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Citation for published version (APA):

Wang, H., Yang, J., & Li, P. (2022). How and when goal-oriented self-regulation improves college students' well-being: A weekly diary study. *Current Psychology*, 41(11), 7532-7543. <https://doi.org/10.1007/s12144-020-01288-w>

Document license:
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DOI:
[10.1007/s12144-020-01288-w](https://doi.org/10.1007/s12144-020-01288-w)

Document status and date:
Published: 01/11/2022

Document Version:
Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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How and when goal-oriented self-regulation improves college students' well-being: A weekly diary study

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Accepted: 11 December 2020 / Published online: 3 January 2021

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Abstract

This study investigates how (i.e., through what mechanism) and when (i.e., under what conditions) goal-oriented self-regulation behaviors improve college students' psychological well-being. On the basis of data from 74 s-year Chinese college students in a weekly diary study (296 observations), we conducted a moderated mediation model and found that goal-oriented self-regulations behaviors (i.e., planning, monitoring, controlling, and reflecting) were positively related to college students' psychological well-being through increased academic performance. Further, such an indirect effect was stronger when college students' optimism and social support were high. This study contributes to student development and self-regulation literature by underscoring that academic performance plays a vital intermediate role in the relationship between self-regulation behaviors and college students' psychological well-being. Besides, we highlight that optimism and social support act as important personal and social resources for college students that can better unleash the positive effects of goal-oriented self-regulation behaviors.

Keywords Self-regulation · Psychological well-being · Optimism · Social support · Diary study · College students

Introduction

Individual's psychological well-being is an important asset for organizations and society. In the college context, students' psychological well-being has been found to be positively related to personal success (Rüppel et al. 2015), positive states (Hardy et al. 2013), and self-motivation (Wang et al. 2007). Given its importance, researchers have devoted significant attention to exploring its antecedents. Especially, from a goal-attaining perspective, recent studies indicated that self-regulation is a vital contributor to one's psychological well-being (Aadland et al. 2018; Hofer et al. 2011). Self-regulation refers to one's capacity to develop, implement and flexibly maintain planned behavior to achieve one's goals (Balkis and Duru 2016). Cumulative evidence suggests that university students with pronounced goal-oriented self-regulatory skills

reported higher levels of well-being (Hofer et al. 2011) and lower levels of depression, stress, and procrastination (Park et al. 2012; Zhao et al. 2019).

Although prior studies provided valuable insights into how self-regulation links to students' psychological well-being, our understanding of this relationship is far from complete. That is, what role does academic performance, individual factors (e.g., optimism), and social factors (e.g., social support) play still remains unclear. College students usually undertake more academic-oriented tasks and goals than company workers. They need to master a variety of knowledge and skills for realizing higher levels of academic performance (Paul and Ruhland 2013). Surprisingly, very few studies have investigated the dynamic relationship among self-regulation, academic performance and well-being. This is a significant omission because we may miss a more nuanced understanding of the intermediate role of academic performance. Building on goal attainment and motivational perspective (Deci and Ryan 2008), which states goal settings and completions can enhance individual performance and positive affect, we argue that academic performance is a salient indicator of students' goal attainments. Therefore, we propose that the beneficial effects of self-regulation behaviors on well-being may be mediated by academic performance.

In addition to the intermediate role of academic performance, we argue that this mediation process is contingent on

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individual and social factors. Despite prior studies examined the moderators such as attachment style and emotion regulation (Choi and Kangas 2020; Pecora et al. 2016), very few studies have taken a resource-based perspective to investigate the potential moderators on the *indirect* effects of self-regulation on well-being through academic performance. It is argued that the availability of resources can foster individuals' self-growth, learning process, and engaged states (Bakker and Demerouti 2017). Accordingly, this study particularly considers the role of optimism (personal psychological resources) and social support (social resources). Literature shows that optimism enables individuals to think things positively and creatively (Sangtani and Murshed 2017) and that social support helps individuals to cope with adversity and stress (Kuriakose et al. 2019). Therefore, this study examines whether the mediating effect of the goal-oriented self-regulation behaviors on psychological well-being through academic performance becomes stronger when one is more optimistic and gains more social support.

In the present study, we recruited 74 s-year college students from a Chinese university and conducted a weekly diary study to investigate how and when goal-oriented self-regulation behaviors improve college students' psychological well-being. Our study contributes to the literature in three ways: First, we contribute to college students' development literature by underscoring the mechanism of goal-oriented self-regulation behaviors on psychological well-being (i.e., through increased academic performance). Second, we contribute to self-regulation literature by uncovering the beneficial roles of optimism and social support. We underline that the process of goal-oriented self-regulation to psychological well-being through academic performance can be more successful if the college students are more optimistic and gain more social support. We thus underline the vital role of the utilization of personal resources and social resources when students conduct self-regulation behaviors. Especially, the changing world and the lockdown due to COVID-19 spark huge demands for students' self-regulation and are threatening students' academic performance and well-being (Liu et al. 2020; Toquero, 2020). Our study underscores that psychological and social resources such as optimism and social support can help to facilitate students' self-regulation process and their well-being. Third, we contribute to college students' behaviors literature by performing a weekly diary research design, by which we examine the within-person behaviors and states fluctuations over time (Rofcanin et al. 2019). A weekly diary study refers to an investigation of individuals' behaviors and states on a weekly basis with repeated measures (Ohly et al. 2010). This study design has significant advantages compared to the cross-sectional design or multi-wave design, which are commonly used by most previous studies on self-regulation (Aadland et al. 2018; Balkis and Duru 2016; Hofer et al. 2011). It can capture the dynamic characters of individual

behaviors and states, and thus can successfully examine how the changes of self-regulation behaviors influence the changes of academic performance and psychological well-being over time. Therefore, we highlight the within-person variations of self-regulation and its consequences and deploy self-regulation behaviors in a more dynamic context.

Literature Review and Hypothesis Development

Self-Regulation and Psychological Well-Being

Psychological well-being refers to positive affect and the perception of life satisfaction (Andrews and Crandall 1976). Psychological well-being can be categorized into six aspects: personal growth, self-acceptance, autonomy, purpose in life, positive relations with others, and environmental mastery (Ryff and Keyes 1995). College students are in a stage where they make efforts to pursue career success, establish good social relationships, and form good personal characters (Arshad and Rafique 2016). Therefore, those who present a higher level of psychological well-being will have more psychological capitals to pursue success and tackle failure (Arshad and Rafique 2016). A lack of psychological well-being may lead to avoidance behavior, social isolation, sadness, and self-doubt (Martin et al. 2013). It is thus important to investigate which strategies students can take to manage their psychological well-being.

Self-regulation, as a goal-oriented strategy, is found to be an effective way to improve college students' psychological well-being and has been widely used for college students (Balkis and Duru 2016). It comprises the ability to modulate emotions, thought, and behaviors that, over time, help to maximize adaptive adjustment (Williams et al. 2008). Students who develop greater maturity in terms of self-regulatory abilities through this transition will be more likely to thrive (Park et al. 2012). It is also proposed that self-regulators react less defensively and appraise events more positively, leading to less cognitive distortion (Scheuer and Epstein 1997). A substantial number of studies provided evidence that university students with pronounced self-regulatory skills reported higher levels of identity achievements (Hofer et al. 2011) and hoped for possible selves (Frazier et al. 2012), and lower levels of emotional exhaustion, depression and stress (Firoozabadi et al. 2018; Park et al. 2012). Thus, we hypothesize:

- H1. *Goal-oriented self-regulation is positively related to psychological well-being for college students.*

Mediating Role of Academic Performance

We further argue that the effect of goal-oriented self-regulation on college students' psychological well-being is through academic performance. Based on goal theory and motivational theory (Deci and Ryan 2008), goal settings and completions can facilitate psychological well-being across life's domains. By achieving one's goals, individuals can obtain a sense of achievement and satisfaction (Deci and Ryan 2008). For example, some goal-oriented strategies such as goal setting, self-efficacy, goal orientation, metacognitive monitoring, and self-evaluation can positively relate to psychological well-being, life satisfaction, and happiness by increasing goal achievements (Travis and Bunde 2020). For college students, academic performance is an important indicator of goal fulfillment. Having excellent academic performance not only benefits their knowledge development but also increases the chance of success in job markets (Paul and Ruhland 2013). Prior studies showed that goal-oriented students are able to become proficient in a given task via developing knowledge, skill, and understanding their own previous performance (Bouffard et al. 1995); that the frequency of students' self-regulated strategy predicted a substantial amount of variance in their achievement test scores (Zimmerman and Martinez-Pons 1988); that effective self-regulation provided a foundation for positive classroom behavior and achievement (Ladd et al. 1999). Thus, goal-oriented self-regulation can lead to better academic performance.

With increased academic performance, college students may receive more sense of achievements and positive affect. In line with goal theory, attainment of important goals is more likely to satisfy one's needs and values (Sheldon and Elliot 1998). Both progression towards and attainment of goals may influence well-being (Sheldon and Elliot 1998). Previous literature indicated that academic facilitators are positively related to engagement, commitment, satisfaction, and happiness (Martínez et al. 2016). Similarly, students who made good progress towards their goals at the end of the school term reported enhanced mood compared with the mood at the beginning of the term (Sheldon and Kasser 2016). These pieces of evidence imply that students with increased academic performance can bring in a higher level of psychological well-being. Taking together, we argue that goal-oriented self-regulation is beneficial to reach better academic performance due to the realization of academic goals. With increased academic performance, students obtain a great sense of satisfaction and happiness. Hence, we hypothesize:

H2. *Academic performance mediates the positive relationship between goal-oriented self-regulation and college students' psychological well-being.*

Conditional Mediating Effects: Optimism and Social Support

Taking a resource-based perspective, we further propose that optimism (personal psychological resources) and social support (social resources) may moderate the mediating effect of goal-oriented self-regulation on psychological well-being through academic performance.

Optimism as a Moderator Optimism refers to one's preconceived notion toward holding the best potential outcomes regardless of circumstances (Chang 1998). Optimistic individuals are more likely to employ problem-focused coping tactics (Sangtani and Murshed 2017), prefer to get started on a task, and have positive attitudes and favorable expectations (Sangtani and Murshed 2017). The optimists generally have a sense of confidence and believe that difficulties can be handled successfully and may achieve their goals in different ways (Brissette et al. 2002). Optimistic persons may perceive challenges as an opportunity for personal growth. Hence, in the college context, optimistic students are more likely to invest, act, and put efforts into achieving goals tenaciously. Specifically, optimistic students tend to engage in practices that are more positive and are more likely to use active coping strategies. Consequently, they have higher chances to realize goals, gain better academic performance, obtain a greater sense of achievement, and in turn enhance their psychological well-being. Numerous studies showed the significant correlations between optimism and life satisfaction for college students (Ayyash-Abdo and Alamuddin 2007). Past literature found the moderating role of optimism, for example, on the relationship between goal adjustment and well-being (Ramírez-Maestre et al. 2019); on the relationship between neuroticism and subjective well-being (Jibeen 2014). Hence, in the college context, optimistic college students are more likely to engage in their goals, and thus the mediating effect of goal-oriented self-regulation on psychological well-being via academic performance may become stronger. We hypothesize:

H3. *Optimism moderates the indirect effect of goal-oriented self-regulation on psychological well-being through academic performance, in such a way that the indirect effect will be stronger when college students have high optimism (vs. low).*

Social Support as a Moderator Social support is defined as the availability of help in relationships and the quality of those relationships (Shumaker and Brownell 1984). Social supports can come from significant others such as family members, friends, and colleagues. These significant others can provide different types of support such as emotional (e.g., providing

empathy, care, love, and trust), appraisal (e.g., transmission of information relevant to self-evaluation), informational (e.g., helping individuals to help themselves), and instrumental support (e.g., various sorts of practical help) (Peeters and Le Blanc 2001). Social support acts as a resource to cope with stressful issues and to mitigate the adverse effects of stressors (Kuriakose et al. 2019). Empirical evidence has demonstrated that social support can prevent burnout (Halbesleben 2006), cardiovascular symptoms (Evans and Steptoe 2001), and negative effects (Ilies et al. 2011), as well as facilitate positive psychological outcomes and life satisfaction (Kuriakose et al. 2019). In a recent meta-analysis, Wang et al. (2020) showed that social resources (e.g., social support from the leaders and coworkers) are positively related to one's well-being and performance. Cole and colleagues (2007) also indicated that given the buffering function of social support, it is important to consider these various sources of support that may be relevant to success in the academic context. Accordingly, we argue that when college students conduct self-regulation strategies (e.g., monitoring goals) in an environment with various sources of social support, they may gain more help, feedback, and positive feelings, and on the process of pursuing academic goals. Meanwhile, with more social supports, college students can better cope with stress and failure in the process of pursuing academic goals. By contrast, those who receive less social support may have a higher likelihood of failing to cope with stress and tend to end up with negative feelings. Therefore, when college students work and live in an environment with more social support, self-regulation strategies can better improve their psychological well-being through academic performance. We hypothesize:

- H4. *Social support moderates the indirect effect of goal-oriented self-regulation on psychological well-being through academic performance, in such a way that the indirect effect will be stronger for those college students who receive high social supports (vs. low).*

Methods

Procedure and Participants

We used a weekly diary design to test our hypotheses. Following the recommended procedure (Ohly et al. 2010), our weekly diary study includes two parts: a general questionnaire at the beginning of this study and four weekly questionnaires afterwards. In the general questionnaire, we briefly welcomed participants to join our study. We told them that this study was to record the fluctuations of their behaviors and moods over weeks and there was no right or wrong answer (i.e., we hide the real research question to reduce demand

characteristics effects, which refers to changes in behavior by experimental subjects due to cues about what constitutes appropriate behavior, Zizzo 2010). The confidentiality and anonymity of responses were secured. In the general questionnaire, we collected basic information such as age, gender, tenure, education background, and our moderator variables (i.e., optimism and social support). At the end of this questionnaire, we asked the participants to create a unique identification code, which will be used for matching with the following weekly questionnaires. Subsequently, we sent out our weekly questionnaires in which we measured our focal variables (i.e., weekly self-regulation behaviors, weekly academic performance, and weekly psychological well-being). During this stage, except that we had an automatic email reminder for participants filling in the questionnaire, we did not have any verbal or non-verbal interactions with the participants. In addition, to control the order effects we used separate pages to divide each questionnaire scale, in order to avoid participants to look back their ratings.

Besides, to reduce potential participants' biases and make sure that our statistics have adequate power, we conducted a power analysis before recruiting the participants. The power analysis results showed that we at least need to recruit 36 participants with four-time repeated measures if statistical power is expected to be above 95%. Despite that, Gabriel et al. (2019) reviewed 90 diary studies and found that on average the sample size is 83, and they recommend that a diary study should have at least 83. Based on this, we decided to recruit at least 80 participants. We invited participants in a Chinese social platform, and 80 s-year college students clicked on the study invitation link, indicating their interest to participate. They first filled in a general questionnaire. Then the diaries were sent to these participants every Wednesday for 4 weeks and expected to be completed by the end of every Sunday. Six participants were deleted due to only answered one weekly questionnaire.

Finally, we obtained 74 participants (i.e., 296 data points in total) who filled in both a general questionnaire and four weekly questionnaires. The response rate was 92.5%. Approximately 57% of our sample was male. The participants' age ranged from 19 to 24 (SD = 0.77). The minimum age was 19 and the maximum age is 24.

Measurement Instruments

The questionnaires were administered in Chinese and were translated from English by following the standard back-translation procedure. Unless otherwise stated, all measures used a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Weekly self-regulation was assessed with a 12-item scale (Gaumer and Noonan 2018), which includes four dimensions: *plan, monitor, control, and reflect*. We adjusted the items to fit

the weekly context. Examples are “This week, I planned out projects that I want to complete” (plan), “This week, I kept track of how my projects are going” (monitor). The Cronbach’s alpha for subscales were plan (α ranged from .705 to .759), monitor (α ranged from .724 to .830), control (α ranged from .777 to .827), and reflect (α ranged from .702 to .722).

Weekly academic performance was assessed with a 6-item scale (Williams and Anderson 1991). An example item is “This week, I fulfilled all the requirements of my study work”, Cronbach’s α ranged from .757 to .803.

Weekly psychological well-being was measured with a 3-item scale (Zhang et al. 2015). An example item is “I felt that I have grown as a person”, Cronbach’s α ranged from .695 to .782. For this construct, all measures used a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree).

Optimism was assessed with the 8 items scale (Scheier and Carver 1985). A sample item is “In uncertain times, I usually expect the best”, Cronbach’s α ranged from .800 to .837.

Social support was measured with the 4 items scale (Zimet et al. 1988). An example item is “My friends really try to help me”, Cronbach’s α ranged from .850 to .858.

Statistical Analysis

Three sets of analysis were conducted. First, we conducted a multilevel CFA using Mplus version 8 (Muthén and Muthén 2018) to analyze if each of the three indicators at the within-person level (i.e., weekly self-regulation including plan, monitor, control and reflect, weekly academic performance, and weekly psychological well-being) is a distinct construct. Results of confirmatory factor analyses with all three within-person level variables as separate constructs showed relatively acceptable fit indices ($\chi^2_{(406)} = 2915.460$; CFI = .85; TLI = .83; RMSEA = .07), indicating that the constructs are sufficiently distinct from one another. Moreover, this model was significantly better than the model collapsing plan, monitor, control and reflect into one factor ($\chi^2_{(465)} = 3337.282$; CFI = .73; TLI = .71; RMSEA = .09; $\Delta\chi^2(59) = 421.822$, $p < .001$), which support our focal variables can be differentiated from each other.

In addition, to justify our multi-level analysis, we examined the between-person and within-person variance components of the week-level constructs by calculating the intraclass correlation coefficient (ICC). The between-person variance of self-regulation, academic performance, and psychological well-being were 31.1%, 39.0%, and 59.5% respectively. We conclude that our variables varied both within and between persons, which warrants an examination of predictor variables at the person and week level.

Finally, to test our hypotheses, we used the MLwiN program (version 2.35) (Rasbash et al. 2000) to conduct a multilevel regression. To avoid multicollinearity and

spurious regression, all week-level variables were centered on the person-mean. We started with a null model that included the intercept as the only predictor (see Table 2, Model 1) and then entered the main effects (Model 2). We examined fixed effects of slopes and tested the improvement of each model over the previous one by computing the differences of their log-likelihood statistic $-2 \times \log$ and subjected this difference to a χ^2 significance-test. For testing mediating effects (H2), we conducted a bias-corrected bootstrapping analysis by using INDIRECT syntax in SPSS (version 25). Finally, we estimated the moderated mediation relationship with the bootstrapping technique by using the PROCESS syntax in SPSS (Hayes 2017; Rockwood and Hayes 2017).

Results

Means, standard deviations, and correlations among all the study variables are reported in Table 1. Week-level variables across the 4 weeks were averaged to correlate them with measures at the person level.

Hypothesis Testing

Table 2 shows that weekly goal-oriented self-regulation including weekly monitor and weekly control is positively related to weekly psychological well-being ($b = 0.587$, $p < .001$; $b = 0.546$, $p < .001$). However, for weekly plan and weekly reflect, the results are not significant ($b = 0.099$, $p > .10$; $b = 0.107$, $p > .10$) (see Table 2). Hence, H1 was partially supported.

In addition, we found that the indirect effects of self-regulation on psychological well-being via academic performance are 0.461, 95% CI [0.238, 0.721] for plan, 0.361, 95% CI [0.186, 0.567] for monitor, 0.463, 95% CI [0.243, 0.723] for control, and 0.539, 95% CI [0.288, 0.839] for reflect (see Table 3). These values do not include zero. Hence, H2 was supported.

In support of our Hypothesis 3, we found that the indirect effects of self-regulation including plan, monitor, control, and reflect on psychological well-being via optimism are 0.430, 0.402, 0.423, and 0.373 respectively, when optimism is high (95% bootstrapped CI = [0.259, 0.628], [0.251, 0.572], [0.250, 0.603], [0.159, 0.577]) (see Table 4). A two-way interaction figure was plotted (see Fig. 2). It shows that presented that goal-oriented self-regulation behavior is more positively related to academic performance when college students’ level of optimism is high. For other moderating effects of goal-oriented self-regulation such as monitoring, controlling, and reflecting, the figure patterns are similar and can be obtained via request from the corresponding author. In conclusion, H3 was supported.

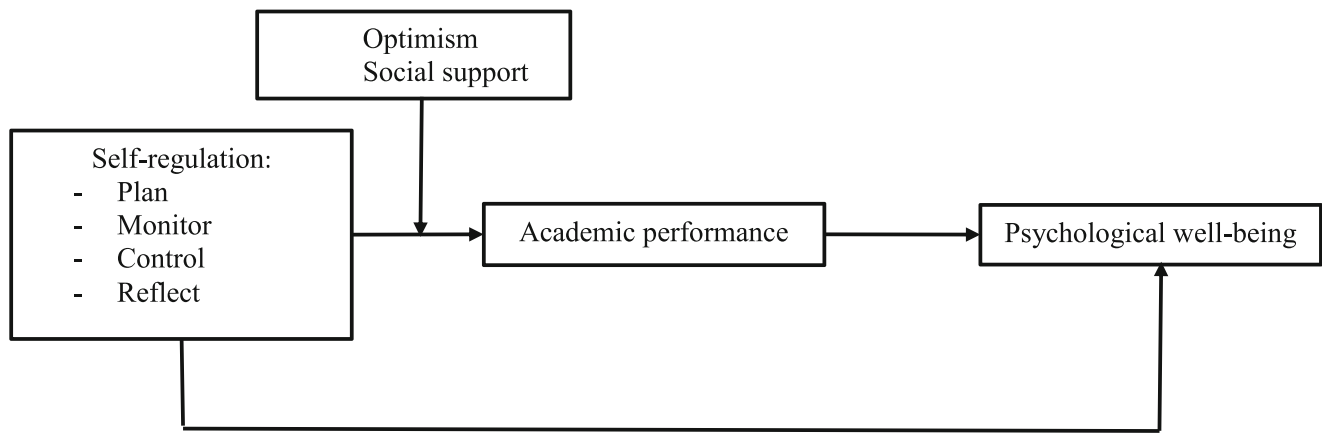


Fig. 1 Conceptual model

Table 4 shows that the indirect effects of self-regulation including plan, monitor, control, and reflect on psychological well-being via optimism are 0.363, 0.339, 0.396, and 0.282 respectively, when optimism is high (95% bootstrapped CI = [0.199, 0.600], [0.211, 0.479], [0.241, 0.573], [0.116, 0.456]). A two-way interaction was plotted (see Fig. 3). It shows that presented that goal-oriented self-regulation behavior is more positively related to academic performance when college students’ level of social support is high. For other moderating effects of goal-oriented self-regulation such as monitoring, controlling, and reflecting, the figure patterns are similar and can be obtained via request from the corresponding author. In conclusion, H4 was supported.

and college students’ psychological well-being. Using a weekly diary study among 74 s-year college students, the results supported our hypotheses. That is, the positive relationship between goal-oriented self-regulation (i.e., plan, control, monitor, and reflect) and college students’ psychological well-being is through increasing academic performance. Such indirect relationship becomes stronger when college students have a higher level of optimism and gain more social support. Based on these results, our study presents a more nuanced understanding of the mechanism and vital boundaries of college students’ goal-oriented self-regulation behaviors on a weekly basis. We highlight the important intermediate role of academic performance and moderating roles of optimism and social support.

Discussion

This study aims to examine the mechanism and the boundary conditions between goal-oriented self-regulation behaviors

Theoretical Contributions

This study contributes to college students’ development and mental health literature by underscoring that goal-oriented

Table 1 Means, S.D., and within level (below the diagonal) and between level (above the diagonal) correlations among the study variables

	Mean	SD	1	2	3	4	5	6	7	8
1. Goal-oriented self-regulation_Plan	3.97	0.58		.50**	.25**	.34**	.43**	.29**	.24**	.25**
2. Goal-oriented self-regulation_Monitor	3.86	0.57	.49**		.65**	.68**	.63**	.54**	.57**	.73**
3. Goal-oriented self-regulation_Control	4.00	0.49	.30**	.57**		.69**	.61**	.39**	.60**	.69**
4. Goal-oriented self-regulation_Reflect	4.10	0.47	.38**	.53**	.58**		.53**	.44**	.53**	.52**
5. Academic performance	3.84	0.54	.39**	.52**	.56**	.41**		.31**	.65**	.69**
6. Social support	3.91	0.63	.31**	.47**	.40**	.43**	.43**		.76**	.56**
7. Optimism	3.78	0.58	.20**	.43**	.47**	.44**	.47**	.68**		.65**
8. Psychological well-being	5.39	0.85	.37**	.63**	.60**	.46**	.65**	.60**	.56**	

* $p < .05$; ** $p < .01$; $N = 74$ participants and $N = 296$ data points

Table 2 Multi-level regression of goal-oriented self-regulation on psychological well-being

	Model 1			Model 2		
	b	SE	<i>p</i>	b	SE	<i>p</i>
Constant	5.40	0.11	<.001***	5.57	0.18	<.001***
Weekly goal-oriented self-regulation_ plan				0.10	0.09	
Weekly goal-oriented self-regulation_ monitor				0.59	0.10	<.001***
Weekly goal-oriented self-regulation_ control				0.55	0.12	<.001***
Weekly goal-oriented self-regulation_ reflect				0.11	0.12	
-2LL	503.68			377.97		
-2LL diff				125.71		<.001***
d.f.				4		
Level 2 variance	0.02	0.03		0.08	0.08	
Level 1 variance	0.71	0.07		0.37	0.04	

* $p < .05$; ** $p < .01$; *** $p < .001$; $N = 74$ participants and $N = 296$ data points

self-regulation behaviors can enhance psychological well-being through increasing academic performance. In the college context, academic performance is the core task for every college student. Although prior literature indicated that physical activities and high-quality interpersonal relationships are positively related to college students' psychological well-being (Armsden and Greenberg 1987; Bray and Born 2004), this study particularly stresses that students' self-regulation behavior that aims to achieve academic goals is also an effective way to bring in positive feelings and happiness. Our results showed that although the direct effect of self-regulation behaviors was partially supported, the indirect effect of self-regulation behaviors is fully supported. This implies that goal-oriented self-regulation behaviors are not directly positively related to psychological well-being but can indirectly relate to psychological well-being through increasing academic performance. We thus contribute to college students' psychological well-being literature by pinpointing that academic performance plays a mediating role in the relationship between goal-oriented self-regulation and psychological well-being.

This study also contributes to self-regulation literature by stressing the beneficial roles of optimism and social support. Our results showed that the indirect effect of goal-oriented self-regulation behaviors on psychological well-being through academic performance is stronger when college students are more optimistic and gain more social support. This implies that students who have a high level of personal resources and social resources are more likely to engage in self-regulation behavior. We thus underline two important contextual factors of the effects of goal-oriented self-regulation behaviors – optimism and social support. In the college context, it is important for college students to incorporate personal factor (e.g., optimism) and environmental factor (e.g., social support) during the self-regulation processes. This study provides a more nuanced insight into two resource-based conditional factors for the indirect effect of goal-oriented self-regulation on psychological well-being through academic performance.

Finally, we used a weekly diary design to examine our research hypotheses. This study design is able to reduce

Table 3 Results of the indirect effects of goal-oriented self-regulation on psychological well-being through academic performance

	Effect	SE	<i>z</i>	<i>p</i>	C.I.
Goal-oriented self-regulation_ Plan -> academic performance -> psychological well-being	0.46	0.13	3.69	0.002	[0.24, 0.72]
Goal-oriented self-regulation_ Monitor -> academic performance -> psychological well-being	0.36	0.10	3.65	0.003	[0.19, 0.57]
Goal-oriented self-regulation_ Control -> academic performance -> psychological well-being	0.46	0.12	3.73	0.002	[0.24, 0.72]
Goal-oriented self-regulation_ Reflect -> academic performance -> psychological well-being	0.54	0.14	3.79	0.002	[0.29, 0.84]

$N = 296$; unstandardized regression coefficients are reported; bootstrap sample size = 5000 bias corrected; LL = lower limit, UL = upper limit; significance level of confidence is at 95%

Table 4 PROCESS results for testing the conditional indirect effects of goal-oriented self-regulation behaviors on psychological well-being through academic performance (moderated mediation)

Predictors	Moderator	Indirect effect	SE	95% Bootstrapped CI
Goal-oriented self-regulation_Plan	Low social support (-1SD)	-0.10	0.12	[-0.33, 0.14]
	High social support (+1SD)	0.43	0.09	[0.26, 0.63]
Goal-oriented self-regulation_Monitor	Low social support (-1SD)	0.08	0.06	[-0.03, 0.20]
	High social support (+1SD)	0.40	0.08	[0.25, 0.57]
Goal-oriented self-regulation_Control	Low social support (-1SD)	0.22	0.08	[0.07, 0.38]
	High social support (+1SD)	0.42	0.09	[-0.25, 0.60]
Goal-oriented self-regulation_Reflect	Low social support (-1SD)	0.16	0.11	[-0.10, 0.35]
	High social support (+1SD)	0.37	0.11	[0.16, 0.58]
Goal-oriented self-regulation_Plan	Low optimism (-1SD)	0.03	0.13	[-0.27, 0.24]
	High optimism (+1SD)	0.36	0.10	[0.20, 0.60]
Goal-oriented self-regulation_Monitor	Low optimism (-1SD)	0.12	0.07	[-0.01, 0.27]
	High optimism (+1SD)	0.34	0.07	[0.21, 0.48]
Goal-oriented self-regulation_Control	Low optimism (-1SD)	0.27	0.09	[0.10, 0.45]
	High optimism (+1SD)	0.40	0.08	[0.24, 0.57]
Goal-oriented self-regulation_Reflect	Low optimism (-1SD)	0.16	0.12	[-0.11, 0.36]
	High optimism (+1SD)	0.28	0.09	[0.12, 0.46]

N = 296 Bootstrap sample size = 10,000. Values in bold indicate statistical significance at *p* < .05

the retrospective bias and examine how individual states change over time and how states and behaviors translate into other states and behaviors within short periods of time (Ohly et al. 2010). We, therefore, reveal a more dynamic relationship between goal-oriented self-

regulation behaviors and college students’ psychological well-being. That is, we capture the within-person fluctuations of self-regulation behavior and its effects on the fluctuations of psychological well-being on a weekly basis.

Fig. 2 The interaction effects between goal-oriented self-regulation (e.g., plan) and optimism on academic performance

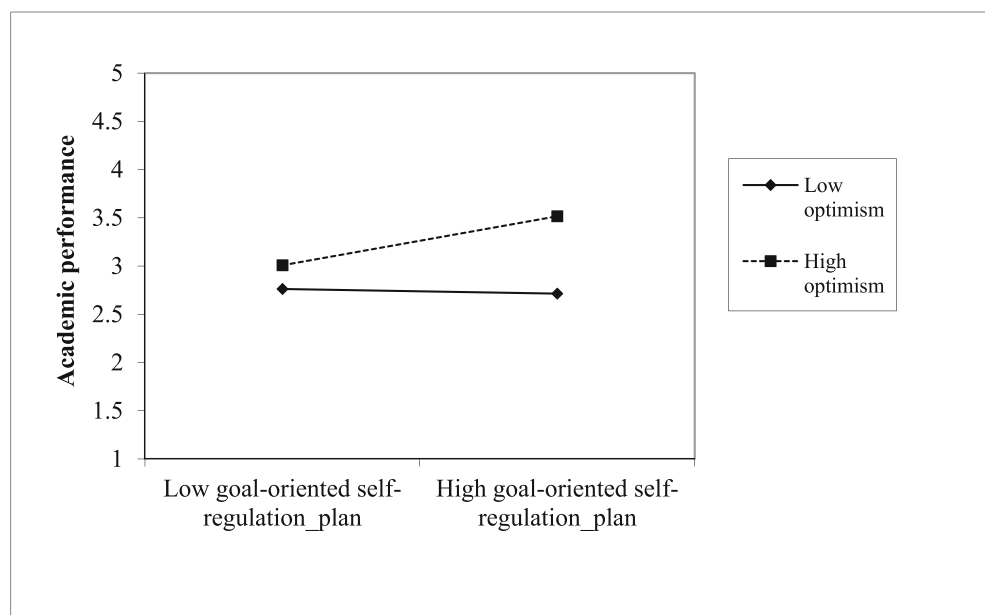
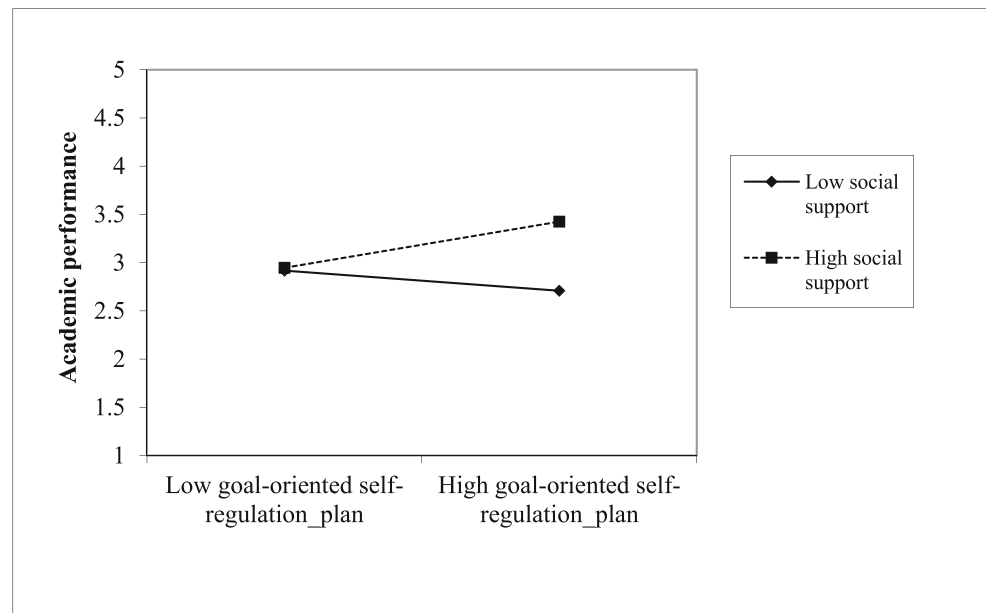


Fig. 3 The interaction effects between goal-oriented self-regulation (e.g., plan) and social support on academic performance



Limitations and Future Research

Our study has potential limitations which represent future research directions. First, all constructs in our study were self-reported, which may raise the question of whether common method bias may explain the results (Evans 1985; Podsakoff et al. 2003). For example, it is difficult to completely avoid the order effects bias for the questionnaire survey design, although we used separate pages to divide each scale. Besides, demand characteristics bias might be another issue for conducting the questionnaire survey, although we have hidden our real research question at the introduction of the questionnaire and tried not to have any verbal or non-verbal interactions with the participants. Based on these limitations, we encourage future studies to use laboratory experimental designs with adding control group to investigate the (causal) effects of college students' self-regulation behaviors. Moreover, future studies can take more objective measures to measure studied variables. For example, academic performance could be measured by the exam grades of the students.

Second, with regard to the sample size, we yielded 74 participants with 296 data points in total into our analysis. Although we did a power analysis to check the minimum number of the sample size before recruiting participants, the literature, especially multilevel analysis research, indicates that that 83 participants with 10 times measurement are recommended to conduct a multilevel (i.e., a diary with repeated measures) analysis (Gabriel et al. 2019). In this case, our study did not meet this guideline. Therefore, we suggest that future studies should take a statistical power analysis before conducting a diary study and be careful about the minimum number of sample size and measurement times.

Third, we collected diary data from the second-year college students in China, which may restrict the generalizability of the study. It is acknowledged that different levels of college students (e.g., second-year and final-year) may present different attitudes, behaviors, and performance. It will increase the generalizability of the study if different levels of college students can be included. Therefore, future studies should consider recruiting more different students. Moreover, another sample limitation is the country setting. China is a collectivistic cultural setting in which group orientation and interpersonal harmony are valued (Hofstede and Bond 1988), which might be different from western culture. Therefore, it remains unclear whether our findings are specific to the Chinese context or could be generalizable to other contexts. We suggest that future studies map into the investigation on whether the main effects, mediating effects, and moderating effects of goal-oriented self-regulation behaviors differ in other cultural settings.

Practical Implications

Our study mainly presents three practical implications. First, our results showed that goal-oriented self-regulation behaviors are positively related to psychological well-being through increasing academic performance. This implies that the goal-oriented self-regulation strategy is able to act as an effective way to promote psychological well-being. We thus suggest that universities and educational practitioners develop relevant training programs, workshops, and interventions to cultivate college students to proactively engage in self-regulation behaviors.

Second, our results indicated that optimism strengthens the indirect effect of goal-oriented self-regulation on

psychological well-being. This implies that more optimistic students are more likely to engage in self-regulation behaviors and gain positive feelings. Prior literature demonstrated that optimism can be enhanced through psychological interventions (Sergeant and Mongrain 2014). Universities and educational practitioners thus need to pay more attention to the cultivation of students' personal resources such as optimism. More optimism-related training courses may be considered to be developed to coach college students to stay positive and optimistic towards life.

Third, social support is another important contextual factor of the indirect effect of goal-oriented self-regulation on psychological well-being. Accordingly, in the college context, universities can encourage a supportive environment in which administrative personnel and lecturers can provide tangible aid for students in terms of study domain and/or non-study domain. Universities can also train and develop administrative personnel and lecturers' helping behaviors and supportive mindsets. Students can become more engaged in their goal-oriented self-regulation behaviors if universities, lecturers, and classmates are willing to create a more supportive environment.

Conclusion

This study sheds lights on how and when goal-oriented self-regulation behaviors can positively relate to college students' psychological well-being on a weekly basis. Specifically, we stress that this relationship is mediated by academic performance, and such an indirect effect is stronger when the levels of optimism and social support are high. Our study suggests that it is important for universities and educational practitioners to pay more attention to the mediating mechanism of academic performance and the moderating roles of personal psychological resources and social resources during self-regulation processes.

Authors' Contribution The first author contributed this paper by writing the manuscript and doing data analysis; The second author collected data; The third author helped to improve the manuscript and revised the article.

Data Availability The data can be obtained via request from the corresponding author.

Compliance with Ethical Standards

Conflict of Interest The authors do not have any potential conflict of interest.

Ethics of Approval All procedures performed in this study were in accordance with American Psychological Association (APA) ethical regulations regarding the treatment of human participants.

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