Willing, able, and engaged: roles of action-state orientation, intrinsic academic motivation, and time management on academic engagement

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Abstract

The current study investigates the longitudinal association between decision-related action orientation (AOD, the ability to initiate the intended actions decisively) and academic engagement. Moreover, this study examines the roles of time management and intrinsic academic motivation in this relationship. Specifically, it is proposed that time management mediates the relationship between AOD and academic engagement, and this mediated effect is moderated by intrinsic academic motivation. The analysis of the data collected in three waves from 222 undergraduates (180 women) with a mean age of 20.98 years (SD = 2.73) confirmed the predictions. Time management mediated the relationship between AOD and academic engagement for students who reported high intrinsic motivation. Study results suggest that AOD and intrinsic academic motivation work synergetically to shape academic engagement through efficient time management. The study findings provide valuable insights for practice, emphasizing the consideration of both motivational and volitional processes, and time management strategies to contribute to student engagement.

Keywords Action–state orientation · Academic engagement · Time management · Intrinsic academic motivation · Volition

Introduction

Academic engagement denotes a positive state of mind that is characterized by vigor, dedication, and absorption in academic activities (Schaufeli et al., 2006). Students with high academic engagement devote more time and energy to their academic tasks, have increased psychological resources to deal with academic demands, experience flow in performing academic activities, have high levels of school attendance, and are more eager to complete academic responsibilities (Christenson et al., 2012). Consequently, academic engagement is shown to be associated with academic achievement and student well-being.

A significant amount of research has been dedicated to identifying the individual differences and personality characteristics that are associated with academic engagement. In this vein, studies have shown that self-efficacy, achievement motivation, goal orientation, mindsets, and success and failure attributions are among the antecedents that are linked to engagement (see Christenson et al., 2012 for a review). However, a close inspection of the engagement research indicates that most of the investigated individual differences relate to motivation and affect. Research investigating dispositional volitional antecedents of student engagement, on the other hand, is relatively scarce.

The theory of action control defines volition as a concept related to the underlying mechanisms and processes of how individuals regulate their actions. In contrast to motivation, which focuses on the content of individuals' goals and motives, volition pertains to the processes facilitating the accomplishment of those goals (Kuhl, 1984, 1994a). The scarcity of research addressing the volitional factors that relate to engagement is noteworthy considering numerous theoretical and empirical advancements that emphasize the role of volitional processes in understanding engagement. For example, building on the theory of action control,

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Corno ([1989](#), [2001](#)) introduced volition as a distinct process relevant to self-regulated learning engagement (active and dedicated participation in self-regulated learning activities) as well as achievement and discussed the role of volitional processes in predicting engagement. Wong and Liem ([2022](#)) conceptualized volition as a distinct antecedent that stimulates engagement. In their dynamic model of self-regulated learning engagement, Cleary and Zimmerman ([2012](#)) postulated a cyclical feedback loop between motivational and volitional processes. They noted the role of volitional strategies such as self-instruction and attention focusing on learning engagement.

Studies employing students at varying educational levels have demonstrated substantive associations between volitional processes in the form of self-regulation strategies and different aspects of student engagement. Garcia et al. ([1998](#)) found that the volitional strategies (e.g., action control and encoding control) mediate the relationship between motivational factors (e.g., intrinsic goal orientation, task value) and cognitive engagement, conceptualized as learning strategies. Wang et al. ([2021](#)) provided evidence that self-regulatory skills prospectively predict student engagement in math.

Theoretical rationale and empirical evidence underscore the relevance of volitional processes in academic engagement and learning. These processes are instrumental in facilitating the execution of self-regulatory actions that are important for engagement (Cleary & Zimmerman, [2012](#); Corno, [2001](#)). Consequently, individual differences in volitional abilities are likely to play an important role in academic engagement because these abilities are closely related to the successful and efficient performance of regulatory actions (Kuhl, [1994a](#)). Given the importance of academic engagement on student learning, performance, and well-being, there exists a compelling need to explore the role of dispositional differences in volitional processes and their underlying mechanisms in driving engagement. Such an endeavor holds the potential to broaden our understanding of factors that influence engagement and substantively contribute to the policies and practices aimed at maintaining optimal student engagement.

Building on the theory of action control (Kuhl, [1994a](#)), this study aims to address this gap by introducing decision-related action orientation (AOD). AOD relates to how individuals differ in their ability to decisively initiate planned actions and is proposed to be associated with academic engagement. Below, we outline hypotheses for a model that explores the connection between AOD and academic engagement, including moderating and mediating processes.

Decision-related action orientation and academic engagement

The theory of action control (Kuhl, [1994a](#)) defines volitional processes that foster the enactment and execution of intentions. Those processes involve volitional strategies, such as attention and affect control, that become relevant in goal attainment after the goal is formed. Specifically, these strategies facilitate the initiation of an intended goal and help to see the goal completed. For example, they guide cognitive processes, such as attention and decision-making, toward the fulfillment of intentions and protect these intentions from competing actions by modifying information processing to prioritize the current intention (Kuhl, [1984](#)). The theory also specifies relatively stable individual differences in the volitional abilities of people (e.g., individual differences in enactment and maintenance of self-regulatory resources), which are captured by action-state orientation (ASO). ASO is a bipolar construct with action versus state orientation representing opposite ends of a continuum. Action orientation refers to a change-promoting regulatory mode that facilitates actions while state orientation entails a change-preventing regulatory mode that is characterized by the preservation of the present state and hesitation toward change. In this regard, action-oriented people are better at directing self-regulatory resources in the service of goal enactment and attainment compared to state-oriented people (Koole et al., [2005](#); Kuhl, [1994a](#)).

Kuhl ([1994b](#)) identified dimensions of ASO that tap into individual differences in distinct self-regulatory processes involved in goal initiation and completion. Among these dimensions, AOD refers to the individual differences in facilitating volitional processes related to the initiation of intended goals. Action-oriented individuals on AOD are better than state-oriented individuals at self-generating positive affect, beginning the task at hand, and handling task-related demands. (Kuhl, [1994b](#)).

The concept of engagement has drawn scholarly interest from different disciplines of psychology, including work and education. Perhaps stemming from diverse streams of research in multiple disciplines, different definitions with diverse emphases have been offered (Salmela-Aro & Upadyaya, [2014](#)). The current study utilizes the concept of engagement which views engagement as a positive, lasting *state* that involves high energy, resilience, sense of significance, focus, and concentration. This conceptualization of engagement integrates three interrelated processes. Of these, vigor denotes high levels of mental resilience while studying, and a willingness to invest effort in schoolwork. Dedication is marked by a sense of significance and inspiration toward school, coupled with the perception of schoolwork as meaningful. Absorption is characterized by

behavioral accomplishments and flow-like experiences, where individuals become immersed in studying (Salmela-Aro & Upadyaya, 2014).

This definition follows the reasoning that even though engagement is a positive and fulfilling state, it also demands the devotion of significant personal resources to initiate and sustain (Skinner et al., 2009). Put differently, academic engagement signifies the depth to which an individual immerses themselves in academic tasks, reflecting prompt initiation of and dedicated involvement in these duties. Because academic tasks are often perceived as difficult, long-term, or boring (Sharp et al., 2020), positive experience of and committed involvement with schoolwork is likely to hinge on a student's ability to easily and effectively initiate academic tasks in the first place.

Hence, we argue that individual differences in volitional abilities, such as AOD, relate to how easily and frequently the students experience engagement in their schoolwork. Students high on AOD can be expected to self-regulate the task-related positive affect that supports goal initiation, easily start working on academic duties, and be better at meeting deadlines, especially under demanding situations (Jostmann & Koole, 2007). Therefore, AOD is likely to positively relate to academic engagement by mitigating the challenges related to task enactment difficulty, making it easier to initiate and promptly pursue academic goals.

This proposition concurs with the arguments stating that volitional processes can enhance motivation and engagement in learning (Corno & Kanfer, 1993), as well as the process-oriented view of student motivation which addresses motivation as an ongoing process that can be improved by initiated actions (Dörnyei, 2000). Accordingly, initiating the intended tasks may bring about engagement (such as increased energy and dedication in doing schoolwork) that was previously low or absent. Additionally, an ability characterized by prompt action initiation would lead to a more frequent experience of academic engagement.

Research on AOD provides initial support for our proposition that links AOD to academic engagement. Jaramillo and Spector (2004) showed that action-oriented students on AOD reported higher effort on academic tasks, which is an important aspect of academic engagement. Merino-Tejedor et al. (2016) found that self-regulation of attention control was positively associated with academic engagement, characterized by vigor, dedication, and absorption.

Altogether, building on the views that highlight the role of volitional processes in engagement (Corno, 1989, 2001; Wong & Liem, 2022), we propose a model that depicts a positive association between a prompt and decisive task initiation ability (i.e., action orientation on AOD) and academic engagement. Moreover, in the next section, we introduce time management as an intermediary process that

would particularly be relevant in explaining the association between AOD and academic engagement.

Hypothesis 1 AOD positively predicts academic engagement.

The mediating role of time management

Time management pertains to actions directed toward optimizing the efficient utilization of time during the execution of specific goal-oriented tasks (Claessens et al., 2007). It includes regulatory behaviors such as goal-setting, task-planning, prioritization, and creating to-do lists, and schedules (Britton & Tesser, 1991). Given that being action-oriented on AOD is characterized by a decisive initiation of the intended goals (Koole et al., 2005), one outcome of high AOD scores should be effective time management. Once a goal is set, action-oriented individuals on AOD would utilize volitional strategies to initiate their goals effectively and easily (Kuhl, 1994a). Therefore, AOD positively contributes to effective time management by supporting the initiation of the goals that are part of the time management activities. Research provides support for this prediction. In a study conducted by Diefendorff et al. (1998), AOD was strongly related to time management activities among undergraduate students. Similarly, Papantoniou et al. (2013) showed that action-oriented students on AOD reported more time and study environment management strategies.

Time management, in turn, would be associated with academic engagement. Time management behaviors set clear and tangible goals, act as task reminders, diminish intrusions of distractions, and provide feedback about the current goal progress (Wolters & Brady, 2021). Consequently, time management practices are likely to enhance a positive and fulfilling task experience by facilitating a structured, dedicated, and uninterrupted process of task completion. Confirming this argument, several studies provided support for the relationship between time management and academic engagement. Pérez-Sanagustín et al. (2020) designed an intervention that comprised time management and strategic planning and showed that it improved engagement in learning activities in flipped classrooms (i.e., an instructional approach in which traditional, in-class teaching methods are reversed to take place outside of the classroom). Liu et al. (2014) showed that the personality tendency characterized by effective time management was positively related to study engagement among nursing students.

In summary, we propose that time management behaviors play an important role as an intermediary process linking AOD and academic engagement. Individuals with a disposition towards decisive intention initiation are likely

to exhibit regulatory behaviors that facilitate the initiation of intended goals, including time management practices (Diefendorff et al., 1998). Time management behaviors, in turn, hold relevance for engagement in academic activities. Given the complexity and difficulty of academic tasks, the experience of engagement relies, in part, on successful self-regulatory activities (Corno & Kanfer, 1993), including time management behaviors such as prioritization and planning (Claessens et al., 2007). Additionally, inherently engaging, non-academic activities like socializing and entertainment often compete for students' time in academic life (Wolters & Brady, 2021), underscoring the importance of effective time management. Consequently, time management behaviors regulating students' time become particularly critical for participation in and the positive, fulfilling experience of study (i.e., academic engagement). Based on these considerations, we propose that time management behaviors serve as a relevant underlying process in the association between AOD and academic engagement.

Hypothesis 2 Time management mediates the relationship between AOD and academic engagement.

The moderating role of intrinsic academic motivation

Defined as a desire to commit to academic activities for the enjoyment and interest related to enacting them, intrinsic academic motivation is one of the key motivational determinants of academic success and well-being (Gottfried, 2019). A recent meta-analysis (Howard et al., 2021) showed that the intrinsic form of student motivation is positively related to effort, engagement, and academic performance. Notably, motivational processes also play an important role in the theory of action control. This theory distinguishes the roles of motivational and volitional processes and emphasizes their concerted roles in goal attainment (Kuhl, 1984). Accordingly, motivation energizes intentions about engaging in activities and increases readiness to exert effort, and volitional processes foster effective goal enactment and completion. In the learning context, Corno (1989) highlighted distinct yet facilitatory roles of motivational and volitional processes by stating while the former are predecisional and mediate the formation of goals and promote them, the latter are post-decisional and mediate the enactment of goals and protect them till completion. Theory and research on learning and academic achievement (Corno & Kanfer, 1993; Keller, 2008; Wang et al., 2021) confirmed the separate and interactive influences of motivational and volitional processes on desirable academic outcomes. Focusing on the interactive relationships between these two concepts

in the study of academic engagement, Wang et al. (2021) assessed situational interest, metacognitive skills, and self-control. The metacognitive skills and self-control measures in this study share significant similarities with the volitional strategies discussed in Kuhl (1984), and situational interest refers to a motivational state. The results of the study revealed that metacognitive skills interact with situational interest to predict math engagement. Moreover, the interaction worked in a compensatory fashion; both metacognitive skills and situational interest compensated for the lack of the other to sustain the engagement over time.

Based on the theory of action control (Kuhl, 1994a) and research indicating the interactive roles of motivational and volitional processes in goal attainment (Wang et al., 2021), our model proposes that the positive association between AOD and academic engagement through time management should be more pronounced among students who are intrinsically motivated in academic endeavors. Intrinsic motivation should foster goal-setting and invigorate goal intentions related to academic activities because it is an autonomous and internalized form of motivation (Ryan & Deci, 2020). Therefore, intrinsic motivation is likely to strengthen the indirect association between AOD and academic engagement through time management by facilitating intentions about the activities that contribute to effective time management. Related to the facilitatory role of interaction between AOD and intrinsic motivation, Jaramillo et al. (2007) investigated whether AOD moderates the association between intrinsic motivation and adaptive selling (a performance-related work behavior). Supporting the facilitatory interaction proposition, the results indicated a stronger positive association between motivation and adaptive selling when AOD was high. Based on these arguments we propose the following hypothesis:

Hypothesis 3 Intrinsic academic motivation moderates the mediated relationship between AOD and academic engagement through time management such that the mediated relationship is stronger under high intrinsic academic motivation.

Taken together, our model (see Fig. 1) draws on the view that volitional processes have a role in the experience of academic engagement and proposes individual differences in the ability to enact goals (i.e., AOD) are associated with engagement. Subsequently, we seek to identify an underlying mechanism through which AOD associates with engagement by testing time management as a mediator of this relationship. In addition to explaining why AOD is related to academic engagement, identifying such mechanisms may inform the educational practices aimed at fostering student engagement by serving potential targets of intervention. For
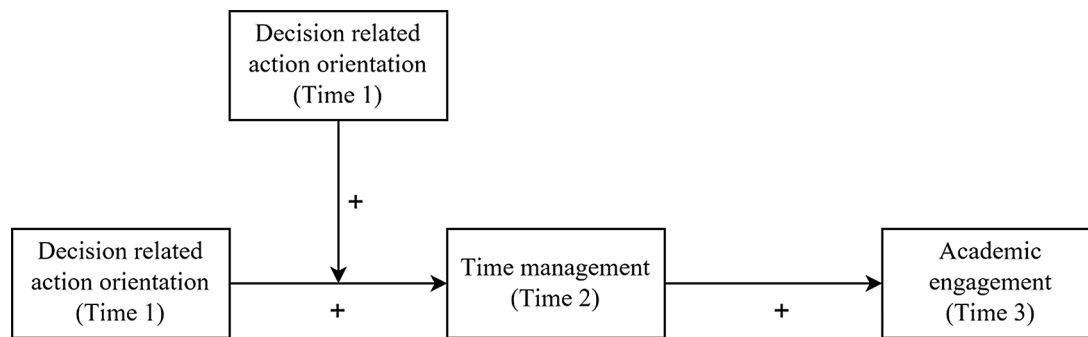
Fig. 1 The proposed moderated mediation model

instance, if the study hypotheses are confirmed, interventions may target the improvement of students' time management behaviors. This targeted intervention may seek to capitalize on the positive influence of AOD on academic engagement, offering a strategy to enhance overall student success. We then expand this mediation model by testing the moderating role of intrinsic academic motivation. Confirmation of this first stage moderated mediation hypothesis yields important insights, underscoring the importance of both motivational and volitional processes in effective time management and academic engagement. Furthermore, it provides empirical support to one of the core propositions of the theory of action control which states the importance of concerted interplay between motivational and volitional processes in people's actions.

Method

Participants and procedure

The study participants were undergraduate students from the Psychology and Sociology departments and students who enrolled in the Introduction to Psychology course available to students at the university. The study consisted of three data collection waves. Two hundred and seventy students agreed to participate in the study in exchange for course credit (equivalent to four bonus points added to the final exam). Of those, 242 responded at Time 2 and of 242 who responded at Time 2, 224 responded at Time 3, which resulted in a response rate of 83% between Time 1 and Time 3. Two participants were excluded from the sample due to careless responding (i.e., those with identical responses across measures), which resulted in the final sample of 222 participants. The mean age was 20.98 years ($SD = 2.73$), and 180 (81.1%) participants were women.

A post hoc power analysis was conducted by performing a Monte Carlo simulation using the values obtained from the model as input for population parameters. The results revealed that the power for estimations of all the

hypothesized relationships was above 0.80, suggesting that the study has adequate power to detect the hypothesized associations. We separated measurements with a one-month time lag. Specifically, we assessed action-state orientation and intrinsic motivation at Time 1, time management at Time 2, and academic engagement at Time 3. Given the absence of established guidelines on optimal assessment intervals (Cain et al., 2017), our time interval decision aimed to minimize sample attrition and to capture the model-driven temporal relationships among variables, facilitating variations in time management practices and academic engagement. This approach further reduced the risk of common method bias.

The data were collected with online questionnaire forms. The questionnaire links were distributed via an e-mail group that was created with students who agreed to participate. At Time 1, participants were provided an informed consent form that stated the participant's rights and researchers' responsibilities along with the study measures. Codes created by the participants were used to match the responses obtained at different time points. The study and data collection procedure followed the ethics code of the Declaration of Helsinki.

Measures

The selection of study measures was guided by two criteria. First, the chosen measures are well-validated scales with widespread use and extensive evaluation. Second, these scales also have Turkish translations that demonstrate reliability and validity.

Action-state orientation

Participants responded to an 8-item decision-related action orientation subscale of the Turkish translation of the Action Control Scale, the ACS-T (Peker & Meşe, 2022), which was originally developed by Kuhl (1994b). The scale consists of action- and state-oriented choices that participants

are required to make for each situation depicted in items. An example item is: When I know I must finish something soon: (a) I have to push myself to get started (state-oriented response), (b) I find it easy to get it done and over with (action-oriented response). State-oriented responses get the value 0 and action-oriented responses get the value 1, which then are summed into the final action orientation score. The Cronbach's alpha of the AOD subscale was 0.80 in Peker and Meşe (2022), and 0.75 in the current study.

Intrinsic academic motivation

The Academic Motivation Scale developed by Vallerand et al. (1992) was utilized to measure the intrinsic motivation of students. The scale probes respondents with the question "Why do you go to school?" and measures their agreement with different reasons. Two example items for intrinsic academic motivation are "Because I experience pleasure and satisfaction while learning new things" and "For the pleasure I experience while surpassing myself in my studies". This scale was translated into Turkish by Can (2015) who suggested a 5-factor structure in which the three intrinsic motivation dimensions (intrinsic motivation towards knowledge, accomplishment, and stimulation) were combined into a single factor. Consequently, the 12-item unified intrinsic motivation dimension that is rated on a 7-point scale (1 = *does not correspond at all*, 7 = *corresponds exactly*) was used. The Cronbach alpha score for the intrinsic motivation dimension was 0.93 in Can (2015), and it was 0.92 in the current study.

Time management

Time management was measured with the Time-Management Questionnaire developed by Britton and Tesser (1991) and translated into Turkish by Alay and Koçak (2002). This questionnaire assesses the time management practices employed by students, prompting them to rate the frequency with which they engage in various time management activities. The factor analysis of Turkish translation resulted in a 16-item time planning dimension that combined short- and long-range planning, which was used in the current study. The items (e.g., "Do you make a list of the things you have to do each day?", "Do you have a set of goals for the entire quarter?") are rated on a 5-point scale (1 = *never*, 5 = *always*). The Cronbach alpha reported by Alay and Koçak (2002) was 0.88, and the Cronbach alpha obtained in this study was 0.90.

Academic engagement

Participants rated the extent they experience engagement in academic works by rating a 9-item student version of the Utrecht Work Engagement Scale (Schaufeli et al., 2006) that was translated into Turkish by Çapri et al. (2017). The items (e.g., "I feel energetic and capable when I'm studying or going to class", "I am immersed in my studies") are rated on a 5-point scale (1 = *never*, 5 = *always*). The Cronbach alpha reported by Çapri et al. (2017) was 0.88, and it was 0.90 in the current study.

Data analysis

Before the analyses, we tested for attrition-related bias in SPSS v26. Since the attrition at the Time 2 and Time 3 measurements was low, we combined participants who did not respond at either Time 2 and/or Time 3 in a single group ($N = 46$) and compared them with those who responded at all waves. We examined differences between these two groups in terms of age, sex, and two Time 1 measures, namely AOD and intrinsic academic motivation.

We conducted confirmatory factor analysis (CFA) to assess the distinctiveness of the study measures in Mplus v8.3. We created item parcels for intrinsic motivation, time management, and academic engagement scales, given their high number of items and relatively low sample size ($N = 222$). This procedure rendered a more adequate sample size-to-parameter ratio and helped to avoid problems of solution instability due to low sample size (Little et al., 2002). Specifically, considering the number of scale items, four random parcels were created for the time management scale and three random parcels were created for the intrinsic motivation and academic engagement scales. The items of the AOD subscale were used as indicators since parceling does not work well with items that have two response categories (Yang et al., 2010). The items of the AOD subscale were specified as categorical variables and mean and variance adjusted weighted least squares estimation (WLSMV) was used as it displays good performance with item-level indicators that have few response categories. The model fit was evaluated based on the relative fit indices criteria of the root-mean-square error of approximation (RMSEA) < 0.08, the comparative fit index (CFI) > 0.90, the Tucker-Lewis index (TLI) > 0.90, and the standardized root mean square residual (SRMR) < 0.08.

The hypotheses were tested with PROCESS macro v4.1 (Hayes, 2017) installed in SPSS v26. PROCESS utilizes bootstrapping techniques to inspect the indirect effects as well as conditional indirect effects at high and low values of the moderator. It also provides an index of moderated mediation to infer the validity of the model. 95% bias-corrected

Table 1 Descriptive Statistics, Correlations among Variables, and Reliability Estimates

Variable	Mean	SD	1	2	3	4
1. Action orientation	3.97	2.37				
2. Intrinsic motivation	5.02	1.18	0.16*			
3. Time management	3.22	0.70	0.32**	0.31**		
4. Academic engagement	2.60	0.77	0.39**	0.43**	0.55**	

Note. $N = 222$. Cronbach Alpha estimates are reported in parentheses on the diagonal. SD: standard deviation. *$p < .05$, ** $p < .01$

Table 2 Mediation Analysis Results

	Time management		Academic engagement	
Predictor	b	SE	b	SE
Intercept	2.88***	0.08	0.64**	0.20
Action orientation	0.09***	0.02	0.08***	0.02
Time management			0.52***	0.06
R^2	0.10		0.35	
Bootstrap analysis results				
	Coefficient	SE	LLCI	ULCI
Indirect effect	0.05	0.01	0.03	0.07

Note $N = 222$. SE: standard error, LLCI: lower level of the 95% confidence interval, ULCI: upper level of the 95% confidence interval. *$p < .05$, **$p < .01$, ***$p < .001$

Table 3 Moderated Mediation Analysis Results

	Time management		Academic engagement	
Predictor	b	SE	b	SE
Intercept	3.20***	0.04	0.93***	0.21
Action orientation (AOD)	0.08***	0.02	0.08***	0.02
Intrinsic motivation (IM)	0.18***	0.04		
AOD × IM	0.04**	0.02		
Time management			0.52***	0.07
R^2	0.20		0.35	
Bootstrap analysis results				
	Coefficient	SE	LLCI	ULCI
Conditional indirect effects				
Low intrinsic academic motivation	0.02	0.01	–0.01	0.05
High intrinsic academic motivation	0.07	0.01	0.04	0.10

Note. $N = 222$. SE: standard error, LLCI: lower level of the 95% confidence interval, ULCI: upper level of the 95% confidence interval. *$p < .05$, **$p < .01$, ***$p < .001$

confidence intervals for the indirect effects and conditional indirect effects were calculated with bootstrapping (5000 resamples). To obtain the total effect of AOD on academic engagement and the indirect effect of time management in the relationship between AOD and academic engagement, Model 4 of PROCESS was used. The rest of the estimates, as well as the conditional indirect effects (i.e., the indirect association between AOD and academic engagement through time management for high (+1SD) and low (-1SD) values of intrinsic academic motivation), were obtained by running Model 7. AOD and intrinsic academic motivation were mean-centered before the analyses.

Results

Preliminary analyses

The attrition analyses indicated that the only significant difference was in sex; males were more likely than females to drop out, $\chi^2 (1, N = 268) = 6.06$, $p = .01$. Confirmatory factor analysis results showed that the model consisted of the five study variables provides an acceptable fit to the data, $\chi^2(129, N = 222) = 211.70$, $p < .001$, RMSEA $= 0.054$, TLI $= 0.90$, CFI $= 0.92$, SRMR $= 0.07$. Factors loadings of all indicators were above 0.40.

Table 1 displays means, standard deviations, and correlations among the study variables. The correlation analysis indicated that AOD is significantly associated with time management ($r = .32$, $p < .001$) and academic engagement

($r = .39$, $p < .001$). Time management was significantly correlated to academic engagement ($r = .55$, $p < .001$).

Hypothesis tests

Hypothesis 1 proposed that AOD significantly predicts academic engagement. The results provided support for the hypothesis as AOD prospectively predicted academic engagement ($b = 0.13$, SE $= 0.02$, $p < .001$). It remained significant after the inclusion of time management ($b = 0.08$, SE $= 0.02$, $p < .001$). Hypothesis 2 anticipated a significant mediated relationship between AOD and academic engagement through time management. Table 2 displays the analysis results. The analysis revealed that AOD significantly predicts time management ($b = 0.09$, SE $= 0.02$, $p < .001$) and time management significantly predicts academic engagement ($b = 0.52$, SE $= 0.06$, $p < .001$). Lastly, the indirect effect was significant, coefficient $= 0.05$, SE $= 0.01$ 95% CI[0.03, 0.07], which confirms Hypothesis 2.

Hypothesis 3 proposed that the mediated relationship between AOD and academic engagement through time management is moderated by intrinsic academic motivation such that the mediated relationship is stronger under high intrinsic motivation. The results of the moderated mediation analysis are displayed in Table 3. To test this hypothesis, the

AOD × intrinsic academic motivation interaction is investigated as a first step. The results revealed a significant interaction effect ($b = 0.04$, $SE = 0.02$, $p = .007$), that accounted for 3% of the explained variance. To probe the interaction, the relationship between AOD and time management was graphed for low (–1SD) and high (+1SD) values of intrinsic academic motivation. The results revealed a positive relationship ($b = 0.13$, $SE = 0.03$, $p < .001$) between AOD and time management when intrinsic academic motivation was high and an insignificant relationship ($b = 0.03$, $SE = 0.03$, $p = .20$) when intrinsic academic motivation was low (see Fig. 2).

In the second step, the mediated relationship between action orientation and academic engagement through time management was investigated for low (–1SD) and high (+1SD) values of intrinsic academic motivation. The results confirmed Hypothesis 3 as depicted by the statistically significant index of moderated mediation, coefficient = 0.02, $SE = 0.008$, 95%CI[0.006, 0.04]. The mediated relationship was significant for the intrinsically motivated students and was not significant for those who reported low intrinsic academic motivation (see Table 3). The model explained a 20% variance in time management and a 35% variance in academic engagement.

Discussion

The present study sought to investigate the role individual differences in the ability to initiate intended actions on the propensity to experience academic engagement and what are the underlying processes behind this relationship. Specifically, it was predicted that AOD is associated with academic engagement through time management and this relationship is moderated by intrinsic academic motivation. The results obtained from longitudinal data supported the predictions.

The significant prospective relationship between AOD and academic engagement underscores the role of individual differences in volitional abilities (i.e., the dispositional tendency to decisively initiate intended actions) to explain variations in the experience of engagement. Accordingly, differences in the ability to initiate intended goals were positively associated with the state of high engagement characterized by energy, dedication, and absorption in academic responsibilities. Previous research demonstrated the influence of specific volitional or self-regulatory beliefs, skills, and strategies for student engagement. For example, the findings of Merino-Tejedor et al. (2016) indicated a positive association between self-regulation of attention control and academic engagement marked by vigor, dedication, and absorption. Wang et al. (2021) showed that regulatory strategies relate to math engagement, which is characterized by dedication, persistence, and effort in the context of mathematics classes. The current study complements these findings by showing that differences in volitional abilities to initiate action decisively are related to experiencing engagement in academic activities. Thus, students who are quick to take action to complete the intended goals seem to find benefit from this disposition in the form of engagement.

The significant mediating role of time management sheds light on a process through which AOD contributes to academic engagement. Academic duties are often difficult, long-term, and time-consuming (Sharp et al., 2020), which makes effective time management crucial to not become overwhelmed by and to efficiently handle the workload. The findings of the present study suggest that students who quickly initiate the intended goals manage time- and planning-related aspects of academic duties more efficiently, which in turn translates into higher engagement in the study. It is likely that easily beginning to work on intended actions fosters engaging in time management activities (e.g., scheduling, planning, prioritizing) and helps meet deadlines and schedules, thus bolstering a sense of achievement, motivation, and engagement. This result resonates with the characteristics of people high in AOD (Kuhl, 1994a) and findings that showed a prospective positive influence of self-regulatory strategies (i.e., time management, concentration, and test strategies) on positive attitudes towards study (Ning & Downing, 2010).

Fig. 2 The moderating effect of intrinsic academic motivation on the association between action orientation and time management. *Note* Low intrinsic academic motivation: 1 *SD* below the mean. High intrinsic academic motivation: 1 *SD* above the mean
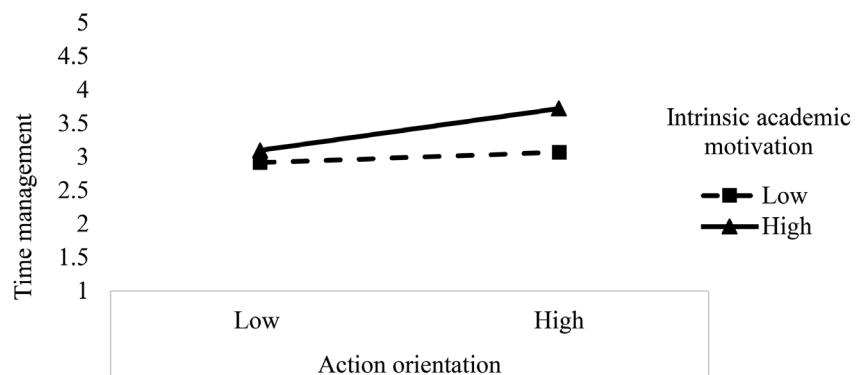
Moreover, our findings revealed that intrinsic academic motivation moderates the mediated relationship between AOD and engagement through time management. The positive effect of AOD on academic engagement through time management was observed for the students who reported high intrinsic academic motivation. These results suggest that being intrinsically motivated in academic activities and being able to quickly start the intended goals work in concert to facilitate time management practices, and subsequently to shape academic engagement. The results support the theory of action control's mutual emphasis on motivated goals and self-regulatory abilities (Kuhl, 1994a) for time management practices and academic engagement. Moreover, our findings indicate that time management practices are shaped not solely by volitional abilities but also by an intrinsic, self-driven motivation. In this sense, the results concur with the findings that regulatory behaviors, including time management and planning, are bolstered by beliefs and attitudes driven by motivation (Zimmerman, 2008). The results also highlight that the facilitated time management practices, in turn, positively affect engagement. In this regard, the study findings are in line with the arguments that articulate the interplay between motivational and volitional processes in self-regulated behaviors, and positive student outcomes (Corno, 2001; Keller, 2008). The present study complements those views in that the positive and fulfilling state of engagement is facilitated by time management activities that are driven by the interplay of motivational and volitional processes.

These results offer important insights for education practitioners. For instance, the study findings underscore the importance of both intrinsic academic motivation and AOD for time management and academic engagement. Thus, practitioners may aim for practices that offer ways to improve intrinsic motivation and volitional skills of goal initiation. For example, Corno (2004) discusses a procedure that involves an initial assessment of volitional skills and subsequent employment of class activities that aims to improve the volitional skills and strategies of students. Accordingly, student development teams in universities may develop tools that assess volitional skills and offer self-regulated learning activities aimed at improving volitional skills and strategies for the use of undergraduate students. The results of the present study suggest that time management practices serve as an intermediate process influencing academic engagement. Consequently, these findings emphasize the potential benefits of integrating self-regulated learning activities related to time management and planning to enhance student engagement with their academic tasks.

Some limitations should be considered in interpreting the findings. First, even though the data was collected at three time points, the initial levels of time management and academic engagement were not collected and controlled in analyses. Therefore, study designs that allow the modeling of autoregressive paths would be helpful to arrive at more definite conclusions about the ordering of relationships. Second, the present study incorporated a one-month interval between the assessments, and different time intervals may affect the results obtained (Cain et al., 2017). Thus, future research employing diverse time intervals could shed light on whether these findings remain consistent across different durations. Third, the sample comprised university students from psychology and sociology departments studying in a single public university. To enhance the generalizability of this study's findings, future research can consider recruiting participants from diverse educational levels and backgrounds. Fourth, the participants were disproportionately female, warranting caution in generalizing results to the male participants. Fifth, future studies could also investigate the role of affect and task characteristics on the relationship between AOD and academic engagement. The theory of action control postulates that people high on AOD easily generate the positive affect necessary for task initiation (Kuhl, 1994a). Thus, examining whether self-regulation of positive affect plays a role in the relationship between AOD and academic engagement could be an aim for future research.

Lastly, it is worth noting that task characteristics (e.g., difficulty and dullness) and the learning environment (e.g., high task structure) might exhibit interactive associations with the goal initiation of action- versus state-oriented students. Even though our study revealed that low action orientation (i.e., state orientation) relates to diminished academic engagement, studies show state-oriented individuals may perform as well as or even better than their action-oriented counterparts under certain conditions such as relaxed, structured environments (Koole et al., 2005). Moreover, the theory of action control and research findings note that state-oriented individuals struggle with initiating the intended actions when the task is difficult or boring (Jostmann & Koole, 2007). Thus, state-oriented students may benefit from learning environments tailored for them (e.g., highly structured assignments) or practices that help them overcome perceptions of task difficulty or dullness for academic engagement. For example, self-efficacy training designed to enhance the motivational beliefs and self-confidence of students, aiming to positively alter their perceptions of academic challenges, could be particularly beneficial for state-oriented students. In summary, understanding the interactions between task characteristics, environment, and action orientation suggests avenues for future research. Investigation of tailored learning environments and interventions specifically for state-oriented students

could provide valuable insights and strategies for enhancing their academic engagement and performance.

Data availability The author declares the study data and supporting information are available on request.

Declarations

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent to participate Digital informed consent was obtained from all individual participants.

Conflict of interest The author declares he knows of no conflicts of interest associated with this publication, and there has not been significant financial support for this work that could have influenced the study.

Submission The author declares this is an original submission that has not been published before and that is not currently under review elsewhere.

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