Factors Affecting Student Engagement in Psychology Undergraduates Studying Online Statistics Courses in Indonesia

Astri Setiamurti[1]* , Rose Mini Agoes Salim[1] , Maridha Normawati[1], Atikah Ainun Mufidah[1] ,
Frieda Maryam Mangunsong[1] , Shahnaz Safitri[1]

[1]Faculty of Psychology, Universitas Indonesia, Depok, Indonesia
E-mail: setiamurti.astri@gmail.com, romy.prianto@gmail.com, maridha.normawati@gmail.com,
tikahainun@gmail.com, friemangun@gmail.com, shahnazsafitri@ui.ac.id

Abstract: This study aimed to assess the influence of students' intrapersonal factors, namely Academic Intrinsic Motivation (AIM), Perceived Creativity Fostering Teacher Behavior (P-CFTB), Academic Self-Efficacy (ASE), and Self-Regulated Learning (SRL) on student engagement in undergraduate psychology students taking online Statistics courses. A cross-sectional and quantitative design was used from October to December 2022. The data collection procedure used a convenience sampling technique, with questionnaires distributed online (via social media) and offline (via lecturers, the Student Executive Board, and the Association of the Faculty of Psychology from various universities in Indonesia). The research participants were psychology undergraduates who had studied and passed the Statistics courses online, with 671 filling out the questionnaire. The results showed that all students' intrapersonal factors, namely AIM, P-CFTB, ASE, and SRL, can determine student engagement by 66.9%, with ASE having the highest influence (23.99%) and P-CFTB having the lowest impact (9.78%). Moreover, the correlation value between SRL and SE was r = 0.700, p < 0.001, signifying a robust positive relationship between both variables.

Keywords: student engagement, perception of creativity fostering teacher behavior, academic self-efficacy, academic intrinsic motivation, self-regulated learning, online learning.

Introduction

Low student engagement reduces students' chances of acquiring the necessary talents and skills (Kuh, 2009). Besides students' ability to apply knowledge in more complex situations (Primana, 2015), students' memory of learning materials and final grades will also be low (Staikopoulos et al., 2015). Thus, student engagement has become a critical issue in higher education as it significantly influences the quality of learning students acquire (Staikopoulos et al., 2015; Xia et al., 2022). Moreover, due to COVID-19, Higher Education Institutions (HEIs) worldwide were forced to apply online learning methods. One of the issues often highlighted in online learning methods is closely related to student engagement (Czerkawski and Lyman, 2016; Xia et al., 2022). According to previous studies, online learning methods could increase student engagement (Khusniyah and Hakim, 2019; Kuntarto, 2017). On the contrary, studies in Indonesia found that online learning methods reduced student engagement (Fatoni et al., 2020; Rusman and Nasution, 2020; Sa'diyah, 2021).

Student engagement only happens when students involve their feelings and active thinking processes in learning (Harper and Quaye, 2009). Fatoni et al. (2020) found that 100 students from five universities in Indonesia experienced student engagement problems during online learning. This finding is supported by Rusman and Nasution (2020) on UIN Sumatera Utara Medan college students, who found that out of 191 students, only 4.71% had high student engagement during online learning. Furthermore, Sa'diyah (2021) found that students only join online classes to fulfill their attendance but ignore the lessons and do other activities. Thus making them have low student engagement.

Maulana and Iswari (2020), who analyzed student engagement in calculation-based courses, found that online learning in courses (such as Statistics) causes students to experience stress and difficulty

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*Corresponding author: setiamurti.astri@gmail.com

understanding the learning material. It made them have low student engagement scores. Moreover, students often view Statistics courses as very mathematical, challenging, and frightening because they use many formulas (Carpenter and McDonald, 2017; Waruwu, Hao and Hia, 2022; Zaimil, 2017).

Stress regarding statistics courses also occurs in psychology students. Suminta (2016) found psychology students are prone to experience anxiety when studying Statistics. For psychology students, besides being difficult, the Statistics courses are also felt to be unrelated to their future career choices (Lloyd and Robertson, 2012). In fact, those courses are one of the fundamental courses in the psychology program. From developing new therapy techniques to evaluating the effectiveness of strategies, it is a statistical analysis that plays a role in providing an overview and drawing conclusions. Psychologists use statistical analysis to find ways to interpret and draw conclusions from their data (Watts and Thomas, 2022). Given the importance of Statistics for Psychology students, it is urgent to explore the factors that can affect student learning engagement (Firmansyah, 2017; Ulpah, 2009).

Several studies exploring factors affecting student engagement in higher education have been conducted. Almarghani and Mijatovic's (2017) study showed that the lecturers' role and teaching skills are the most influential factors for student engagement. Elshami et al. (2022) explored that factors such as techno-pedagogical skills, self-directed learning, peer-assisted learning, and collaborative learning are required to support medical and health students' engagement in online learning. Calabrese et al. (2022) found that frequency and regular meetings, demographic factors such as course of study, expectation, and perception of students, can affect student engagement in personal tutoring schemes.

Student engagement is an interaction process between contextual or learning environment and intrapersonal factors (Christenson, Reschly and Wylie, 2012). Contextual factors include the context of teaching and social relationships (support from teachers, friends, and parents) (Christenson, Reschly and Wylie, 2012; Skinner, Kindermann and Furrer, 2009). However, several studies have found that contextual factors are not always able to predict student engagement. In fact, prior research had shown that students' perceptions of understanding contextual factors were predictive for student engagement (Christenson, Reschly and Wylie, 2012; van Petegem et al., 2007). The students' perceptions of these contextual factors belong to intrapersonal factors, such as how they perceive their learning experience and the source of knowledge (Christenson, Reschly and Wylie, 2012; Raviv et al., 2003).

Various intrapersonal factors have been reported to influence student engagement, such as academic self-efficacy (ASE) (Helsa and Lidiawati, 2021; Pramisjayanti and Khoirunnisa, 2022; Zhen et al., 2017), academic intrinsic motivation (AIM) (Dierendonck et al., 2023; Myint and Khaing, 2020), and self-regulated learning (SRL) (Lidiawati and Helsa, 2021; Setiani and Wijaya, 2020). ASE is a student's determination and behavior toward assignments and the educational process (Chang and Chien, 2015; Zhen et al., 2017). Students with low ASE showed more indifference and low engagement in learning (Bassi et al., 2007). In contrast, according to meta-analysis studies (Chang and Chien, 2015), students with high ASE scores had higher student engagement.

AIM is also strongly related to engagement. This is proven by Dierendonck et al. (2023), who found that students who study for intrinsic reasons tend to be more focused and actively engaged because they enjoy learning. The next intrapersonal factor that is positively related to student engagement is self-regulated learning (SRL) (Lidiawati and Helsa, 2021; Setiani and Wijaya, 2020). To improve academic achievement, students must have self-regulated learning skills to stay engaged in lectures, especially online learning.

Additionally, Primana (2015) found that college students in Indonesia perceive their lecturers as the primary source of knowledge. Students' perceptions of their lecturers also significantly impact student engagement (Pachler, Kuonath and Frey, 2019; Primana, 2015). Furthermore, Lawton and Taylor (2020) investigated college student perceptions of engagement and teaching strategies in the Introduction to Statistics course. They discovered activities that increased student engagement in online learning, such as when lecturers gave simulation-based instructions and asked students to carry out group discussions and independent study. On the other hand, students identified low engagement when there were no hands-on activities and students were only taking notes and listening during online classes.

A strategy and consistent effort of lecturers to encourage students to use their knowledge to think independently and flexibly by using new approaches to solve problems is called Creativity Fostering Teacher Behavior (CFTB) (Cropley, 1997). Based on Lawton and Taylor (2020) findings, we concluded that the concept of creativity fostering teacher behavior (CFTB) was strongly related to how students perceived the teaching strategies used by lecturers in the study. CFTB is a teaching strategy that aims to develop students' creative thinking or behavior" (Jeffrey and Craft, 2004). The CFTB concept also aligns with learning material in Statistics courses, which require flexible and creative thinking to solve complex calculation problems (Grégoire, 2016).

Up until now, most studies involving the CFTB variable measured CFTB from teachers' or lecturers' perceptions (Huang, 2022; Karwowski, Gralewski and Szumski, 2015; Palaniappan, 2009; Varatharaj, 2018); pre-service teachers (Katz-Buonincontro, Perignat and Hass, 2020; Kim et al., 2019; Orr and Kukner, 2015); and the effect of CFTB on students' creativity (Bell et al., 2014; Hafizi and Kamarudin, 2020; Mao et al., 2020; Zhang et al., 2022). Meanwhile, the research that examined the relationship and role of students' perceptions of CFTB on student engagement is still limited. Even though, since 2000, Soh has suggested that the research on CFTB should be measured based on student perceptions. Students' perceptions of CFTB in this study will be called perceived CFTB or P-CFTB.

As previous studies have shown, student engagement is more influenced by intrapersonal factors. In addition, as Rusman and Nasution (2020) stated, there is a need for research that explores the factors affecting student engagement in an online learning context. Therefore, it is vital to conduct exploratory research on students' intrapersonal factors by assessing the role of these factors in learning engagement in online Statistics courses. Rodgers (2008) also said that to increase teaching effectiveness and academic achievement, HEIs should consider developing online teaching strategies that encourage greater student engagement.

Although some studies have investigated the role of AIM (Cayubit, 2022; Giesbers et al., 2013; Gettle, 2022), ASE (Chang and Chien, 2015; Helsa and Lidiawati, 2021; Pramisjayanti and Khoirunnisa, 2022; Zhen et al., 2017), SRL (Lidiawati and Helsa, 2021; Nurfitri and Aslamawati, 2021; Setiani and Wijaya, 2020; Utami and Aslamawati, 2021) that influence student engagement, however their role in undergraduate psychology students taking online Statistics courses are still limited. Furthermore, empirical research on CFTB is limited to teacher/lecturer (Huang, 2022; Karwowski, Gralewski and Szumski, 2015; Palaniappan, 2009; Varatharaj, 2018) and pre-service teacher/lecturer (Katz-Buonincontro, Perignat and Hass, 2020; Kim et al., 2019; Orr and Kukner, 2015), so few studies examine student perceptions of CFTB. Therefore, the study hypothesizes that academic intrinsic motivation, perceived creativity fostering teacher behavior, academic self-efficacy, and self-regulated learning simultaneously can determine student engagement in undergraduate psychology students taking online Statistics courses.

Materials and Methods

Research Design
This study used a cross-sectional design from October to December 2022. The following criteria were emphasized for the selection of participants: (1) The psychology undergraduates need to have studied and passed the Statistics course through the online learning method, (2) The students should follow the appropriate time interval for studying the course, and (3) The period used by the undergraduates to complete the research questionnaire should not be more than three semesters. It has been done since the implementation of online learning methods by most HEIs in the last three semesters during the COVID-19 pandemic. The data collection procedure used a convenience sampling technique, with questionnaires distributed online (via social media) and offline (via lecturers, the Student Executive Board, and the Association of the Faculty of Psychology from various universities in Indonesia).

Table 1
Demographic Data of Participants (N= 533)

Demography		n	%
Gender	Female	435	81.61
	Male	98	18.39
Age (year)	18	32	6.00
	19	232	43.53
	20	199	37.34
	21	48	9.01
	>21	22	4.13
Semester	3	322	60.41
	4	3	0.56
	5	183	34.33
	7	21	3.94
	8	1	0.19
	>8	3	0.56
University Location (Province)	Aceh	1	0.19
	Banten	36	6.75
	DI Yogyakarta	9	1.69
	DKI Jakarta	219	41.09
	West Java	163	30.58
	Central Java	9	1.69
	East Java	63	11.82
	South Kalimantan	5	0.94
	South Sulawesi	3	0.56
	South Sumatera	22	4.13
	North Sumatera	3	0.56

Participants

The research participants were psychology undergraduates who had studied and passed the Statistics courses via online learning, with 671 filling out the questionnaire. However, only 533 participants met the selection criteria and were spread from 11 provinces in Indonesia, with the majority originating from DKI Jakarta (40.68%). Most of the participants were 19 years old (43.55%), female (81.54%), and 3rd-semester students (59.86%). A detail of participants' demographic data of participants can be seen in Table 1.

Research Instrument

This research used five research instruments, namely (1) The University Students' Engagement Inventory (USEI) by Morocco et al. (2016), (2) The Creativity Fostering Teacher Index (CFTIndex) by Soh (2000), (3) The Indonesian College Academic Self-Efficacy Scale (CASES) by Ifdil et al. (2019), (4) The Online Self-regulated Learning Questionnaire (OSLQ) by Mutiara and Rifameutia (2021), and (5) The Academic Motivation Scale (AMS) by Marvianto and Widhiarso (2019). Each instrument was tested for reliability through the Cronbach Alpha and CRiT values, with validity analyzed by using Confirmatory Factor Analysis (CFA). The fit index used as a criterion for the cut-off value was also CFI > 0.90, RMSEA < 0.08, and SRMR < 0.08 (Hu and Bentler, 1999; Schermelleh-Engel, Moosbrugger and Müller, 2003).

Students' Engagement (SE)

The Indonesian version of the University Student Engagement Inventory (USEI) instrument by Morocco et al. (2016) was adopted to measure students' engagement. This instrument consisted of three dimensions (cognitive, behavioral, and emotional engagement), each with five items. These items were then assessed using a 6-point Likert scale, with 1 to 6 emphasizing never to always, respectively. The

total value was counted by adding up the scores of each item. An example of a sample item is, "I usually do my homework on time." The Indonesian version of the USEI had a reliability value of Cronbach's α = 0.862, signifying that the instrument was reliable (Kaplan and Saccuzzo, 2017). All items also showed good internal validity, with CRiT values ranging from 0.261-0.647 (Nunnally and Bernstein, 1994). In addition, CFA showed that the USEI was valid due to meeting the goodness of fit criteria with chi-square = 3.72 (X^2 = 320.355; df = 86, p < 0.001), CFI = 0.905, RMSEA = 0.072, and SRMR = 0.067.

Academic Intrinsic Motivation (AIM)

AIM was measured through the Academic Motivation Scale (AMS) by taking three dimensions of Intrinsic Motivation from Vallerand et al. (1992), which has been adapted into the Indonesian version by Marvianto and Widhiarso (2019). It consisted of three factors, namely IM-to know, IM-toward accomplishment, and IM-to experience stimulation, each having four items. Using a 6-point Likert scale, namely 1 (do not correspond at all) to 6 (corresponds exactly), the total scores of AIM were obtained by adding up the scores of all items. The sentences in several items were also adjusted, such as the replacement of 'school' with 'college' to fit the research context. For example, a sample item stated, "Because I experience pleasure and satisfaction while learning new things." From the results, AMS had a reliability value of Cronbach's α = 0.896 and CRIT = 0.526 - 0.685. CFA also showed that AMS was valid due to meeting the goodness of fit criteria with chi-square = 4.17 (X^2 = 204.624; df = 49, p < 0.001), CFI = 0.945, RMSEA = 0.077, and SRMR = 0.040.

Perceived Creativity Fostering Teacher Behavior (P-CFTB)

Researchers adapted the Creativity Fostering Teacher Index (CFTIndex) instrument by Soh (2000) into the Indonesian version to measure lecturer creativity fostering from a student perspective, named Perceived CFTIndex (P-CFTIndex). This instrument initially contained 45 items, which was reduced to 27 after being adapted based on the CFTB-Index procedure by Lee and Kemple (2014). It still consisted of nine dimensions, each containing three items in the Indonesian version. Each item was also assessed using a 6-point Likert scale, namely 1 (never) to 6 (always). Moreover, the total score was obtained by adding up the scores of each item, with a sample example indicating the following, "Lecturer encourages me to try out what I have learned in different situations." From the results, P-CFTIndex had a reliability value of Cronbach's α = 0.944, signifying that the instrument was reliable. All items also showed good internal validity, with the CRiT values ranging from 0.357 to 0.713. In addition, CFA showed that P-CFTB measuring instrument was valid because of meeting the goodness of fit criteria with chi-square = 3.25 (X^2 = 936,660; df = 288, p < 0.001), CFI = 0.904, RMSEA = 0.065, and SRMR = 0.047.

Academic Self-Efficacy (ASE)

ASE was measured using the Indonesian CASES version by Ifdil et al. (2019), adapted from Owen and Froman (1988). This instrument initially contained 33 items, which were then reduced to 17 items and categorized into three dimensions. These dimensions included technical skills (5 items), overt social situation (6 items), and cognitive operation (6 items). The total score was calculated by adding up the scores of all items. Each item was also assessed by using a 6-point Likert scale, namely 1 (strongly disagree) to 6 (strongly agree), with a sample example presented as follows, "I master most of the lecture materials having many elements of calculation." From the results, CASES had a reliability value of Cronbach's α = 0.914, with CFA emphasizing its validity due to meeting the goodness of fit criteria with chi-square = 2.36 (X^2 = 1092.270; df = 462, p < 0.001), CFI = 0.905, RMSEA = 0.079, and SRMR = 0.054.

Self-Regulated Learning (SRL)

Online Self-Regulated Learning Questionnaire (OSLQ) was used to measure SRL (Barnard-Brak, Paton and Lan, 2010) and adapted to the Indonesian version by Mutiara and Rifameutia (2021). This instrument initially contained 24 items, which were then reduced to 21 elements after translation and categorized into six dimensions. These dimensions included environmental structuring, goal-setting, time management, help-seeking, task strategies, and self-evaluation, which consisted of 4, 5, 3, 2, 4, and 4 items, respectively. The items were also assessed using a 6-point Likert scale, namely 1 (strongly disagree) to 6 (strongly agree). Moreover, the total score was obtained by adding up the scores of each item, with the example of a sample stating the following, "I prepare questions before joining an online lecture-discussion session." OSLQ had a reliability value of Cronbach's α = 0.918 and CRIT = 0.377 - 0.673. CFA also showed that the instrument was valid due to meeting the goodness of fit criteria with chi-square = 3.63 (X^2 = 626.008; df = 172, p < 0.001), CFI = 0.906, RMSEA = 0.070, and SRMR = 0.055.

Research Procedure and Data Analysis

The procedures and instruments of this study were carefully reviewed by the Faculty of Psychology ethics committee under number 136/FPsi.Komite Etik/PDP.04.00/2022. The adaptation of measuring instruments into Indonesian versions (P-CFTIndex and USEI) was also carried out regarding the procedure of Beaton et al. (2000), which contained five stages, namely (1) translation, (2) synthesis, (3) back translation, (4) expert assessment, and (5) data collection. In addition, the results were analyzed by performing multiple regression through JASP software version 0.164.

Results

Statistic Descriptive Analysis

Pearson's test was carried out to determine the correlation of each variable, as described in Table 2. The results showed a moderate correlation among the variables, with ASE and SE showing the most vital relationship than other independent determinants ($r = 0.714$, $p < .001$). However, P-CFTB and SE exhibited a moderate correlation between the independent and the dependent variables ($r = 0.593$, $p < .001$), with P-CFTB and AIM portraying the weakest relationship (0.468).

Table 3 explains the descriptive analysis of each variable, where the range of values included 45-90, 37-72, 77-162, 90-193, and 45- 126 for SE, AIM, P-CFTB, ASE, and SRL, respectively. Based on the results, the Mean/Standard Deviation values were high for SE, AIM, and P-CFTB at 69.46/9.17, 58.20/7.72, and 126.47/18.18, respectively. Meanwhile, the Mean/Standard Deviation values were in the moderate category for ASE and SRL at 71.90/12.63 and 88.92/16.18, respectively.

Table 2.
Variables Intercorrelation

Variable	1	2	3	4	5
1. SE	—				
2. AIM	0.621***	—			
3. P-CFTB	0.593***	0.468***	—		
4. ASE	0.714***	0.505***	0.495***	—	
5. SRL	0.700***	0.503***	0.572***	0.676***	—

Note: * p < .05, ** p < .01, *** p < .001
SE = Students' Engagement, AIM = Academic Intrinsic Motivation, P-CFTB = Perceived Creative Fostering Teacher Behavior, ASE = Academic Self-Efficacy, SRL = Self-Regulated Learning

Table 3.
Descriptive Statistic

Variables	N	Mean	SD	Min	Max
1. SE	533	69.46	9.17	45.00	90.00
2. AIM	533	58.20	7.72	37.00	72.00
3. P-CFTB	533	126.47	18.18	77.00	162.00
3. ASE	533	71.90	12.63	90.00	193.00
4. SRL	533	88.92	16.18	45.00	126.00

Note: SE = Students' Engagement; AIM = Academic Intrinsic Motivation; P-CFTB = Perceived Creative Fostering Teacher Behavior; ASE = Academic Self-Efficacy; SRL = Self-Regulated Learning.

Table 4.
Participants' Categorization of Each Variable (N= 533)

Variable		Category		
		Low	Moderate	High
SE	score range	<40	40 ≤ x < 65	≥65
	n	0	157	376
	%	00.00	29.46	70.54
AIM	score range	<32	32 ≤ x < 52	≥ 52
	n	0	101	432
	%	00.00	18.95	81.05
P-CFTB	score range	<72	72 ≤ x < 117	≥117
	n	0	162	371
	%	00.00	30.39	69.61
ASE	score range	<45.3	45.3 ≤ x < 73.7	≥73.7
	n	11	283	239
	%	2.06	53.09	44.84
SRL	score range	<56	56 ≤ x < 91	≥91
	n	12	280	241
	%	02.25	52.53	45.22

Note: SE = Students' Engagement; AIM = Academic Intrinsic Motivation; P-CFTB = Perceived Creative Fostering Teacher Behavior; ASE = Academic Self-Efficacy; SRL = Self-Regulated Learning.

Table 4 presents the participant categorization of each variable, where the majority of samples were observed in the high category for SE (70.54%), AIM (81.05%), ASE (50.47%), and P-CFTB at 70.54%, 81.05%, 50.47%, and 69.61%, respectively. However, most participants on the SRL variable were included in the medium category at 52.53%.

Multiple Linear Regression Prerequisite Test

Multiple regression analysis was employed to determine whether the research model's four independent variables (IVs) collectively possess predictive abilities for student engagement. When assessing multiple linear regression models, it is crucial to meet at least four prerequisite tests: multicollinearity, data linearity, homoscedasticity, and multivariate normality (Osborne and Waters, 2002).

Multicollinearity Test

The multicollinearity test was applied to gauge the degree of correlation among the independent variables. Midi, Sarkar and Rana (2010) stipulated that there is no multicollinearity when the tolerance value is >0.1 and the Variance Inflation Factor (VIF) is <10. Table 5 demonstrates the tolerance values for each variable are >0.1, and the VIF values for all variables are <10, signifying that the model meets the multicollinearity requirement.

Table 5.
Multicollinearity Test Result

Model		Collinearity Statistics	
		Tolerance	VIF
H$_1$	(Intercept)		
	AIM	0.664	1.506
	P-CFTB	0.620	1.614
	ASE	0.499	2.005
	SRL	0.456	2.195
a. Dependent variable: Student Engagement			

Data Linearity Test

The data linearity test establishes a linear relationship among the independent variables (Hayes, 2015). It is tested by examining the scatterplot between the DV and each IV. The outcomes of the linearity test, illustrated in Figure 1 below, indicate the presence of a linear relationship between the dependent and independent variables, thereby fulfilling the linearity assumption.

Homoscedasticity Test

A scatterplot of residuals against predicted values is used to evaluate homoscedasticity (Hariyanto, Triyono and Köhler, 2020). Figure 2, presented below, illustrates the data distribution pattern, signifying that the assumption of homoscedasticity has been met.
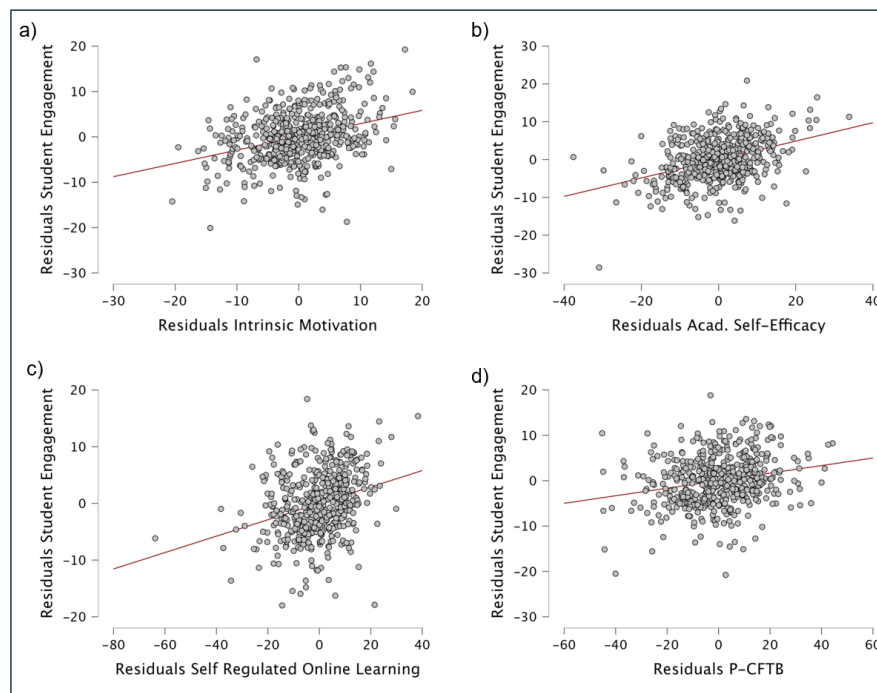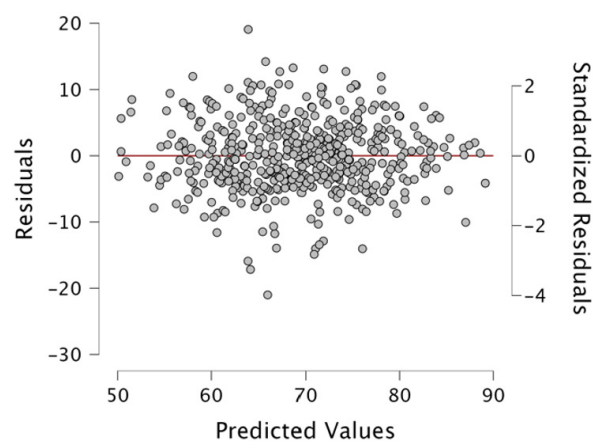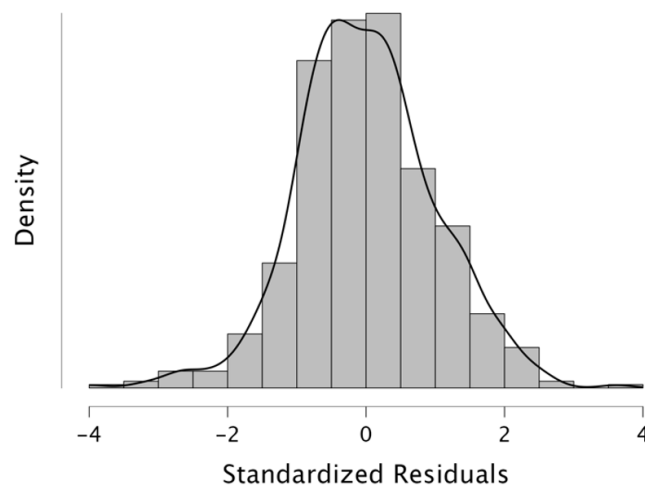

Figure 1. Data Linearity Test Results

Figure 2. Homoscedasticity Test Result

Multivariate Normality Test

The multivariate normality test is used to verify the normal distribution of data. Figure 3 indicates that the residuals conform to a normal distribution, affirming that the model meets the multivariate normality assumption.

Figure 3. Normal Distribution Curve

Multiple Linear Regression Results

Multiple linear regression was conducted after all the prerequisite tests showed that the results met the requirement. Table 6 below shows that F = 267.358; p < 0.001, meaning that AIM, P-CFTB, ASE, and SRL can significantly determine student engagement. This means the research hypothesis is accepted. Table 6 also shows that multiple linear regression's coefficient of determination (R2) is 0.669. Based on the guidelines for interpreting the coefficient of determination (R2) by Sarjana, Hayati and Wahidaturrahmi (2020), 0.669 is included in the strong influence category. This means that AIM, P-CFTB, ASE, and SRL significantly predict learning engagement with an influence contribution of 66.90%, with the remaining 33.10% influenced by variables not included in this study.

Table 6.
Multiple Linear Regression Model Summary

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
H_0	0.000	0.000	0.000	9.168	0.000		0	532	
H_1	0.818	0.669	0.667	5.291	0.669	267.358	4	528	< .001

Table 7.
Coefficients

Model		Unstandardized (B)	Standard Error	Standardized (Beta)	t	p
H_0	(Intercept)	69.460	0.397		174.919	< .001
H_1	(Intercept)	11.539	1.969		5.859	< .001
	AIM	0.292	0.036	0.246	8.022	< .001
	PCFTB	0.083	0.016	0.165	5.188	< .001
	ASE	0.244	0.026	0.336	9.477	< .001
	SRL	0.145	0.021	0.255	6.885	< .001

a. DV: Student Engagement
Note: SE = Students' Engagement; AIM = Academic Intrinsic Motivation; P-CFTB = Perceived Creative Fostering Teacher Behavior; ASE = Academic Self-Efficacy; SRL = Self-Regulated Learning.

From Table 7 above, the relationship between variables can be seen in the following equation:
Y = α + β1X1 + β2X2 + β3X3 + β4X4 + e
Y (SE) = 11.539 + 0.292*AIM + 0.083*PCFTB + 0.244*ASE + 0.145*SRL + e

From the multiple linear regression equation above, it can be explained as follows:

a) The constant (α) has a positive value of 11.539. This shows that if all independent variables are worth 0, the base value of student engagement is 11.539.

b) For every percentage increase in AIM, student engagement increases by 0.292, assuming other independent variables remain constant.

c) For every percentage increase in P-CFTB, student engagement increases by 0.083, assuming other independent variables remain constant.

d) For every percentage increase in ASE, student engagement increases by 0.244, assuming other independent variables remain constant.

e) For every percentage increase in SRL, the student engagement increases by 0.145, assuming other independent variables remain constant.

To determine the amount of influence of each independent variable on the dependent variable partially, we used the Beta*Zero Order formula. Based on the formula, it is known that the most significant influence comes from the ASE, with an influence contribution of 23.99%. This is followed by the SRL, which contributes an influence of 17.85%, the AIM of 15.27%, and the P-CFTB of 9.78%.

Discussions

This study provides an overview of the interaction between intrapersonal factors, namely Academic Intrinsic Motivation (AIM), Academic Self-Efficacy (ASE), Self-Regulated Learning (SRL), and Perceived Creativity Fostering Teacher Behavior (P-CFTB), in predicting student engagement in undergraduate psychology students taking online statistics courses. Hypotheses were examined to test whether these intrapersonal factors simultaneously affect student engagement. The results found that the four independent variables studied (AIM, ASE, SRL, and P-CFTB) significantly determined student engagement, with a contribution of 66.9%. Based on the research results above, it can be concluded that the study's hypothesis is confirmed. These results support findings in previous studies that state that intrapersonal factors are the main factor in predicting student engagement (Christenson, Reschly and Wylie, 2012; van Petegem et al., 2007).

Furthermore, we examined the power contribution of each independent variable to student engagement. The results showed that AIM significantly predicted SE among psychology undergraduates in online Statistics courses ($R2=15.27\%$; $p<0.001$). The results supported Gettle (2022), where AIM significantly affected SE in psychology undergraduate students. The findings of this study also support the findings reported by Giesbers et al. (2013) and Gettle (2022), who discovered that intrinsic motivation is closely linked to student engagement in online learning by utilizing technologies in applications, such as chat, webcams, and microphones. The academic achievement of students is also strongly related to student engagement through the usage of these tools.

Furthermore, ASE had the most significant influence on SE at 23.99%, compared to other variables. The findings support Warwick's statement (Warwick's, 2008) that student self-efficacy predicts student involvement. Students who have confidence that they are capable will be more persistent in facing difficulties. On the other hand, students with low self-efficacy will feel helpless and less persistent in completing complex tasks. In line with this, research by Helsa and Lidiawati (2021) found that self-efficacy had an effect of 36.9% on student learning engagement. Pramisjayanti and Khoirunnisa's (2022) study also found that self-efficacy influenced 64.9% of student engagement in online learning.

The results also revealed that SRL significantly affected SE at an impact level of 17.85%. This was not in line with Lidiawati and Helsa (2021), where a more significant effect of SRL on SE was observed at 55.9%. Nurfitri and Aslamawati (2021) found that self-regulated learning has a 57% impact on student engagement. A similar result was also found in Utami and Aslamawati (2021), who explained that the effect of self-regulated learning was 52.8% on student engagement. These differences emphasized specific research measuring students' SRL abilities when learning Statistics courses.

Moreover, this study found that student perceptions of creativity fostering teacher behavior (P-CFTB) can predict student engagement in online learning, with a 9.78% contribution. Students' perceptions of teaching strategies that encourage creativity, such as independent learning, opportunities to develop and share ideas, divergent thinking, reflection, learning opportunities with a variety of materials and conditions, and support for overcoming failures, play a significant role in predicting student engagement in students who take online Statistics courses. In line with previous research has found that students' attitudes and beliefs about lecturers influence student engagement in the classroom (Christenson, Reschly and Wylie,

2012; Pachler, Kuonath and Frey, 2019; Primana, 2015; Raviv et al., 2003).

Solving statistical problems requires the ability to think creatively. Therefore, creative teaching strategies (teaching for creativity) will also influence students' attitudes toward the statistics learning process, and attitudes toward learning significantly positively affect learning achievement (Hu, Deng and Guan, 2016). This finding also expands on research by Golder (2018) and Lawton and Taylor (2020) regarding student perceptions of lecturer behavior. Golder (2018) found that students' perceptions of their lecturers significantly related to their attitudes toward learning. Furthermore, Lawton and Taylor (2020) found that students' perceptions of independent teaching and learning strategies can increase student engagement.

Additionally, this research found that ASE strongly and significantly correlated with SE in statistics courses (r = 0.714, p < 0.001). This was not in line with this previous research; Fan and Williams (2010) showed that students' ASE in mathematics and English significantly correlated with engagement in these subjects. The results confirmed that the correlation between these variables was more substantial in English lessons (r = 0.54) than in mathematics (r = 0.49). It means that in this research, students will be more engaged in the learning process if they believe they can learn.

Furthermore, the correlation value between SRL and SE was r = 0.700, p < 0.001, signifying a robust positive relationship between both variables. The result differs from Setiani and Wijaya (2020), who reported a weak positive correlation between both variables (r = 0.262). However, the effect aligned with Lidiawati and Helsa (2021), who found a strong positive correlation between SRL and SE (r = 0.748). The strong positive correlation can happen because, according to Bond and Bedenlier (2019), cognitive engagement and the ability towards self-regulation are highly associated. Anjarwati and Sa'adah (2021) also explained that student engagement in the period of online learning is known to increase student participation from students' cognitive and behavioral aspects.

Conclusions

This study found students' intrapersonal factors, namely Academic Intrinsic Motivation (AIM), Academic Self-Efficacy (ASE), Self-Regulated Learning (SRL), and Perceived Creativity Fostering Teacher Behavior (P-CFTB), can determine student engagement by 66.9%, with ASE having the highest influence (23.99%) and P-CFTB having the lowest impact (9.78%). It also found that most participants belong to the high SE, P-CFTB, AIM, ASE, and moderate SRL categories. There was also a moderate correlation among the variables, with ASE and SE showing the most substantial relationship (r = 0.714, p <.001). However, P-CFTB and SE exhibited a moderate correlation between the independent and the dependent variables (r = 0.593, p <.001), with P-CFTB and AIM portraying the weakest relationship (0.468). This indicated that the strongest and weakest correlation values were found between ASE-SE and P-CFTB-SE, respectively. The results also showed that P-CFTB, AIM, ASE, and SRL increased SE among Psychology undergraduates taking online Statistics courses.

The limitation of this study is the high-value questionnaire items, causing participants to experience fatigue during the fill-out process. The variables also promoted a high social desirability tendency. Subsequently, a delay was found between filling out the questionnaire and completing the Statistics courses. For example, when filling out the data instrument, students were already in semester 5, despite the last Statistics courses conducted in semester 3.

According to the research, students' intrapersonal factors in online Statistics courses significantly impact their level of engagement. Therefore, statistics lecturers are expected to create a learning atmosphere that enhances students' intrapersonal factors, namely AIM, P-CFTB, ASE, and SRL. The research implies that our study can pinpoint the contribution of intrapersonal factors that affect student engagement, enabling statistics lecturers to give these internal factors more attention.

Acknowledgments

Conflict of interests
The authors declare no conflict of interest.

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Author Contributions

Conceptualization, A.S., R.M.A.S, M.N., A.A.M., F.M.M., and S.S.; methodology, A.S., R.M.A.S, M.N., A.A.M., F.M.M., and S.S.; formal analysis, A.S., R.M.A.S, M.N., A.A.M., F.M.M.; writing—original draft preparation, A.S., M.N., and A.A.M.; writing—review and editing, A.S., M.N., and A.A.M. All authors have read and agreed to the published version of the manuscript.

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