedback literature encompasses various viewpoints and interpretations of the term feedback (Winstone & Boud, 2022). We adopt a feedback definition that aligns to that of Lipnevich and Panadero (2021), which is compiled from prominent feedback models and theories like Hattie and Timperley's (2007) feedback model. Feedback is information on students' present performance level, goal alignment, future direction, and improvement guidance. The information originates from various sources, such as teachers (Cui et al., 2022), peers (Gao et al., 2024), tutors (van Ginkel et al., 2017), generative artificial intelligence (Banihashem et al., 2024) or, as in the present study, computer-based systems (Fonteyne et al., 2017). For the present study, the generated feedback takes the form of computer-generated standardized advice, based on the judgment of subject matter experts. Additionally, feedback aims to improve student outcomes by encouraging students' active processing of the performance-related information (Lipnevich & Panadero, 2021). Within the TPB, feedback can be considered an information-related background characteristic influencing intention and behavior antecedents (see further) (Ajzen, 2020; Ajzen & Fishbein, 2005).

The present study's feedback emanates from a self-assessment tool that probes academic potential and vocational interests, aiding prospective students in their decision-making process of their study choice, and offering tailored guidance to first-year higher education students (i.e., the SIMON project). Instead of manipulating feedback conditions experimentally and/or virtually (Wisniewski et al., 2020), students are presented with their actual first-year predicted chance of study success (i.e., (very) low, (fairly) high). These predictions are validated based on historical longitudinal data of background and (non-)cognitive predictors of academic achievement. Additionally, students receive a comprehensive overview of their (non-)cognitive competences, linked to recommendations for remediation/competence training activities (Fonteyne et al., 2017). As such, this feedback

extends beyond feedback focused on a specific competence, as commonly observed in feedback research (Kluger & DeNisi, 1996; Wisniewski et al., 2020).

Student Feedback Engagement

Student feedback engagement has reached consensus in literature as a three-dimensional construct, as the concept features a cognitive, affective, and behavioral dimension (e.g., Ellis, 2010; Yu et al., 2019). The cognitive dimension pertains to how students pay attention to and process the received feedback, while the affective dimension includes emotional responses and reactions. The behavioral dimension involves whether and how students subsequently act upon the received feedback (Lipnevich & Smith, 2022; Zhang & Hyland, 2018). Consequently, the behavioral changes and developmental actions stemming from feedback can be situated within this latter dimension (Jellicoe & Forsythe, 2019). Moreover, Winstone and colleagues (2017) introduced the concept of proactive recipience of feedback, which refers to a state or activity in which learners actively participate in feedback processes and take co-responsibility for their effectiveness. The present study emphasizes the behavioral dimension of student feedback engagement (Ellis, 2010; Yu et al., 2019). More specifically, we consider two types of student feedback engagement within this dimension, corresponding to the proposed categorization of Handley and colleagues (2011). The first type, IFE, represents an individual's willingness to engage with feedback (i.e., readiness to invest time and effort). The second type, BFE, reflects an individual's active feedback engagement (i.e., taking actions) (Handley et al., 2011).

Reviews on educational feedback studies reveal that many of these studies focus on how feedback should be provided to effectively facilitate student outcomes (e.g., showing less favorable effects of feedback that relies on punishment/reward) (e.g., Hattie et al., 2017; Van der Kleij et al., 2019). However, such investigations consequently view feedback as a more unidirectional and linear process driven by teachers, hereby neglecting student feedback

engagement (Ajjawi & Boud, 2017; Van der Kleij & Lipnevich, 2020). In addition, findings across these feedback studies do not exhibit a coherent pattern (Shute, 2008; Winstone et al., 2017). Hence, researchers argue that feedback only becomes genuinely effective for student outcomes when students behave as active agents rather than as passive receivers during the feedback process (Carless & Boud, 2018; Winstone et al., 2019). The relationship between student feedback engagement and positive student outcomes is also empirically supported (e.g., Zhang & Hyland, 2018). Nonetheless, empirical studies focusing on student feedback engagement still lack adequate representation in literature (Lipnevich & Panadero, 2021; Van der Kleij et al., 2019).

In the present study, we examine student feedback engagement within the framework of the TPB. This theory suggests that an individual's behavior is mainly determined by their intention to perform that behavior (Ajzen, 1991, 2012), which is supported by meta-analyses (e.g., Hirschey et al., 2020). We similarly hypothesize a positive effect of IFE on BFE (H1) (see Figure 1).

Role of Student Characteristics

Recently, the field of feedback research is increasingly investigating how various feedback design variables (e.g., timing) can contribute to student feedback engagement (Jonsson, 2013; Van der Kleij et al., 2019). However, Panadero and Lipnevich (2022) reviewed the major developed descriptive feedback models across educational levels and state that the student, along with their individual characteristics, should assume a more central role in such models. Indeed, students' responses to feedback tend to vary based on their diverse individual characteristics (Lipnevich & Panadero, 2021; Van der Kleij et al., 2019). For instance, literature already suggests that reception and implementation of feedback may vary based on gender (Ajjawi & Boud, 2017), motivation (Gan & Wang, 2025), cognitive ability (Daniel et al., 2025), personality (Kerman et al., 2024), prior knowledge (Zong et al., 2023),

cultural background (Ranjbaran et al., 2023), attitude towards feedback (Van der Kleij & Lipnevich, 2021), and feedback literacy and tolerance (Nieminen & Carless, 2023).

Further examination of student feedback engagement and the role of student characteristics is therefore highly encouraged (Panadero, 2023), and researchers are gradually venturing into this direction (Adams et al., 2020; Winstone et al., 2019). This approach can lead to a more effective alignment of feedback with students' educational needs, thereby enhancing their feedback engagement and learning outcomes (Panadero & Lipnevich, 2022; Winstone & Nash, 2023).

Feedback Self-Efficacy

The present study therefore incorporates the role of FSE as a student characteristic and its possible determinant effect on the association between feedback and student feedback engagement. This deliberate selection to focus on FSE stems from the decision to (partially) adopt the TPB as the theoretical framework for this study. FSE, in fact, closely parallels the concept of PBC within the TPB (Ajzen, 1985; Bosnjak et al., 2020).

Self-efficacy indicates an individual's belief in their competences to perform a behavior (Bandura, 1977). Ajzen (1985) incorporated this self-efficacy construct into the Theory of Reasoned Action (Ajzen & Fishbein, 1980) in the form of PBC. The addition of PBC (i.e., self-efficacy) as the third determinant of behavioral intention (alongside attitude towards the behavior and subjective norm) eventually led to the development of the TPB (Ajzen, 1991, 2012). In the specific case of a feedback context, FSE refers to a part of an individual's feedback orientation (Linderbaum & Levy, 2010). FSE differs from academic self-efficacy, as the latter encompasses a broader belief in one's abilities to engage in effective study behaviors (Sander & Sanders, 2009). The concept of FSE is well-vested in literature even above and beyond student characteristics, as research pinpoints the origins of FSE in determinants like prior feedback experiences (Hattie & Timperley, 2007), feedback

literacy (Carless & Boud, 2018), and social and cultural context (Ajjawi & Boud, 2017), amongst others.

A review (Schneider & Preckel, 2017) and meta-analysis (Talsma et al., 2018) show a positive relationship between academic self-efficacy and academic achievement across various educational stages. Within the feedback context, researchers also demonstrate that academic self-efficacy mediates the relationship between feedback and academic achievement (e.g., Brown et al., 2016). Specifically focusing on student feedback engagement, studies indicate a positive association between academic self-efficacy and use of feedback (Adams et al., 2020; Handley et al., 2011), FSE and use of feedback (Winstone et al., 2019), and between FSE and readiness-to-engage (Handley et al., 2011). These findings are also supported by the TPB, as self-efficacy (i.e., FSE) influences behavioral intention (i.e., IFE) and actual behavior (i.e., BFE). Indeed, individuals with higher FSE tend to exhibit an increased sense of control, and seem to be more confident in effectively managing the feedback they receive (Adams et al., 2020; Putwain et al., 2013; but see Vancouver and Kendall (2006) for potential drawbacks of (very) high self-efficacy). Furthermore, behavioral intention mediates the relationship between self-efficacy and behavior (Ajzen, 1991, 2012), implying that individuals who believe in their ability to perform a behavior are more likely to perform that behavior when they have a strong intention to do so. Therefore, the present study expects to find a positive effect of FSE on IFE (H2) and BFE (H3), and a mediation of IFE in the relationship between FSE and BFE (H4) (see Figure 1).

Additionally, researchers highlight the potential role of student characteristics, such as FSE, as mediators in the relationship between feedback and student feedback engagement (Lipnevich & Panadero, 2021; Panadero, 2023). In other words, students' belief in their own feedback engagement capabilities (partially) explains the extent to which students engage with received feedback. Indeed, FSE can contribute to interpreting negative feedback as less

threatening and more as valuable learning opportunities or challenges to overcome (Adams et al., 2020; Putwain et al., 2013). Moreover, the TPB emphasizes the importance of recognizing that self-efficacy (and the other antecedents of intention and behavior) are functions of underlying beliefs. For self-efficacy, this relates to one's control beliefs, which can be influenced by various background factors, categorized into individual (e.g., personality), social (e.g., education), and information-related (e.g., intervention) factors (Ajzen, 2020; Ajzen & Fishbein, 2005). Feedback literature similarly indicates the favorable impact of more positive, concrete, process-level etc. feedback on (academic) self-efficacy (Brown et al., 2016; Hattie & Timperley, 2007). However, TPB-based research often disregards this potential influence of background variables on the antecedents of intention. The present study includes the feedback received by students as a background factor. As such, we predict a positive effect of more favorable feedback on FSE (H5) and, consequently, a mediation of FSE in the relationship between feedback and IFE (H6) (see Figure 1).

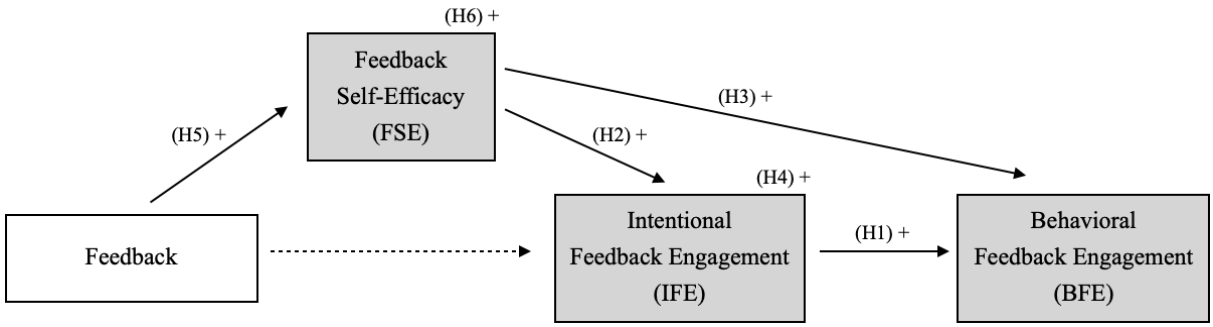
Present Study

Using a TPB-based model in a higher education context, the present study researches how feedback leads to student feedback engagement, as we monitor the mediating role of student self-efficacy (see also Figure 1). In such a way, we aim to predict and explain student feedback engagement to develop targeted interventions that can facilitate feedback-engaging behavior (Panadero, 2023; Winstone & Nash, 2023), thereby enabling (at-risk) first-year university students to experience a successful study career. Our model's feedback refers to the feedback provided to these students at the onset of their higher education journey. This feedback includes their first-year validated chance of study success (i.e., (very) low, (fairly) high) prediction based on their background/(non-)cognitive competences, supplemented with recommendations for remediation/competence training activities.

Specifically, we hypothesize that IFE has a positive effect on BFE (H1), and FSE similarly on IFE (H2) and BFE (H3) (Ajzen, 1991, 2012). Here, FSE constitutes a key component of PBC of the TPB (Ajzen, 1985; Bosnjak et al., 2020). Also, consideration is given to the mediation of IFE in the relationship between FSE and BFE (H4) (Ajzen, 1991, 2012). Additionally, we anticipate that positive feedback increases FSE (H5) (Ajzen & Fishbein, 2005; Brown et al., 2016). And lastly, the mediation of FSE in the relationship between feedback and IFE is assumed (H6) (Lipnevich & Panadero, 2021). A graphical representation of our hypothesized model for the present study is displayed in Figure 1.

Figure 1

Hypothesized Model Using a Modified Version of the Theory of Planned Behavior



Note. The solid and dashed lines represent the hypothesized significant and non-significant paths, respectively. H4 displays the mediation of IFE between FSE and BFE, and H6 the mediation of FSE between feedback and IFE. Feedback refers to the feedback first-year university students receive at the start of their study career regarding feasibility and recommendations for remediation/competence training initiatives.

Materials and Methods

Participants

For the present study, we used data from a large Western European university that ranked in the top 75 of the Academic Ranking of World Universities (formerly Shanghai Ranking, see https://www.shanghairanking.com/rankings/arwu/2024). The Ethics Committee at SIMON University, FPPW, granted a favorable recommendation for the project. Our sample comprises first-year university students in an open-access environment, excluding re-registrants, who have a uniform curriculum within a study program. This open-access environment implies that anyone with a degree of secondary education can enter nearly every study program at any given college or university, with a maximum tuition fee of about €1,150 or $1,200, not including possible scholarships. Longitudinal data of N = 392 (62% female, 42% (very) low first-year predicted chance of study success) first-year university students in the academic years 2021-2022 and 2022-2023 were used, as these students were surveyed through feedback questionnaires at two measurement points before the first exam period (i.e., October and December). These feedback questionnaires addressed the feedback the students received after participating in the longitudinal university-wide study (re)orientation and remediation project by filling out the SIMON test battery (Fonteyne, 2017; Schelfhout, Wille, et al., 2022). For more detail about the sample, see *Supplementary Information (SI)*, Table S1.

Measures

Feedback

First-year university students using the SIMON tool received personalized computer-generated feedback upon completion (see also the introduction's feedback section). We based the computer-generated feedback on algorithms and predictive models that were conceptualized and operationalized by experts (Fonteyne et al., 2017). Students were informed a priori about which information they would receive. As such, the student's

generated feedback reported (1) a personal chance of study success in the first year, (2) more detailed skill scores, and (3) possible remediation towards skill maximization and possibilities for further support. For concrete feedback examples, we refer to *SI*, Feedback Examples.

The instrument estimates students' first-year chance of study success using recursive feature elimination and cross-validation. Background factors (e.g., secondary education degree) and (non-)cognitive characteristics (e.g., motivation, mathematical skills), recognized as significant predictors for academic achievement, are considered (Fonteyne et al., 2017). In the present study, we distinguished between two student groups as determined within the SIMON project: students who received feedback with a (very) low first-year predicted chance of study success (= 0) and those with a (fairly) high predicted chance of study success (= 1). Please see Fonteyne and colleagues (2017) for details on the operationalization of these predicted chances of study success.

Feedback Engagement

Intentional Feedback Engagement was measured through the behavioral and developmental change dimension of the Feedback in Learning Scale (FLS) (Jellicoe & Forsythe, 2019). The adapted questionnaire consisted of six items (e.g., "I will search for study guidance activities in line with competences described in my received SIMON feedback") (M = 2.5, SD = 0.8, Cronbach's α = .87). Students rated their item agreement on a Likert-scale from 1 (totally not agree) to 5 (totally agree). The individuals' scale scores were determined by averaging their item scores. IFE was surveyed in October for both academic years, after the students received their feedback through the SIMON project (Fonteyne et al., 2017). The survey can be found in *SI*, Table S2.

Behavioral Feedback Engagement was assessed through the same questionnaire employed for IFE (i.e., FLS; Jellicoe & Forsythe, 2019), with the verb form as the only difference (e.g., "I have searched for study guidance activities in line with competences

described in my received SIMON feedback") (M = 2.1, SD = 0.7, Cronbach's α = .83). Again, the average of the item scores was used to determine the individuals' scale scores. BFE was questioned in December for both academic years. The survey can be found in *SI*, Table S3.

Feedback Self-Efficacy

Feedback Self-Efficacy was measured by using the same-named subscale of the Feedback Orientation Scale (FOS) (Linderbaum & Levy, 2010). The subscale consisted of five items (e.g., "I believe that I have the ability to deal with feedback effectively") (M = 3.6, SD = 0.7, Cronbach's α = .85). Students rated their item agreement on a 5-point Likert-scale. The individuals' scale scores were obtained by averaging their item scores. FSE was surveyed in October for both academic years, together with IFE.

Analyses

First, to have an overview of the data, we calculated Pearson correlations between the included continuous variables. For the correlations between the continuous variables and the dichotomous variable *Feedback*, point-biserial correlations were used.

Second, we tested our model with the predetermined set of hypotheses through a path analysis of a structural equation model using maximum likelihood estimation through the R package lavaan (Rosseel, 2012). The fit of our model was evaluated using different goodness-of-fit indices (i.e., chi-square test, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR))[1]. To calculate better standard errors (and p-values) of the assumed indirect effects (i.e., mediations) compared to the standard approach (i.e., the delta or Sobel method), the bootstrap method was used (Bollen & Stine, 1992; Rosseel, 2012; Sobel, 1982). We also added a fixed seed value for random sampling to ensure the results' reproducibility and comparability.

[1] Ideally, the chi-square test is not significant, incremental fit indices like CFI > .90, and measures such as RMSEA and SRMR < .06 for a good fit or between .06 and .08 for an acceptable fit (Rosseel, 2012).

Furthermore, we applied the Benjamini-Hochberg False Discovery Rate (FDR) procedure to adjust *p*-values for multiple testing, striking a balance between maximizing power and still effectively controlling Type I errors (Benjamini & Hochberg, 1995).

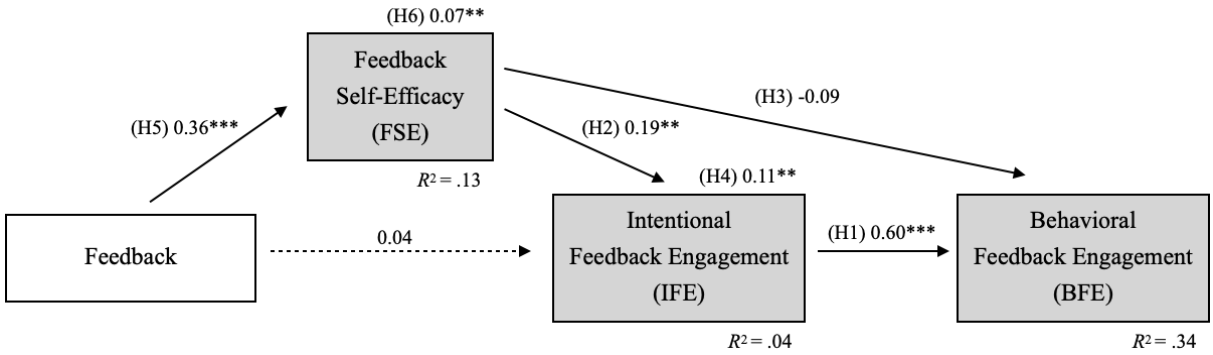
Results

Path Analysis

The goodness-of-fit indices indicate a good fit of the data to the model. For the correlation matrix, we refer to *SI,* Table S4. The observed and model-implied covariance matrices can be found in *SI,* Tables S5 and S6. Figure 2 displays the path analysis results, presenting the standardized regression coefficients with the FDR-adjusted significance levels, and the explained variances for the endogenous variables within the model. For the statistics regarding the direct, indirect, and total effects within the path model, see Table 1.

Figure 2

Path Analysis Results (N = 392)



Note. ***p < .001; **p < .01; *p < .05. The p-values are FDR-adjusted using the Benjamini-Hochberg procedure for multiple testing. R^2 = explained variance. The solid and dashed lines represent the significant and non-significant effects, respectively. The values associated with the lines are the standardized path coefficients. H4 displays the mediation of IFE between FSE and BFE, and H6 the mediation of FSE between feedback and IFE. Model fit statistics: χ^2 = 1.57, df = 1, p = .210; CFI = 0.998; RMSEA = .038; SRMR = .015.

Hypotheses Testing

H1 stated that IFE has a positive effect on BFE. We indeed find a significant effect of IFE on BFE (r = .58). As the IFE level increases, so does the BFE level. H1 is thus confirmed. Additionally, H2 assumed a positive effect of FSE on IFE. The results show that FSE significantly influences IFE (r = .20). Higher FSE is associated with higher IFE, confirming H2. Also, H3 stated that FSE has a positive effect on BFE. We observed no significant effect between FSE and BFE (r = .08), so H3 cannot be confirmed. Further, H4 proposed a mediation of IFE in the relationship between FSE and BFE. The bootstrap method demonstrates a significant effect of FSE on BFE, fully mediated by IFE. Higher FSE increases the BFE level, but this relationship completely relies on the IFE level (the higher IFE, the higher BFE). As such, H4 is confirmed. Moreover, H5 stated a positive effect of feedback on FSE. We find a significant relationship between feedback and FSE (r = .36). Students who received feedback with a (fairly) high chance of study success show higher FSE (M = 3.91, SD = 0.68) compared with students who received a (very) low chance of study success (M = 3.35, SD = 0.77), confirming H5. Finally, H6 assumed a mediation of FSE in the relationship between feedback and IFE. The analyses show a significant effect of feedback on IFE (r = .11), fully mediated by FSE. Students who received a (fairly) high chance of study success shows higher IFE (M = 2.58, SD = 0.89) compared with students who received a (very) low chance of study success (M = 2.39, SD = 0.84), but this association completely depends on their FSE level (the higher FSE, the higher IFE). Hence, we confirm H6. The detailed statistics of the direct, indirect, and total effects within the path model can be found in Table 1. For the concrete feedback formulations, please refer to *SI*, Feedback Examples.

Table 1

Direct, Indirect, and Total Effects Within the Path Model

	B	SE_B	β	*z*	p^1	CI	
						LL	UL
BFE ~ FSE + IFE							
Direct IFE (H1)	0.51	0.04	0.60	13.12	< .001***	0.44	0.59
Direct FSE (H3)	-0.08	0.04	-0.09	-2.01	.060	-0.17	0.00
Indirect FSE (H4)	0.11	0.03	0.11	3.29	.003**	0.04	0.17
Total FSE	0.03	0.05	0.03	0.54	.589	-0.08	0.12
IFE ~ Feedback + FSE							
Direct FSE (H2)	0.21	0.06	0.19	3.37	.003**	0.09	0.34
Direct feedback	0.07	0.09	0.04	0.77	.454	-0.11	0.24
Indirect feedback (H6)	0.12	0.04	0.07	3.06	.008**	0.05	0.20
Total feedback	0.19	0.09	0.11	2.15	.048*	0.02	0.36
FSE ~ Feedback							
Direct feedback (H5)	0.57	0.08	0.36	7.47	< .001***	0.42	0.72
BFE ~ Feedback + FSE							
Indirect feedback	-0.05	0.02	-0.03	-2.09	.057	-0.09	0.00
BFE ~ Feedback + IFE							
Indirect feedback	0.04	0.05	0.02	0.76	.454	-0.06	0.13
BFE ~ Feedback + FSE + IFE							
Indirect feedback	0.06	0.02	0.04	3.03	.008**	0.02	0.11

Note. ***p < .001; **p < .01; *p < .05. [1]FDR-adjusted using the Benjamini-Hochberg procedure for multiple testing. FSE = Feedback Self-Efficacy; IFE = Intentional Feedback Engagement; BFE = Behavioral Feedback Engagement. *B* = unstandardized path coefficients; β = standardized path coefficients; CI = bootstrapped 95% confidence intervals; LL = lower limit; UL = upper limit.

Discussion

In (open-access) higher education, (first-year) fail and dropout rates are alarmingly high (OECD, 2022; Schelfhout, Wille, et al., 2022). Hence, supporting students from the start of their higher education journey is likely to hold advantage for both students and society (OECD, 2022). Addressing this challenge ideally involves providing students with feedback on their validated first-year academic achievement prediction, derived from (non)cognitive competencies, alongside recommendations for remediation and competence training activities. This feedback exceeds the conventional feedback typically associated with a specific competence (Kluger & DeNisi, 1996; Wisniewski et al., 2020). Although such feedback alone is unlikely to meet all the needs of students, educational policy should at least incorporate this type of feedback as a specific tool to address fail rates and dropout (Schelfhout, Bassleer, et al., 2022).

Acknowledging the multidimensional nature of feedback is important, given its diverse forms that can yield distinct impacts on different student outcomes (Hattie & Timperley, 2007; Wisniewski et al., 2020). Previous feedback effectiveness studies mainly focused on identifying factors associated with feedback design and thus with feedback *provision.* However, such research overlooks feedback *reception*, including students' active role in the feedback process (Boud & Molloy, 2013; Lipnevich et al., 2023; Van der Kleij & Lipnevich, 2020; Xiaomeng & Ravindran, 2024). Meanwhile, feedback literature increasingly emphasizes how and to what extent students engage with their received feedback, which is essential for ultimately achieving improved student outcomes (Dann, 2017; Winstone et al., 2019). Nevertheless, theory-based empirical studies regarding student characteristics as possible determinants of student feedback engagement and its underlying mechanisms are limited, necessitating additional research to advance our comprehension and educational practices in this area (Panadero & Lipnevich, 2022; Winstone & Nash, 2023).

The present study therefore researched how feedback leads to student feedback engagement within a higher education context, as we monitored the mediating role of student self-efficacy. We evaluated a model grounded in the Theory of Planned Behavior (TPB, Ajzen 2012), well-known for predicting and explaining various behaviors, by integrating insights from previous (feedback) research (Dangis et al., 2023; Kennedy & Zhu, 2025; Knauder & Koschmieder, 2019; Pfundt & Peterson, 2024). To investigate determinants and underlying mechanisms of student feedback engagement within higher education, we conducted a path analysis using longitudinal data from $N = 392$ first-year university students and so differentiated between their intentional (IFE) (October) and behavioral feedback engagement (BFE) (December). Additionally, the proposed model incorporated students' feedback self-efficacy (FSE) and the feedback they received at the start of their higher education journey regarding feasibility and recommendations for remediation/competence training initiatives.

Feedback Self-Efficacy, Intentional and Behavioral Feedback Engagement

Our findings confirm that students with higher IFE show higher BFE, signifying more actual engagement with received feedback when the corresponding intention is more present, and thus consistent with the TPB's core idea that behavioral intention influences the actual behavior (Ajzen, 1991, 2012). This alignment is further supported by meta-analyses across various fields (e.g., Hirschey et al., 2020). Indeed, intentions capture individuals' willingness to allocate effort and time towards performing a behavior (Ajzen, 1991; Handley et al., 2011).

Next, students with higher FSE exhibit higher IFE, reflecting a stronger readiness to invest effort and time to engage with received feedback when students have greater confidence in their feedback engagement capabilities. This finding confirms previous feedback research (Handley et al., 2011) and matches with one of the basic tenets of the TPB concerning Perceived Behavioral Control (PBC) (i.e., self-efficacy) that, among other things,

determines behavioral intention (Ajzen, 1991, 2012). Individuals who consider themselves capable of succeeding in a task have more self-confidence and an increased sense of control compared with those who harbor uncertainty about their capabilities (Adams et al., 2020; Bandura, 1977). Linked to the Self-Determination Theory, experiencing a sense of competence and autonomy can indeed foster motivation (Deci & Ryan, 2008), which is assumed to be captured in behavioral intention (Ajzen, 1991, 2012).

Further, the path analysis revealed that IFE fully mediated the effect of FSE on BFE. Students with higher FSE show higher BFE, but only through their IFE level. This result implies that even if students believe they can effectively engage with feedback, they will only do so if they also intend to engage with the feedback. Meta-analyses including TPB-based research in non-educational areas do show that PBC (i.e., self-efficacy) also directly influences behavior (e.g., Hirschey et al., 2020). In the educational context specifically, but not focusing on student feedback engagement, TPB-based studies indicate inconsistent results in this regard (e.g., Opoku et al., 2021). Additionally, Winstone and colleagues (2019) find an association between FSE and use of feedback. However, Ajzen (1991, 2012) highlights that the importance of intention and PBC in predicting behavior can vary across situations and behaviors. One of these predictors may be more crucial, or even the sole determinant of behavior, depending on the context. In fact, not finding a direct effect of FSE on BFE fits the TPB's predecessor, the Theory of Reasoned Action (Ajzen & Fishbein, 1980), which posits that individuals have voluntary control over behavior and thus results in the absence of PBC in this theory.

Feedback (Self-Efficacy) and Intentional Feedback Engagement

The present study verifies our expectation that students who received feedback indicating a (fairly) high chance of study success demonstrate higher FSE compared with students who received feedback indicating a (very) low chance of study success. The TPB

postulates that belief in one's own competences is indeed a function of control beliefs, that can be influenced by information-related factors like feedback (Ajzen, 2020; Ajzen & Fishbein, 2005). Previous feedback studies also find that positive feedback is associated with higher (academic) self-efficacy (and conversely for negative feedback) (Brown et al., 2016; Peifer et al., 2020). This pattern is likely applicable to FSE as well. Positive/success versus negative/failure feedback can provide students with a sense of recognition and appreciation, which can boost their emotional positivity (Peifer et al., 2020; Winstone et al., 2017). Additionally, this uplift in emotional/physiological state is an important source of self-efficacy (Bandura, 1977).

Finally, the results of the path analysis demonstrate a full mediation of FSE in the relationship between received feedback and IFE. Students who received feedback indicating a (fairly) high chance of study success (compared with a (very) low chance of study success) show higher intention to engage with the feedback, but this relationship depends on their belief in the own feedback engagement capabilities. Noteworthy, this finding implies that at-risk students are less reached compared with low-risk students due to negative received feedback reducing their FSE.[2] Nash and Thomas (2024) report similar findings in a recent study in which they analyzed students' reflections on feedback: students with lower grades were more likely to ignore feedback. Additionally, this observed mediation confirms that student characteristics like FSE determine the extent to which students engage with received feedback (e.g., Lipnevich & Panadero, 2021). Students with greater FSE may perceive negative/failure feedback as less intimidating and more as valuable learning opportunities or challenges to conquer (Adams et al., 2020; Putwain et al., 2013). Enhancing students'

[2] An extra linear regression on these students who received feedback indicating a (very) low chance of study success reveals a significant effect of FSE on IFE ($F(1, 163) = 7.58$, $p = .007$, $R^2 = .04$ $B = .23$). Within the group of at-risk students, those with higher FSE thus demonstrate higher IFE ($M = 2.52$, $SD = 0.85$) versus at-risk students with lower FSE ($M = 2.21$, $SD = 0.79$).

responsiveness to feedback can thus be achieved by strengthening their FSE. Indeed, Warner and French (2020) refer to self-efficacy-based intervention studies across various domains with small-to-medium effect sizes for behavior. These interventions target at least one of the four established sources of self-efficacy (Bandura, 1977). For student feedback engagement specifically, researchers developed a confidence-building toolkit (Winstone et al., 2019). However, the toolkit's (quantitative) effectiveness on FSE remains unexplored in a sufficiently large sample.

Overall, the present study's results show that the TPB provides a favorable theoretical framework in the feedback context, allowing for student characteristics to be considered in explaining student feedback engagement. The path analysis was instrumental in uncovering the specific contributing role of FSE in the relation between received feedback, IFE and BFE.

Strengths, Limitations and Future Research

The present study offers valuable insights into student feedback engagement (i.e., IFE and BFE), its determinants and underlying mechanisms within higher education, based on a TPB-model. In addition to the favorable longitudinal data collection before the first exam period, we acknowledge that the responses to the surveys originate from self-report. A more objective behavioral outcome measure, especially relevant for BFE, is currently not present and recommended for future research, as the relationship between perception and action in feedback processing is not always straightforward (Farrokhnia et al., 2025). Still, according to the TPB, behavioral intention is one of the strongest predictors of future behavior (Ajzen, 2020).

Future research into feedback engagement and feedback self-efficacy should also consider different theoretical models like models on motivation (i.e., self-determination theory, Ryan & Deci, 2020), and self-regulation (Yang & Zhang, 2023) in order to further support, adjust, or refute our findings. Moreover, these models can complement the

dimensional approach of feedback engagement, also addressing the cognitive and affective dimensions of feedback engagement. These dimensions were beyond the scope of the present study as we exclusively addressed the behavioral dimension of feedback engagement.

Although based on standardized judgments of subject matter experts, the feedback in this study was computer-generated, raising the question of potential disparities compared to other kinds of human feedback sources like teachers (Cui et al., 2022), peers (Gao et al., 2024) or tutors (van Ginkel et al., 2017). In addition to these alternative human sources, future research can also focus on more advanced generative artificial intelligence in order to conduct follow up research to explore feedback source differences (Banihashem et al., 2024). Nonetheless, meta-analytic evidence suggests that the quality and depth of feedback, rather than its source, are critical for improving learning outcomes (Van der Kleij et al., 2015). For student feedback engagement specifically, such empirical research is still understudied.

Also, we did not use the full TBP as attitude and subjective norm were not included, which may explain the limited explained variance in IFE (4%). Noteworthy however, attitudes and norms may be more trait-like, making them less amenable to change. By contrast, PBC (i.e., FSE) is more state-like (Bandura, 1977), rendering this determinant more practically relevant. Incorporating attitude and subjective norm in future research may likely provide a more comprehensive understanding of the factors influencing IFE. Similarly, one could explore the underlying contributing beliefs for the antecedents of behavioral intention, as well as the influencing background factors for these beliefs (Ajzen, 2020; Ajzen & Fishbein, 2005).

On a related point, we thus applied a concise (and partial) TPB model with only a specific number of components to address our research question. Also important to note is that within the scope of the current study, we included FSE as a determinant of intentions and behavior, not as the primary outcome measure. Future research can focus on elaborating the

model with the antecedents or determinants of FSE like prior feedback experiences (Hattie & Timperley, 2007), feedback literacy (Carless & Boud, 2018), and social and cultural context (Ajjawi & Boud, 2017). Bandura (1977) specifically identifies four key sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states. Mastery experiences, or successful past performance, contribute to self-efficacy through prior achievement. Verbal persuasion, including encouragement and feedback from others, can also enhance self-belief, and is for example provided by tutors, parents and/or peers. Previous research shows that these four sources are associated, but also demonstrates unique contributions of each source to (the development of) self-efficacy (e.g., Gill et al., 2022; Kiran & Sungur, 2012; Phan, 2012; Phan & Ngu, 2016; Tschannen-Moran & Hoy, 2007). Moreover, future research can also expand our model with other (possible) mediation effects of (other) student characteristics like gender (Ajjawi & Boud, 2017), motivation (Gan & Wang, 2025), cognitive ability (Daniel et al., 2025), personality (Kerman et al., 2024), interests (Alemayehu & Chen, 2023), prior knowledge (Zong et al., 2023), cultural background (Ranjbaran et al., 2023), attitude towards feedback (Van der Kleij & Lipnevich, 2021), and feedback literacy and tolerance (Nieminen & Carless, 2023) on the relationship between feedback self-efficacy and feedback engagement. Still, the absence of these student characteristics and effects does not seem to affect our TPB model fit, which affirms our model as a robust basis for future research. Nevertheless, we acknowledge that the explained variance for predicting IFE is quite low (R^2 = .04), indicating a small effect size. To answer future research questions, new investigations can explore how these other student characteristics and (mediation) effects contribute to student feedback engagement. Adding these (related) variables or effects to the model can also try and replicate our small but robust effect sizes in order to affirm or correct our findings where needed. We anticipate that the inclusion of additional student characteristics will contribute incremental validity to the

model. As we built the present study on well-established theoretical frameworks and prior findings regarding feedback self-efficacy and engagement, this explanatory enhancement is expected to complement rather than diminish the mediating role of student self-efficacy in predicting student feedback engagement.

Finally, we also did not include (in)direct feedback loops between variables in the present study, as we relied on the TPB in which reciprocal relationships are not addressed. Nevertheless, understanding such feedback loops between various variables (e.g., direct feedback loop between feedback and FSE) is another interesting avenue for future exploration.

Conclusion

The present study advances feedback research by presenting a TPB feedback model to research the behavioral component of feedback engagement. More specifically, the present study emphasizes the importance of feedback self-efficacy on which interventions can focus to enhance student feedback engagement. Such insights are vital in an education context, especially enabling at–risk students to receive more optimal support for the benefit of their study trajectory.

Data Availability Statement

The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research supporting data is not available.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT in order to improve language and readability. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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Supplementary Information for

The Role of Feedback Self-Efficacy in Student Feedback Engagement

This file includes:

Tables S1 to S6

Feedback Examples

References

Table S1

Sample Sizes per Academic Year

Academic Year	*n*	Sex		Feedback	
		Male	Female	(Very) Low CoSS	(Fairly) High CoSS
2021-2022	279	89	153	136	106
2022-2023	142	62	88	29	121
Total	392	151	241	165	227

Note. CoSS = Chance of Study Success.

Feedback Examples

Study Program Psychology Very Low Chance of Study Success

SIMON ZEGT

Always bring this personal report to the study or learning path counseling.

Study program: Psychology

Dear First Name,

You recently filled in 'SIMON zegt'.

SIMON wants to help you and therefore,

- calculates your personal chance of study success in the first year,
- shows you on which skills you score well or not so well and
- indicates what you can do to maximize your skills or where you could still use some support.

Below are your personal results.

Having doubts about your education? Visit your study or learning path counselor.

Would you like to further strengthen certain skills? Be sure to check out the tutoring activities organized by the Monitoring Service and the Study Advice Department.

Do you have questions about 'SIMON zegt' feedback? Check out the student guide at ugent.be/simonzegt.

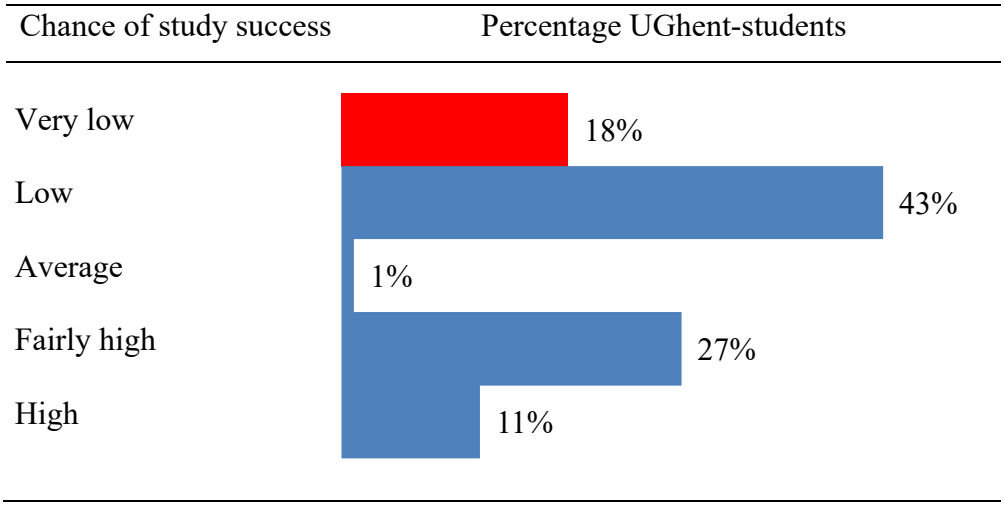
For every issue – no matter how small or 'innocent' it may seem – you have somewhere to turn. So, don't just stick with it alone! Take a look at Feel good about yourself.

Your calculated chance of study success in this study program is VERY LOW

Only 10% of students with this chance of study success achieve the bachelor's degree in this study program within 4 years.

This may come as a bit of a shock. Please know: It is not SIMON's intention to discourage you, but rather just to give you insights into your strengths and possible difficulties when starting higher education.

Below you can see how you (in red) scored, and how other UGhent students from your study program (in blue) scored.



Maybe this study program is not for you at all and you need to rethink your choice of study. Make an appointment and talk about it with a faculty study or learning path counselor or with a student advisor in the Study Advice Department.

Thinking and Reasoning

In the left column, the graph shows how you score **relative to your fellow students in your study program this year.**

In the right column, you will find an **evaluation of your skills** based on research on study success **in your study program**: If you score **low**, you should brush up on this skill in order to tackle your studies in a smooth way. Even if you score **average**, you would do well to strengthen this skill. Below (under 'What now?') you can see how this can be done. If your score is **high**, then in principle you have sufficient skills. You are then of course still welcome at counseling services.

These 2 types of information can sometimes differ from each other. For example, you may score higher than your peers, but still score too 'low' to fully master this skill.

Test, score and position relative to fellow students	Evaluation of your skill
Mathematical reasoning ability (16.80/20)  The middle 50% of the prospective students	Average
Reading comprehension (20/20) This test measures your abilities to process and understand a text. 	High
Vocabulary knowledge (16.25/20)	Low

Reasoning (14/20) This test measures your reasoning skills.  	Average

What now?

General

View the Montoring Service's offerings of study and learning path guidance here or on the info site of the Monitoring Service Faculty Psychology and Educational Sciences (via Ufora).

Specifically

To tackle your studies in an efficient way, the Monitoring Service organizes the following sessions:

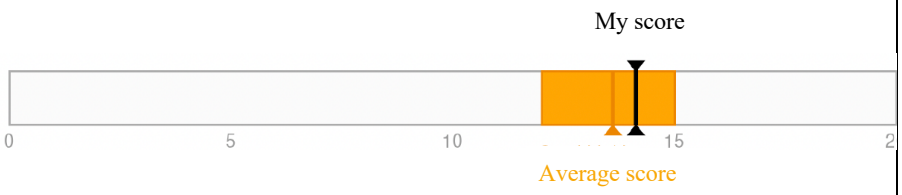
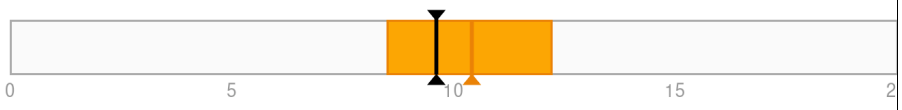
- Study wisely! A 2-part session studying more efficiently for students 1st bachelor Psychology/Pedagogical Sciences (1st and 2nd semester)
- Sessions "How do I study Statistics I?" (1st semester)
- Start2Plan A session study and exam preparation planning for students 1st bachelor Psychology/Pedagogical Sciences (1st and 2nd semester)
- Practice exams (1st semester)

Are you in need of an individual conversation? You can! Make an appointment with one of the study counselors via the e-mail address that belongs to your study program: psychologie.pp@UGent.be or pedawet.pp@UGent.be.

Language coaching and language advice

Looking for **language coaching or language advice**? Take a look at www.ugent.be/taaladvies.

Study Skills

Test, score and position relative to fellow students	Evaluation of your skill
Study skills: knowledge (14.12/20) This test measures your knowledge of study skills and learning strategies.  The middle 50% of the prospective students	Average
Study skills: skills (13.90/20) This test measures your abilities to use learning strategies effectively. 	High
Test anxiety (9.60/20) This test gives a picture of your test anxiety. A high score means more test anxiety. 	High

What now?

General

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To tackle your studies in an efficient way, the Monitoring Service organizes the following sessions:

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- Practice exams (1st semester)

Are you in need of an individual conversation? You can! Make an appointment with one of the study counselors via the e-mail address that belongs to your study program: psychologie.pp@UGent.be or pedawet.pp@UGent.be.

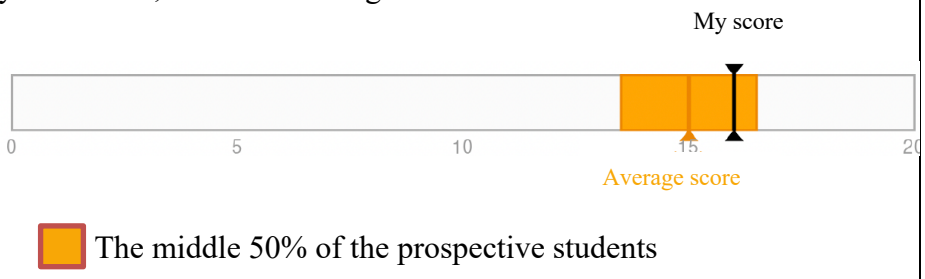
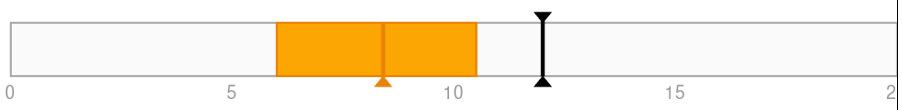
High score on test anxiety: take a fear of failure training course.

You will learn to:

- identify and redirect obstructive thoughts
- view situations in a realistic manner
- set achievable goals
- reduce physical tension and stress
- address procrastination and perfectionism

View training offerings.

Personality

Test, score and position relative to fellow students	Evaluation of your skill
Academic self-efficacy: commitment (16/20) This test gives an idea of how much effort you are willing to put into your studies, even when things are difficult. 	Average
Academic self-efficacy: comprehension (14.86/20) This test reflects the confidence you have in understanding the subject matter. Too much confidence can have a negative impact on study success. 	Average
Motivation: autonomous (13/20) A high score means that you want to take the course primarily because the course interests you and because you think studying is important. 	Low
Motivation: controlled (12/20) A high score means that you want to take the course primarily because others think it is important or because you feel you must take the course. 	High

Self-control (16.31/20) This test measures your self-control of how much you can resist temptation.  	High
Perseverance (15.33/20) Perseverance is what you need to make a lasting commitment during your studies.  	High

What now?

In a successful study, factors such as motivation, self-confidence, time commitment ... have an important share. This is why we focus on these aspects in the various Monitoring Service's sessions.

Low score on self-control: take a procrastination training course.

You acquire:

- insights into your

procrastination behavior

and learn:

- to handle your study method and schedule efficiently
- self-monitoring techniques
- problem-solving activation
- to clarify postponement excuses

View training offerings.

Summary scores

Below you can find a summary of all the scores achieved.

Section	Subtest	Score (/20)	Evaluation
Thinking and Reasoning	Mathematical reasoning skills	16.80	Average
	Reading comprehension	20	High
	Vocabulary knowledge	16.25	Low
	Reasoning	14	Average
Study Skills	Study skills: knowledge	14.12	Average
	Study skills: skills	13.90	High
	Test anxiety	9.60	High
Personality	Academic self-efficacy: commitment	16	Average
	Academic self-efficacy: understanding	14.86	Average
	Motivation: autonomous	13	Low
	Motivation: controlled	12	High
	Self-control	16.31	High
	Perseverance	15.33	High

Success probability formula

The chance of study success was calculated based on the tests below:

Mathematical reasoning skills; Language Skills; Test Anxiety; Academic self-efficacy: commitment; Academic self-efficacy: effort

For more information on the calculation of the chance of study success, see the guide at www.ugent.be/simonzegt.

Study Program Psychology High Chance of Study Success

SIMON ZEGT

Always bring this personal report to the study or learning path counseling.

Study program: Psychology

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- shows you on which skills you score well or not so well and
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Would you like to further strengthen certain skills? Be sure to check out the tutoring activities organized by the Monitoring Service and the Study Advice Department.

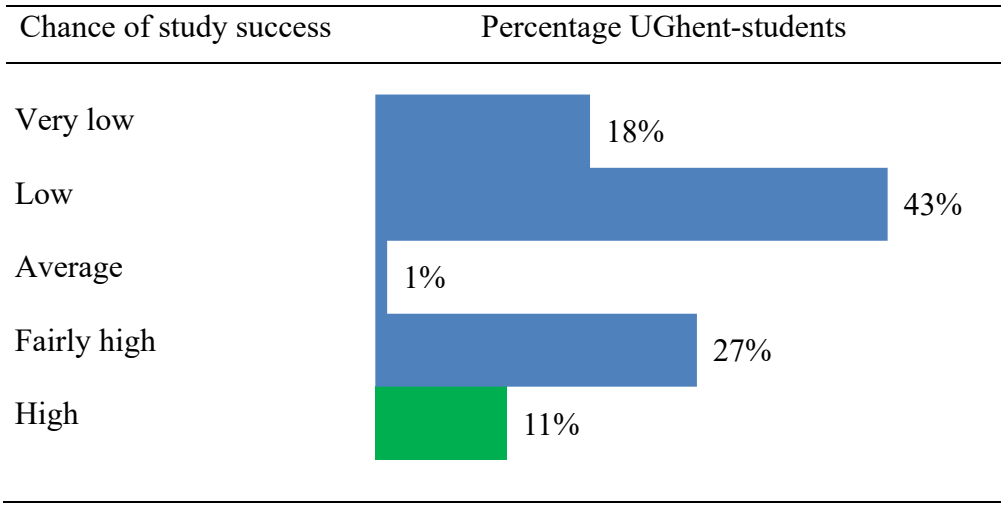
Do you have questions about ‘SIMON zegt’ feedback? Check out the student guide at ugent.be/simonzegt.

For every issue – no matter how small or 'innocent' it may seem – you have somewhere to turn. So, don't just stick with it alone! Take a look at Feel good about yourself.

Your calculated chance of study success in this study program is HIGH

Students with your scores have a good chance of succeeding in this study program. About 80% of students with a high chance of study success achieve the bachelor's degree in this study program within 4 years. Sustained effort, of course, remains necessary.

Below you can see how you (in green) scored, and how other UGhent students from your study program (in blue) scored.



Would you like to further sharpen certain skills? Be sure to check out the tutoring activities organized by the Monitoring Service and the Study Advice Department.

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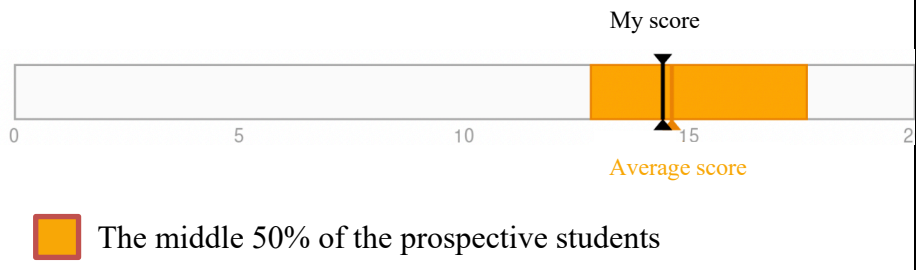
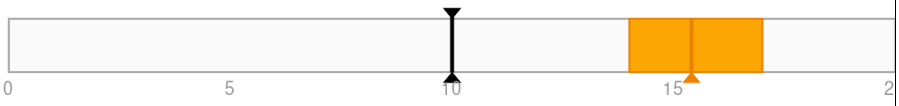
Test, score and position relative to fellow students	Evaluation of your skill
Mathematical reasoning ability (14.40/20) 	Average
Reading comprehension (12/20) This test measures your abilities to process and understand a text. 	Low
Vocabulary knowledge (16.50/20)	Low

	
Reasoning (10/20) This test measures your reasoning skills. 	Low

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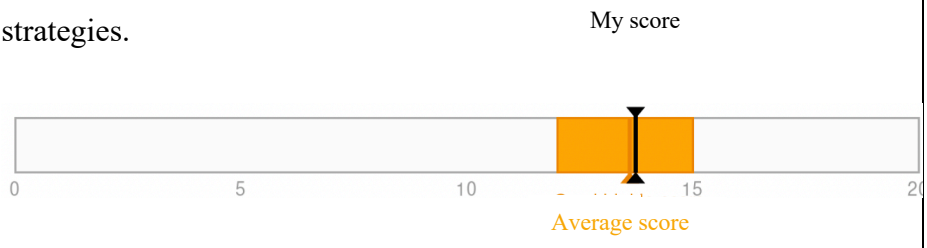
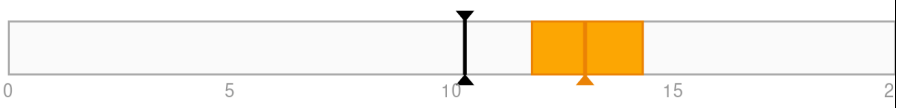
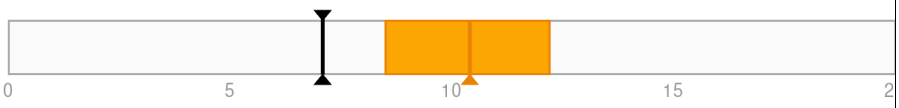
Study skills: knowledge (13.73/20) This test measures your knowledge of study skills and learning strategies. 	Average
Study skills: skills (10.29/20) This test measures your abilities to use learning strategies effectively. 	Low
Test anxiety (7.08/20) This test gives a picture of your test anxiety. A high score means more test anxiety. 	Low

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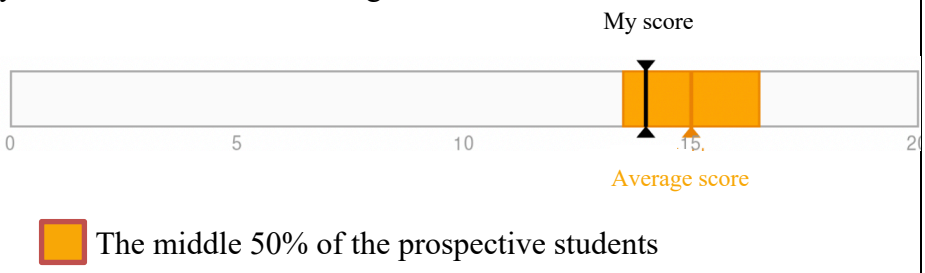
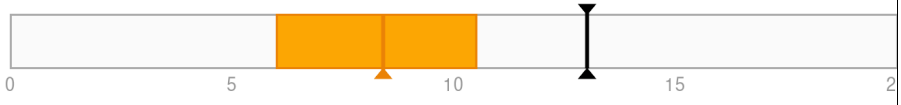
Academic self-confidence: commitment (14/20) This test gives an idea of how much effort you are willing to put into your studies, even when things are difficult. 	Average
Academic self-confidence: comprehension (15.14/20) This test reflects the confidence you have in understanding the subject matter. Too much confidence can have a negative impact on study success. 	High
Motivation: autonomous (16/20) A high score means that you want to take the course primarily because the course interests you and because you think studying is important. 	Average
Motivation: controlled (13/20) A high score means that you want to take the course primarily because others think it is important or because you feel you must take the course. 	High

Self-control (13.54/20) This test measures your self-control of how much you can resist temptation.  	Average
Perseverance (13.67/20) Perseverance is what you need to make a lasting commitment during your studies.  	Average

What now?

In a successful study, factors such as motivation, self-confidence, time commitment ... have an important share. This is why we focus on these aspects in the various Monitoring Service's sessions.

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Below you can find a summary of all the scores achieved.

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	Vocabulary knowledge	16.50	Low
	Reasoning	10	Low
Study Skills	Study skills: knowledge	13.73	Average
	Study skills: skills	10.29	Low
	Test anxiety	7.08	Low
Personality	Academic self-confidence: commitment	14	Average
	Academic self-efficacy: understanding	15.14	High
	Motivation: autonomous	16	Average
	Motivation: controlled	13	High
	Self-control	13.54	Average
	Perseverance	13.67	Average

Success probability formula

The chance of study success was calculated based on the tests below:

Mathematical reasoning skills; Language Skills; Test Anxiety; Academic self-efficacy: commitment; Academic self-efficacy: effort

For more information on the calculation of the chance of study success, see the guide at www.ugent.be/simonzegt.

Table S2

Items Intentional Feedback Engagement

	Item
IFE1	I will seek more feedback from others to develop competences discussed in my received SIMON feedback
IFE2	I will ask others for suggestions on how I could improve competences described in my received SIMON feedback
IFE3	Through my received SIMON feedback, I will voluntarily participate in study guidance activities organized by Ghent University
IFE4	Through my received SIMON feedback, I will ask a study counselor, mentor and/or study coach from Ghent University for a study guidance plan
IFE5	I will search for study guidance activities in line with competences described in my received SIMON feedback
IFE6	Through my received SIMON feedback, I will work on my study behavior

Note. The items were adapted from the behavioral and developmental change dimension of the Feedback in Learning Scale (FLS) (Jellicoe & Forsythe, 2019).

Table S3

Items Behavioral Feedback Engagement

	Item
BFE1	I have sought more feedback from others to develop competences discussed in my received SIMON feedback
BFE2	I have asked others for suggestions on how I could improve competences described in my received SIMON feedback
BFE3	Through my received SIMON feedback, I have voluntarily participated in study guidance activities organized by Ghent University
BFE4	Through my received SIMON feedback, I have asked a study counselor, mentor and/or study coach from Ghent University for a study guidance plan
BFE5	I have searched for study guidance activities in line with competences described in my received SIMON feedback
BFE6	Through my received SIMON feedback, I have worked on my study behavior

Note. The items were adapted from the behavioral and developmental change dimension of the Feedback in Learning Scale (FLS) (Jellicoe & Forsythe, 2019).

Table S4

Correlation Matrix

	1	2	3	4
1 Feedback with CoSS[b]	1			
2 FSE[a]	.36**	1		
3 IFE[a]	.11*	.20**	1	
4 BFE[a]	.08	.04	.58**	1

Note. **p* < .050, ***p* < .010. Pearson correlation coefficients are shown for two continuous variables. [a]Point-biserial correlation coefficients are shown when associated with the categorical variable. 'Feedback with CoSS'. CoSS = Chance of Study Success; FSE = Feedback Self-Efficacy; IFE = Intentional Feedback Engagement; BFE = Behavioral Feedback Engagement. [b]0 = (Very) Low, 1 = (Fairly) High.

Table S5

Observed Covariance Matrix

	1	2	3	4
1 Feedback with CoSS[a]	0.24			
2 FSE	0.14	0.60		
3 IFE	0.05	0.14	0.76	
4 BFE	0.03	0.02	0.37	0.55

Note. CoSS = Chance of Study Success; FSE = Feedback Self-Efficacy; IFE = Intentional Feedback Engagement; BFE = Behavioral Feedback Engagement. [a]0 = (Very) Low, 1 = (Fairly) High.

Table S6

Model-Implied Covariance Matrix

	1	2	3	4
1 Feedback with CoSS[a]	0.24			
2 FSE	0.14	0.60		
3 IFE	0.05	0.14	0.75	
4 BFE	0.01	0.02	0.37	0.55

Note. CoSS = Chance of Study Success; FSE = Feedback Self-Efficacy; IFE = Intentional Feedback Engagement; BFE = Behavioral Feedback Engagement. [a]0 = (Very) Low, 1 = (Fairly) High.

References

Jellicoe, M., & Forsythe, A. (2019). The Development and Validation of the Feedback in Learning Scale (FLS). *Frontiers in Education*, *4*, 1-17. https://doi.org/10.3389/feduc.2019.00084