Exploring the Influence of Intrinsic and Extrinsic Motivation on Academic Performance With Flow as a Mediator

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Abstract

This study investigates the intricate relationship between intrinsic and extrinsic motivation, flow experiences, and academic performance among 554 University of Groningen psychology students. The findings underscore the crucial role of student engagement, characterized by intrinsic motivation in shaping academic success. Specifically, a significant positive correlation is observed between intrinsic motivation and GPA, highlighting the importance of students' sincere interest and commitment to their studies. Moreover, flow experiences during studying positively correlate with GPA, emphasizing the necessity of creating conducive learning environments that foster students' engagement and absorption in their academic tasks. Further analysis reveals the partial mediation of the relationship between intrinsic motivation and GPA by flow experiences. Notably, extrinsic motivation demonstrates no significant correlation with GPA, suggesting that external rewards or pressures may not directly influence academic achievement. Future research should explore additional moderators and mediators of motivation and academic performance relationships, considering individual differences and contextual factors. Longitudinal and cross-cultural studies can offer insights into the long-term effects and cultural variability of motivational processes, enhancing our understanding of student success.

Keywords: motivation, flow experience, academic performance, university students, GPA

Exploring the Influence of Intrinsic and Extrinsic Motivation on Academic Performance With Flow as a Mediator

Motivation, cognitive processes, and academic achievement are longstanding areas of interest in academia, motivating researchers to probe their complex interconnections. This study aims to explore the associations between intrinsic and extrinsic motivation, flow experiences, and academic performance among university students. Specifically, it seeks to examine how intrinsic and extrinsic motivation predict academic achievement with flow as a mediator.

Motivation, a fundamental driver of human behavior, encompasses a broad spectrum of factors. It is often characterized by intrinsic motivation, where individuals engage in activities for their inherent enjoyment (Deci & Ryan, 1985), and extrinsic motivation, which involves external rewards or pressures to achieve specific goals (Deci & Ryan, 1985; Mustafa et al., 2010). In the academic context, intrinsic motivation is propelled by personal interest and a thirst for knowledge, while extrinsic motivation may stem from factors such as grades or societal expectations (Deci, 1975; Lee, 2005; Mustafa et al., 2010). While intrinsic motivation propels individuals to engage in activities for the inherent satisfaction they provide, extrinsic motivation often arises from the pursuit of external rewards or the avoidance of punishment. In the academic context, understanding these distinctions is crucial for exploring their differential impacts on student performance and learning outcomes.

Despite the extensive exploration of motivation and cognitive processes, the concept of "flow" remains relatively unexplored within the academic context. "Flow," as described by Csikszentmihalyi and Rathunde (1992), refers to a state of complete immersion and absorption in an activity, characterized by intense focus, heightened enjoyment, and a loss of self-awareness. A person engaged in flow has a goal to reach, which they are completely focused on (Faria, 2016). Flow has a strong positive correlation with learning engagement in

students (Brom et al., 2017). To facilitate students in experiencing flow, adjustments can be made to the settings and structure of activities, promoting conditions that either encourage flow or impose fewer restrictions (Mehta & Vyas, 2022). Understanding how motivational factors and cognitive processes intersect within the state of "flow" is essential for unraveling its implications for academic success (Harmat et al., 2016; Norsworthy, Jackson, & Dimmock, 2021).

Despite the extensive exploration of motivation and cognitive processes, the concept of "flow" remains relatively underexplored within the academic context. "Flow," as described by Csikszentmihalyi and Rathunde (1992), refers to a state of complete immersion and absorption in an activity, characterized by intense focus, heightened enjoyment, and a loss of self-awareness. Understanding how motivational factors and cognitive processes intersect within the state of "flow" is essential for elucidating its implications for academic success (Harmat et al., 2016; Norsworthy, Jackson, & Dimmock, 2021).

Moreover, it could be, that cognitive processes significantly influence academic experiences. These processes, including curiosity, interest, and the pursuit of mastery, are intrinsic to students' motivation and engagement with academic material (Lee, 2005; Cacioppo & Petty, 1982; Cacioppo et al., 1996), thus can perhaps provide insight for investigating the dynamics between intrinsic motivation, flow experiences, and academic performance.

Literature review

Multiple research studies have indicated that individuals with elevated intrinsic motivation for academics, spanning from childhood through adolescence and across diverse demographic groups, tend to demonstrate greater competence in academic settings. This typically manifests in higher academic achievement, more favorable perceptions of academic ability, reduced academic anxiety, and lower reliance on extrinsic motivation (Gottfried,

A.W., Gottfried, Cook, & Morris, 2005). According to Afzal et al. (2010), students with high levels of intrinsic motivation consistently outperform their counterparts who lack such internal drive. Intrinsically motivated individuals embrace challenges with enthusiasm, demonstrating a personal commitment to achieving academic excellence and expanding their knowledge base.

Different results can be found on the influence of extrinsic motivation on academic success. Areepattamannil, Freeman, and Klinger (2011) found a negative correlation between extrinsic motivation and academic achievement among Indian immigrant adolescents in Canada and no correlation between extrinsic motivation and academic achievement among Indian students in India. Lepper et al. (2005) also demonstrated a negative correlation between extrinsic motivation and students' academic achievement. Lemos and Verissimo (2014) observed a negative association between extrinsic motivation and students' achievement at the conclusion of elementary school as well.

Research has shown that intrinsic motivation is positively associated with experiencing flow states. Intrinsic motivation, characterized by engaging in an activity for its inherent enjoyment or interest, often leads individuals to experience flow, which is a state of deep concentration and enjoyment in an activity. Csikszentmihalyi (1990) proposed that individuals are more likely to enter flow states when they are intrinsically motivated, as they are naturally drawn to activities that they find inherently rewarding or enjoyable. We would like to confirm that hypothesis, as well as research, whether the existence of this association mediates the relationship between intrinsic motivation and academic performance.

Previous research among students, namely architecture students, by Mills and Fullagar (2008) explained that there was no significant effect on the correlations between each type of extrinsic motivation and flow when controlling for the effects of intrinsic motivation. On the other hand, Kowal and Fortier (1999) discovered a notable association between self-

determined extrinsic motivation and flow, and a nonsignificant, but negative association between non-self-determined extrinsic motivation and flow within a cohort of swimmers. We would therefore like to discover if there is a significant relationship between extrinsic motivation and flow, and if so, how it mediates the relationship between extrinsic motivation and academic performance.

Lastly, Schüler (2007) found out, that flow experience was positively associated with exam performance. We aim to replicate the findings in our study as well, seeking a positive association between flow and academic performance.

This study aims to address a gap in the literature by investigating the dynamic relationships between intrinsic and extrinsic motivation and the occurrence of "flow" states in academic settings. We seek to provide a comprehensive understanding of how these factors interact to influence students' academic experiences and achievements.

Research Problem and Hypotheses

Specifically, the research problem revolves around the following question: What are the influences of intrinsic and extrinsic motivation on the occurrence of "flow" states in academic contexts, to what extent do intrinsic and extrinsic motivation independently predict academic performance, and how does the occurrence of "flow" contribute to this relationship?

Furthermore, based on the research problem, we have formulated the following hypotheses:

H1: Intrinsic motivation positively predicts academic performance.

H2: Intrinsic motivation positively predicts the occurrence of "flow" in academic studies.

H3: "Flow" in academic studies mediates the relationship between intrinsic motivation and academic performance.

H4: Extrinsic motivation negatively predicts academic performance.

H5: Extrinsic motivation negatively predicts the occurrence of "flow" in academic studies.

H6: "Flow" in academic studies mediates the relationship between extrinsic motivation and academic performance.

H7: "Flow" in academic studies positively predicts academic performance.

This study seeks to explore the relationships between intrinsic and extrinsic motivation, flow experiences, and academic performance among university students. By investigating how these factors interact, we aim to gain insight into their combined influence on student success in academic settings. Through this investigation, we hope to provide valuable understanding that can inform strategies for improving educational practices and enhancing student outcomes.

Methods

Participants

The participants in this study initially included 742 Bachelor of Psychology students at the University of Groningen. First-year participants were recruited through the compulsory SONA program, earning points for course completion, while second and third-year students not participating via the same program were recruited through a paid SONA system, social networks of student researchers, and advertisements on campus and received a small monetary reward for their involvement.

We excluded participants based on the following predefined criteria: non-given consent, wrongly answered pseudo items that tested if the participants were paying attention, non-completion of all the scales we used, unavailability of data about their grade, age eligibility with the ASRS scale’s requirement for adults and questions about honesty and language proficiency. After the first question regarding consent to participate, 32 participants were excluded, followed by an additional 34 after the second question concerning the consent for processing student numbers for grade access. Subsequent scale completions further narrowed the sample: 30 participants did not complete the AMS scale, 1 participant did not

complete the DFS2 scale, and another 1 did not complete the ASRS scale. We decided to exclude any non-completed questionnaire data due to concerns about the general validity of that specific data set. Quality checks following scale completions resulted in 5 exclusions for participants who answered the pseudo item in the AMS scale incorrectly, while no exclusions were made for the pseudo item in the ASRS scale. Additional checks for honesty led to the exclusion of 2 participants. The check for perceived English proficiency resulted in no further exclusions. Exclusion based on age eligibility, aligning with the ASRS scale's requirement for adults, led to the elimination of 13 participants. An additional 39 participants were excluded due to the unavailability of data about their grades. After these steps, 585 participants remained, each with complete data across all scales, including information about academic performance.

Demographically, the final sample was diverse. Among them, 430 had their biological sex assigned at birth as female, 153 as male, and 2 participants preferred not to disclose their biological sex assigned at birth. Nationalities varied, with 311 participants being Dutch, 125 German, and 149 representing other nationalities. The age range was 18 to 35, with a mean age of 20.2479 (SD = 2.1641). Occupationally, 417 participants were full-time students, while 168 were working students. The distribution across academic years included 469 participants in their 1st year, 40 in their 2nd year, and 76 in their 3rd year of studies. Educational backgrounds ranged from upper secondary education to Master's or equivalent degrees. Among the participants, 508 finished upper secondary education - high school, six finished post-secondary vocational education preparing for labor market entry, 10 finished short-cycle higher education, 29 participants had already obtained a Bachelor's degree or equivalent, and two had obtained a Master's degree or equivalent. None of the participants had obtained a Doctoral or a higher degree, and 30 were unsure about their highest completed level of formal education.

Materials/ Measures

An online self-report was used with Qualtrics, containing seven scales, namely, Hyperfocus in School Scale of the AHQ, Short-Dispositional Flow Scale, Need for Cognition, The Utrecht work engagement scale for students, Academic Motivation Scale, Adult ADHD Self-Report Scale, and Five Dimensional Curiosity Scale. The self-report was formulated in English. To address the primary research question, two of these questionnaires were utilized, the Short Dispositional Flow Scale and the Academic Motivation Scale.

The Academic Motivation Scale (AMS) included 28 items measuring motivation toward education on a Likert scale (Vallerand et al., 1992). AMS is a translation of the 1989 French Echelle de Motivation en Education (EME) by Vallerand et al. (1992). Within AMS, there are seven subscales, assessing three types of intrinsic motivation, three types of extrinsic motivation, and amotivation. More specifically, it measures intrinsic motivation to know (e.g. a student that goes to school for the pleasure of learning something new), intrinsic motivation toward accomplishment (e.g. the motivation of a student to surpass themselves and the enjoyment associated with it), intrinsic motivation to experience stimulation (e.g. students who go to class to experience the excitement of stimulating class discussions), extrinsic motivation-identified (e.g. “I’ve chosen to study tonight because it is something important for me”), extrinsic motivation-introjected (e.g. “I study the night before the exams because that is what good students are supposed to do”), extrinsic motivation-external regulation (e.g. “I study the night before the exams because my parents force me to”), and amotivation, with four items in each subscale. We combined the scores of the subtypes of IM and separately of those measuring EM to transform them into a mean score of extrinsic and intrinsic motivation per student. We calculated the internal reliability for both our subscales, intrinsic motivation, and extrinsic motivation. The internal reliability of IM yielded a Cronbach’s Alpha of .89 while the Cronbach’s Alpha of EM was .85 in our sample. Internal reliability for the seven

subscales has been shown by previous studies and typically ranged from .83 to .86, apart from the Identification subscale which yielded a lower internal reliability score from .62 to .78 (Vallerand et al., 1992). Additionally, investigating the AMS subscales yielded fairly strong discriminant and convergent reliability, providing evidence of the distinctiveness of the seven subscales (Fairchild et al., 2005).

Flow was measured through the Short Dispositional Flow scale (DSF-2) (Jackson et al., 2008). It is a modified version of the DSF-2 scale, which is shortened from 36 to nine items, representing each of the nine flow dimensions conceptualized by Csikszentmihalyi (1990). The nine dimensions are the following: (1) challenge-skills balance, (2) merging of action and awareness, (3) clear goals, (4) unambiguous feedback, (5) concentration on the task at hand, (6) sense of control, (7) loss of self-consciousness, (8) transformation of time, and (9) autotelic experience. The short DSF-2 scale measures one item per flow dimension on a five-point Likert scale. The students were asked to imagine themselves in a studying situation by the following sentence: "When I'm studying…" followed by a description of one of the nine dimensions of flow. The students had to respond on a five-point Likert scale about how much they experienced that dimension. The introductory sentence is our modification from the original DSF-2 scale and operationalized for our academic setting. Previous research showed a reliability score for this scale of around .80 after cross-validation, and a high internal consistency score from .78 to .90. The shortened dispositional scale is reliable, and more effective than the long DSF-2 for multimethod studies due to its shortened length (Jackson & Eklund, 2002) which made it a better choice considering the students needed to fill in other scales as well. The internal reliability of the DSF-2 scale yielded a Cronbach's Alpha of .73 in our sample.

To measure academic success, the grades of the students were collected from the student office. We calculated the grade point average by calculating the mean of the grades

achieved by the students. In the questionnaire, we included four attention-check questions to confirm if the participant paid attention to the questions and did not answer randomly.

Procedure

After the approval by the Ethics Committee of the Psychology Faculty of the University of Groningen, the data collection started. The participants were asked to fill in an online questionnaire of around 20–25 minutes. The participants were informed of the goals of the study and no deception was involved. Participation for the students was voluntary, and they could quit at any time. Students then had to fill in the consent form to take part in the study after which they received several questions about their personal data and demographic characteristics (age, sex). Then, the scales we used were introduced as questions about "hunger for knowledge" and included all the items of the AMS scale and the DSF-2 scale. Students were told that no negative consequences of participation were expected and that the data is pseudonymous. Finally, an honesty question was included to ask participants if they filled in the questionnaire truthfully, a question confirmed English capabilities and asked participants if they think their English is good enough to answer the questionnaire reliably.

Design

Our research design is correlational. We are planning to use two mediation models as there is multicollinearity between our predictors and using two separated models enables us to differentiate easily between the unique explained variance of both predictors. We measured the variables through the different scales and assessed the grades of the participants. The measured variables are the following. There are two predictors, namely extrinsic and intrinsic motivation, one mediating variable, flow, and a dependent variable, academic success.

Results

Assumptions

From the sample of 585 students left after excluding the ones who did not complete the study or give access to their grades, Cook's distance was utilized to detect outliers, resulting in the identification of 31 participants with Cook's distance higher than the threshold of $4/n = 0.0068$. These outliers were subsequently removed from the dataset to ensure the robustness of the analysis, making the final $N = 554$. The variables are normally distributed, as checked by examining the histogram of the residual data (Appendix, Chart 1). The residual plots were used to check for heteroscedasticity and linearity between variables (Appendix, Chart 2). No pattern was observed, thus confirming that the assumptions of normality, homoscedasticity, and linearity are met.

Descriptives

Descriptive statistics for the variables of interest are presented in Table A1. The Grade Point Average (GPA) data exhibit notable variability, spanning from 3.75 to 9.35 among sampled students. With a mean GPA of 6.91 and a standard deviation of 0.997, this range underscores the diverse academic performance levels captured within the sample, reflecting varying degrees of success in students' studies. Flow scores, indicating students' experiences of optimal concentration and enjoyment during studying, range from 1.67 to 4.78. The mean flow score of 3.42 suggests moderate levels of flow experiences on average. However, a standard deviation of 0.506 reveals variability in flow occurrences among students, highlighting differences in engagement during academic tasks. Extrinsic Motivation (EM) scores range from 2.00 to 7.08, with a mean of 5.20 and a standard deviation of 0.883. This indicates a range of extrinsic motivational factors influencing students, with some displaying higher external motivational tendencies than others. The mean demonstrates a notably elevated degree of extrinsic motivation compared to the midpoint on the scale. The variability in EM scores underscores differences in the degree to which external factors drive students' motivation. Intrinsic Motivation (IM) scores range from 1.58 to 6.83, with a mean of 4.78 and

a standard deviation of 0.914. These statistics suggest an above-average level of inherent interest and enjoyment in learning among students. The range of IM scores reflects variability in students' intrinsic motivation levels, indicating differences in their natural inclination towards learning and academic tasks.

Table A1

Descriptive Statistics

Variable	Range	Mean	Standard Deviation
GPA	3.75 - 9.35	6.91	0.997
FLOW	1.67 - 4.78	3.42	0.506
EM	2.00 - 7.08	5.20	0.883
IM	1.58 - 6.83	4.78	0.914

Correlation coefficients

Correlation coefficients between variables are presented in Table A2. Individual differences researchers often interpret correlations of .10, .20, and .30 as relatively small, typical, and relatively large, respectively, in the context of power analysis and normative interpretation of statistical results.

Surprisingly, there was no significant correlation between GPA and extrinsic motivation (EM) (r = -.005, p > .05), suggesting a lack of direct influence on academic performance. The effect size, represented by r^2, would be close to 0, indicating negligible variability in GPA explained by variability in Extrinsic Motivation.

A significant positive correlation was observed between GPA and Flow (r = .196, p < .05), indicating a relatively small but meaningful association. The effect size, represented by r^2, would be approximately 0.038, suggesting that around 3.8% of the variability in GPA can

be explained by variability in Flow. This underscores the potential academic benefits associated with optimal engagement and concentration during academic tasks.

Furthermore, a significant positive correlation was found between GPA and intrinsic motivation (IM) ($r = .176$, $p < .05$), indicating a relatively small yet meaningful relationship. The effect size, represented by r^2, would be approximately .031, suggesting that around 3.1% of the variability in GPA can be explained by variability in Intrinsic Motivation. This highlights the importance of students' inherent interest and enjoyment in learning for academic success.

Additionally, a significant positive correlation was found between Flow and Intrinsic Motivation (IM) ($r = .412$, $p < .05$), indicating a relatively large association. The effect size, represented by r^2, would be approximately .170, suggesting that around 17% of the variability in Flow can be explained by variability in Intrinsic Motivation. This emphasizes the interplay between students' intrinsic motivation and their experiences of optimal engagement during studying.

Table A2

Correlation coefficients

	GPA	FLOW	EM	IM
GPA	1.00	.196*	-.005	.176*
FLOW	.196*	1.00	.047	.412*
EM	-.005	.047	1.00	.163*
IM	.176*	.412*	.163*	1.00

Note. *$p < .05$

Main analysis

To comprehensively explore the relationships between intrinsic and extrinsic motivation, flow experiences, and academic performance, we conducted several models using

the PROCESS procedure in SPSS. These models incorporated Grade Point Average (GPA) as the outcome variable, with Intrinsic Motivation (IM), Extrinsic Motivation (EM), and Flow (FLOW) as predictor variables.

Model 1: GPA as the Outcome Variable

In Model 1, where GPA was the outcome variable, both IM (path $b = .126$, $p = .012$, $SE = 0.050$, 95% CI [0.028, 0.223]) and FLOW (path $c = .293$, $p < .001$, $SE = 0.090$, 95% CI [0.117, 0.469]) significantly predicted GPA. These findings support Hypotheses 1 and 7, indicating that higher levels of intrinsic motivation and flow experiences are associated with better academic performance.

Model 2: FLOW as the Outcome Variable

Model 2 examined the relationship between FLOW and predictor variables IM and EM. The regression coefficient for IM (path $a = .228$, $p < .001$, $SE = 0.021$, 95% CI [0.186, 0.270]) indicated a positive relationship with FLOW, supporting Hypothesis 2. However, the relationship between EM and FLOW was not significant, failing to support Hypothesis 5.

Mediation Analysis:

Following the traditional mediation approach, we examined whether flow mediates the relationship between intrinsic motivation and academic performance (Hypothesis 3). The mediation analysis demonstrated a significant indirect effect of IM on GPA through FLOW (path $a*b = .067$, $SE = 0.046$, 95% CI [0.026, 0.099]). This suggests that flow partially mediates the relationship between intrinsic motivation and GPA. The direct effect of IM on GPA (path $c' = .126$, $p = .012$, $SE = 0.050$, 95% CI [0.028, 0.223]), remained significant, confirming the importance of intrinsic motivation for academic success. The relationship between intrinsic motivation and GPA is partially mediated by flow, with approximately 34.9% of IM's effect on GPA operating through its influence on FLOW. This calculation is

derived by dividing the indirect effect of IM on GPA through FLOW (.067) by the total effect of IM on GPA (.192) and then expressing it as a percentage.

Discussion

The present study aimed to explore the intricate relationships between intrinsic and extrinsic motivation, flow experiences, and academic performance among university students. Specifically, we sought to investigate how intrinsic and extrinsic motivation predict the occurrence of flow states during studying and their subsequent impact on academic achievement. Our findings reveal significant positive correlations between intrinsic motivation and GPA, as well as between flow experiences and GPA. Intriguingly, extrinsic motivation did not demonstrate a significant correlation with GPA in our study. Furthermore, mediation analyses unveiled the partial mediation role of flow experiences in the relationship between intrinsic motivation and academic performance. These results shed light on the nuanced dynamics of motivation, flow, and academic success, offering valuable insights for educators, policymakers, and researchers alike.

The significant positive correlation between intrinsic motivation and GPA highlights the pivotal role of students' genuine interest and engagement in their studies for achieving academic success (Ryan & Deci, 2000). This suggests that students who are inherently motivated to learn are more likely to perform well academically. Intrinsically motivated students may approach their studies with enthusiasm and persistence, leading to better outcomes.

Moreover, the observed positive correlation between flow experiences and GPA underscores the importance of creating learning environments that foster optimal states of engagement and concentration to facilitate academic achievement (Csikszentmihalyi, 1990). Students who experience flow during their academic tasks may be more likely to be absorbed in their work, leading to increased productivity and better performance. These findings have

significant implications for educational practice. Given the importance of intrinsic motivation and flow experiences for academic success, educators should prioritize strategies that enhance students' intrinsic motivation and create conducive environments for flow to occur. For example, incorporating student-centered teaching methods, providing opportunities for autonomy and choice in learning activities, and designing challenging yet achievable tasks can help promote intrinsic motivation among students (Deci & Ryan, 1985). Additionally, educators can design learning experiences that are immersive and engaging, allowing students to experience flow more frequently. By fostering intrinsic motivation and facilitating flow experiences, educators can create learning environments that optimize student engagement and promote academic achievement.

The finding of no significant correlation between extrinsic motivation and GPA challenges traditional beliefs regarding the effectiveness of external rewards and pressures in motivating academic performance, as suggested by some of prior research, such as Vansteenkiste et al. (2009). This result diverges from previous studies that have reported negative correlations between extrinsic motivation and academic achievement (Areepattamannil, Freeman, & Klinger, 2011; Lepper et al., 2005; Lemos & Verissimo, 2014). While these studies have all focused on specific demographic groups or educational stages, our findings, which also support that hypothesis in a different setting, suggest that the relationship between extrinsic motivation and academic performance may vary across different contexts or populations.

Our mediation analysis revealed intriguing insights into the underlying mechanisms linking intrinsic motivation, flow experiences, and academic performance. While the direct effect of intrinsic motivation on GPA remained significant, indicating the importance of students' inherent interest and enjoyment in learning for academic success, we also found evidence of partial mediation through flow experiences. Specifically, flow experiences

partially mediated the relationship between intrinsic motivation and GPA, with approximately 34.9% of the effect of intrinsic motivation on GPA operating through its influence on flow. This finding suggests that while intrinsic motivation plays a significant role in driving academic achievement, part of its impact is channeled through the facilitation of optimal states of engagement and concentration during academic tasks. This aligns with Csikszentmihalyi's concept of flow, which posits that individuals are more likely to experience deep engagement and satisfaction when intrinsically motivated (Csikszentmihalyi, 1990). However, it is important to note that our analysis revealed only partial mediation, indicating that other factors may also contribute to the association between intrinsic motivation and GPA. Further research is needed to explore these additional factors and to delineate the specific conditions under which flow experiences mediate the relationship between motivation and academic performance.

The results offer theoretical and practical implications that can inform both research and practice in educational psychology. The present results are consistent with Shernoff and Csíkszentmihályi's (2009) work that deals with the role of optimal learning environments in fostering academic success. Shernoff and Csíkszentmihályi (2009) demonstrated that creating conducive learning environments, characterized by supportive teacher-student relationships, engaging instructional practices, and opportunities for autonomy and competence, can enhance students' cognitive performance and learning outcomes. By prioritizing policies that support the cultivation of intrinsic motivation and engagement, policymakers can contribute to creating a more conducive learning environment for students. Incorporating flow-promoting elements into teaching practices should be looked into as educators may be able to use it as a way to enhance students' cognitive performance and learning outcomes.

Furthermore, the lack of a significant correlation between extrinsic motivation and academic performance suggests that external rewards or pressures may not directly influence

students' academic achievement (Vansteenkiste et al., 2009). This challenges conventional approaches to motivating students and underscores the need for educators to focus on fostering students' intrinsic motivation and engagement in their learning process.

There are also several potential limitations concerning this study, which are essential to consider in interpreting the findings and guiding future research. Firstly, the cross-sectional nature of the data restricts our ability to infer causality or establish temporal relationships between variables. Longitudinal studies are needed to explore how motivation, flow experiences, and academic performance unfold over time, providing insights into the dynamic interplay between these factors. Understanding the dynamic interplay between motivation, flow experiences, and academic performance is crucial for elucidating their causal relationships and identifying critical periods of influence. Longitudinal studies enable researchers to track changes over time, revealing temporal sequences and informing intervention strategies. Additionally, exploring potential moderators and mediators within this dynamic framework provides valuable insights into the mechanisms driving student achievement and informs evidence-based educational policies

Secondly, reliance on self-reported measures may introduce response biases and social desirability effects, potentially influencing the validity of the findings (Vansteenkiste et al., 2009). Future research could benefit from incorporating a combination of self-report measures and objective assessments to provide a more comprehensive understanding of motivation and flow experiences.

Additionally, the sample primarily consisted of first-year university students from a single university, limiting the generalizability of the findings to other student populations and contexts (Ryan & Deci, 2000; Csikszentmihalyi, 1990). Future research could address this limitation by recruiting more diverse samples and examining how contextual factors shape students' experiences of motivation and flow.

Moreover, the present study focused on examining the relationships between intrinsic and extrinsic motivation, flow experiences, and academic performance, without considering other potential predictors of academic achievement (Vansteenkiste et al., 2009). Future research could explore additional factors such as study habits, self-regulation strategies, or socio-economic factors to gain a more comprehensive understanding of the complex factors influencing student outcomes. In terms of future research, it would be useful to extend the current findings by examining additional moderators and mediators of the relationships between intrinsic and extrinsic motivation, flow experiences, and academic performance among university students (Ryan & Deci, 2000; Csikszentmihalyi, 1990; Vansteenkiste et al., 2009).

Furthermore, exploring how contextual factors such as classroom environment, instructional methods, and institutional policies interact with motivational processes could offer a more comprehensive understanding of learning dynamics and academic success among students (Csikszentmihalyi, 1990).

Conclusion

In conclusion, this study sought to unravel the interplay between intrinsic and extrinsic motivation, "flow" experiences, and academic performance in university settings. Through our hypotheses, we aimed to understand how intrinsic and extrinsic motivation independently predict academic success, and how the occurrence of "flow" influences this relationship. Our findings largely supported the formulated hypotheses, revealing significant associations between intrinsic motivation, "flow" experiences, and academic performance, while also elucidating the role of "flow" as a partial mediator between intrinsic motivation and academic success. The role of extrinsic motivation in predicting academic success in our study was, however, not significant. While our study sheds light on these relationships, further

longitudinal research is imperative to grasp the dynamic nature of motivation and its impact on academic outcomes over time.

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Appendix

Chart 1

Histogram of Regression Residuals

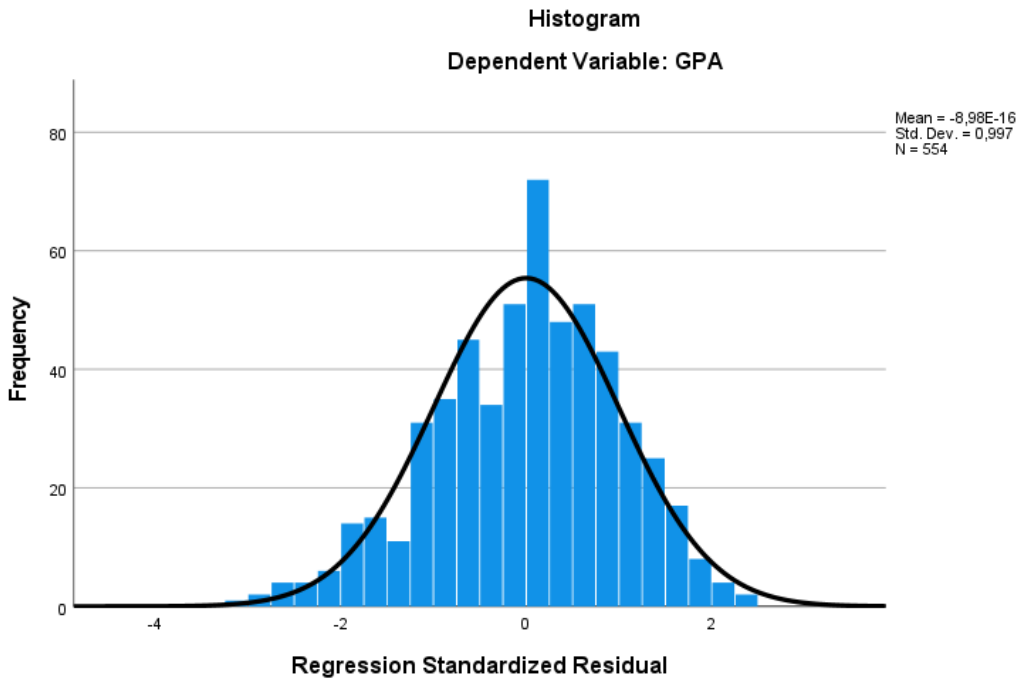
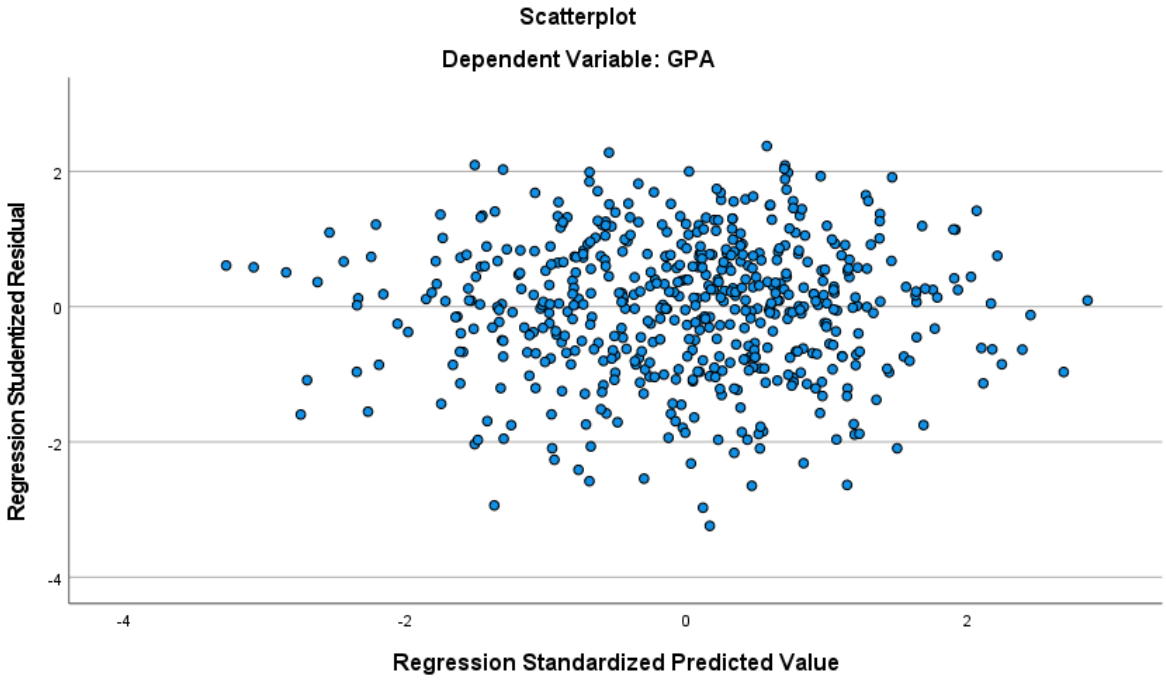
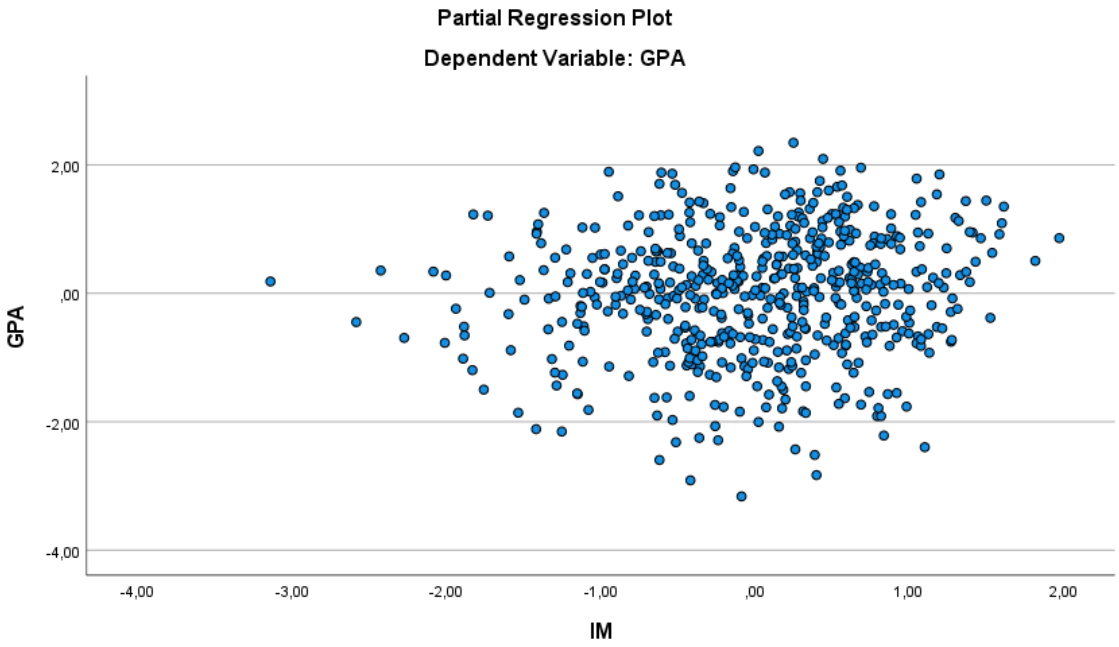
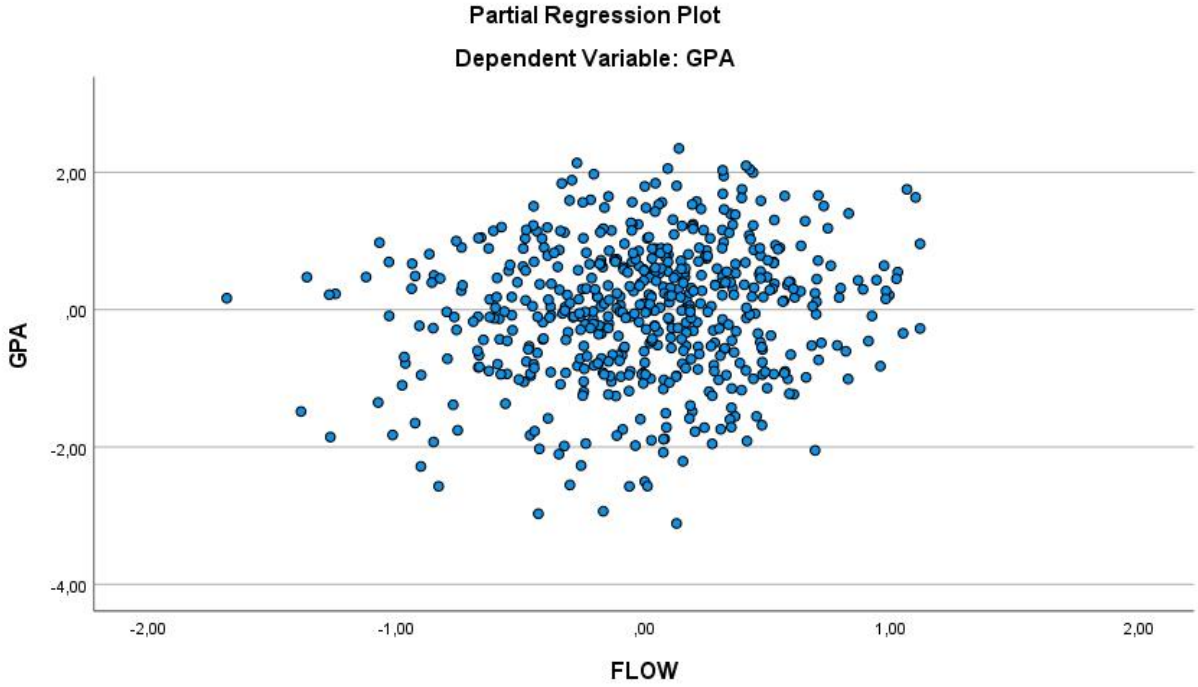


Chart 2

Residual Plots




Partial Regression Plot
Dependent Variable: GPA
GPA
2,00
,00
-2,00
-4,00
-4,00
-3,00
-2,00
-1,00
,00
1,00
2,00
IM


Partial Regression Plot
Dependent Variable: GPA
GPA
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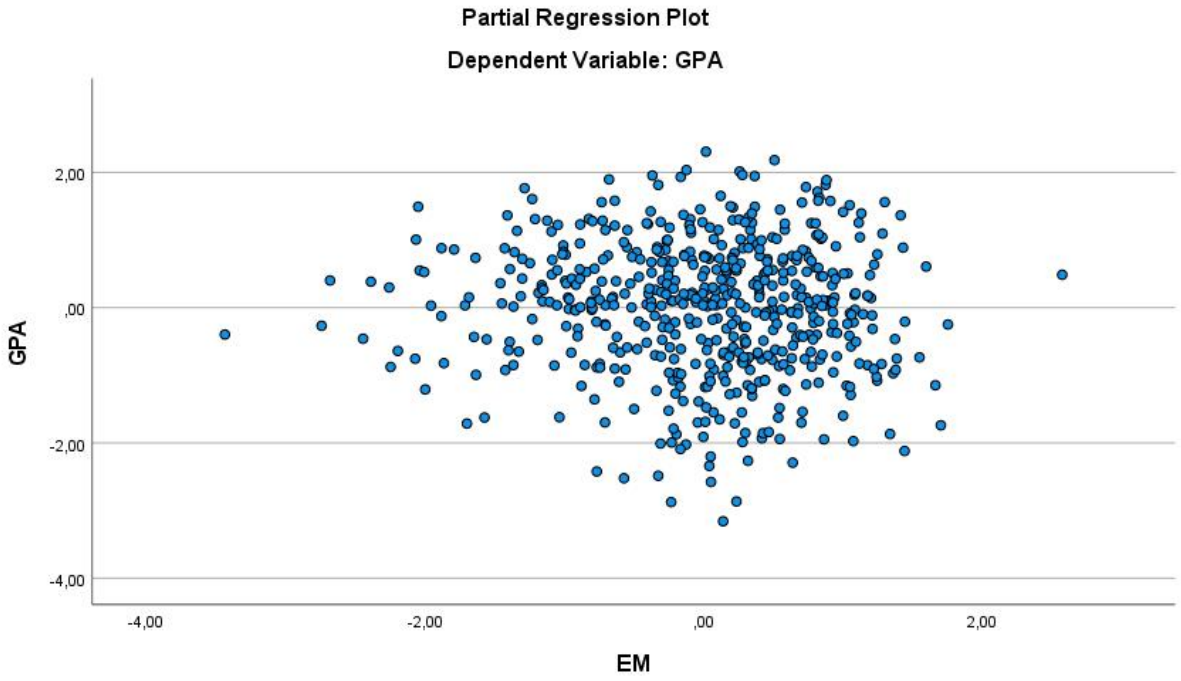
,00
-2,00
-4,00
-2,00
-1,00
,00
1,00
2,00
FLOW


Partial Regression Plot
Dependent Variable: GPA
GPA
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,00
-2,00
-4,00
-4,00
-2,00
,00
2,00
EM