The Effect of Mindful Planning on the Academic Productivity of Adolescents

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Abstract:

Mindfulness is the concept that indicates the awareness, acceptance, and nonjudgment of present-moment experience. However, until now, mindfulness is still a topic that has yet to be explored in great depth. To downsize mindfulness from a vague concept to a concrete application, in this study, the role of mindfulness in selfplanning will be focused on determining its effect on academic productivity (measured by a self-reported questionnaire with 20 baseline questions and 10 followup questions) of adolescents (Chinese from 15-18 years old, N=20). At the beginning of the study, all participants were asked to complete a questionnaire with 20 baseline questions indicating their productivity level; then, they were divided into the experimental group (N=10) and control group (N=10) with a similar average base level of productivity. In the following week, the experimental group was asked to write and submit their plans for the next day following the directions on a specially designed mindful plan table in detail using handwriting and the reflection on their plan completion during the day every night. The control group just listed their tasks and completed other procedures similarly. After a week, effective results were gained from most participants (N=6 in each group) who finished the experiment, and they did the same questionnaire again with 10 more followup questions to determine the new productivity. Paired sample t-tests are used to analyse the data within groups, and between groups. The result indicates that no significant differences in baseline scores (p=0.12) were found between time points within the control group, while a significant difference (p=0.002) was found between time points for the experimental group; no differences were found between groups on the follow-up scores (p=0.956).

Keywords: : mindfulness, academic productivity, self-regulated learning, adolescents, mindful planning.

1. Introduction

1.1 Mindfulness

Mindfulness is often described as a state of active attention to the present moment. This awareness is non-judgmental, and it helps us focus on the current experience (Germer, C., 2004), which can be described as "a wake-up of mind". Mindfulness is not only about meditation or to reduce cognitive vulnerability (Bishop et al., 2004). It emphasizes more on neutral awareness and attention to the world. From ancient contemplative practices, mindfulness has gained scientific credibility as a tool for improving emotional regulation and cognitive performance (Baer, 2003). More recently, within a few decades, the concept of mindfulness started to achieve broader applications. For instance, there have been more studies focusing on the effect of mindfulness on working outcomes (Glomb, T.M. et al., 2011), improving working memory (Williams, J. M. G., 2010), education (McCown, D. et al., 2010) and so on. Therefore, these approaches indicate that mindfulness enable profound impacts to be occurred on how we deal with tasks and manage stress in both personal and professional contexts (Shapiro et al., 2006).

1.2 Self-Regulated Learning (SRL) and Mindful plan

Self-Regulated Learning (SRL) refers to self-generated thoughts, feelings, and behaviours that are aimed to attaining goals (Zimmerman, 2000). Self-regulated learners watch and reflect on their own actions in terms of their goal-setting to assess their effectiveness and possibilities (Zimmerman, 2002). Its framework involves three key processes: *forethought* (goal setting), *performance* (self-monitoring), and *self-reflection* (evaluating and future informing) (Zimmerman, B. J., & Cleary, T. J., 2009; Pintrich, 2004; GAO, T., Fan, Y., & Chen, T. G., 2024). SRL is the basis of every individual to achieve academic success, since they have to deal with evolving tasks in this dynamic world.

Mindfulness enhances self-awareness, which is critical for effective self-regulation in learning contexts. According to the *Objective Self-Awareness Theory*, when individuals are self-aware, they tend to reflect on their thoughts, feelings, and behaviours, leading to greater alignment with their personal goals and values (Duval & Wicklund, 1972). This heightened state of awareness facilitates the self-regulation process, as individual learners become more attuned to their cognitive and emotional states, allowing for making more informed decisions and ongoing better forethought process (Schunk & Zimmerman, 2008). By integrating mindfulness into SRL, individual learners can monitor their learning strategy more effectively, thus improving their overall performance.

To start with mindful foresight, process with mindful awareness, and end with mindful reflection in an individual learner's study period, Mindful plan is definitely an ideal tool to bring the theory of mindfulness into practice. According to Moran and Ming (2022), a mindful plan requires a special design to help users find out and apply their self-as-context skills, present moment mindfulness, acceptance skills, defusion skills, committed action, and values. Self-as-context skill is described as seeking to develop psychological flexibility by guiding individuals in how they view themselves and the way they define their identity. Present moment mindfulness emphasizes the importance of engaging in current actions. Acceptance skills make it easier and more flexible for people to deal with mental burden. Defusion skills help individuals become attention to their internal verbal processes without being controlled by them. Committed action is observable actions driven by personal values. And values are self-defined, consciously chosen guiding principles that create motivation to engage in actions that hold personal significance (Moran & Ming, 2022). Those specific approaches will be considered in the design of mindful plan table in this study, which will be discussed in the following passage. In addition, making and following physical plans enhances the effectiveness of mindful plan: a normal plan that is listed on a paper or a document provides direct visual stimuli, which then enables the brain to process visual encoding (Kandel et al., 2012), storage of visual information (Squire & Zola-Morgan, 1991), and retrieve visual information (Baddeley, 2000). According to the Dual Coding Theory (Paivio, 1971), visual information is encoded both verbally and visually, giving it two cognitive pathways for retrieval, whereas purely verbal or abstract information is only encoded through a single pathway. In other words, a physical normal plan could avoid forgetting and enhance memorization, which strengthen awareness that is essential for mindful approaches

1.3 Mindful plan and self-efficacy

Self-efficacy means an individual's belief in their ability to perform specific tasks or achieve particular goals (Bandura, 1997). The framework of self-efficacy consists of *mastery experiences, vicarious experiences, social persuasion, and emotional and physiological states*. Mastery experience refers to learning from past successful performance. Vicarious experience refers to learning through observing the experience and outcomes of others. Social persuasion refers to receiving positive feedback and insightful suggestions from others. And emotional and physiological states refer to the reaction and feeling towards certain tasks, which affects self-belief (Schunk, D. H., 1987; Maddux, J. E. ,1995; Bandura, 1997). The mindful

plan affects three components of these. In the case of mastery experience, which is similar to performance accomplishments, mindful planning encourages individuals to break down tasks into manageable, specific, and achievable steps. When people successfully follow through on a mindful plan, they accumulate mastery experiences. The sense of accomplishment from completing planned tasks boosts confidence in their ability to achieve similar tasks in the future. In the case of social persuasion, mindful planning often incorporates social interactions, such as seeking feedback or discussing plans with those who can provide positive reinforcement. Encouragement during the planning process helps to increase self-efficacy by reducing doubts about one's ability to succeed (Bandura, 1997). In the case of emotional and physiological states, mindful planning often involves techniques like stress-reduction strategies by encouraging acceptance towards all kinds of emotions, which helps individuals manage negative emotions like anxiety, maintain a positive mindset, and ultimately promote self-efficacy.

Noticing that even though the concept of *self-efficacy* emphasizes the word "self", it is not necessarily an independent action in theory since to achieve self-efficacy, *vicarious experiences* and *social persuasion* are necessary as well. However, if the individual learner relies heavily on external monitoring to complete tasks, it could suggest a lower level of self-efficacy. According to Bandura's self-efficacy theory, individuals with high self-efficacy believe in their ability to succeed independently, set goals, and persist through challenges (Bandura, 1997). When someone depends on external monitoring to finish tasks, it might indicate that they have lower confidence in their ability to self-regulate, plan, or complete tasks on their own, which are characteristics of lower self-efficacy.

1.4 Self-efficacy and productivity

Self-efficacy directly influences productivity through its effect on motivation, persistence, and goal achievement. When goals are self-set, people with high self-efficacy often set higher goals than people with low self-efficacy (Locke & Latham, 2002). They are also more committed to assigned goals, find and use better task strategies to achieve goals, and respond more positively to negative feedback than people with low self-efficacy. According to Locke & Latham, 2002, page 708, "*self-efficacy enhances goal commitment*", which makes the goal–performance relationship stronger.

Overall, under the condition of SRL, a mindful plan promotes self-efficacy, and by fostering self-efficacy, individuals can improve their productivity sustainably (Stajkovic & Luthans, 1998). Therefore, this study will examine the effect of mindful planning on the academic productivity of adolescents, who are developing on learning how to organize and master their own lives .

2. Methods

2.1 Participants

20 (13 female) individuals took part in the study. Participants were recruited via social media. All participants were Chinese adolescents aged between 15 and 18 years old. People who completely lack of the ability and the willing to organize their daily lives were excluded. This factor was measured in terms of participation, as participants who were unable to do this drop out of the program on the first day or in the middle of the week, and thus their performance is not counted in the valid data.

2.2 Materials and tools

2.2.1 Mindful Plan Table (MPT)

Before the experiment started, a normal plan table for the control group and a mindful plan table for the experimental group were designed. The normal plan table only contained two columns: Task lists (include step-by-step plan and specific information) and a yes or no question about whether participants finished the tasks on their list.

List of tasks	Please review your assignment and answer this question: Did you accomplish it?

Table 1 Task lists for the control group

The *mindful plan table (MPT)* was developed based on the *Mindful Action Plan* Table (MAP) (Daniel J. Moran & Siri Ming, 2020). However, while the MAP focus on filling the blanks by listing tasks, the *mindful plan table* was designed to emphasize more on guiding the participants in the experimental group to achieve mindfulness by writing down all the details of their planed tasks in a visible way. It contained five columns: List of tasks, reasons why participants choose to complete these tasks with the importance of the tasks, long-term goals they want to accomplish when they make their plans, how they should arrange their timelines in steps in order to complete their tasks, and whether they succeeded in completing those tasks with a self-reflection on its completion.

List of tasks	Why did you choose to accomplish this task? Why is it important to you?	When you set yourself this task, what long-term goal do you think you want to achieve?	What are the specific things you have to do? You can write about your manage- ment of the timeline.	Did you actually accomplish it? If you didn't, then why? Please review and analyse.

Table 2 Mindful Plan Table for the experimental group

Tips:

1. Notice if you are being influenced by any unhelpful self-descriptions. Let go of any problematic thoughts that you are believing about yourself.

2. Center your situational awareness on what you are doing. Notice what is happening here and now, and rather than getting wrapped up in events not in your present control, let go of these distracting events. Focus on what is relevant to your actions.

3. Allow yourself to acknowledge any emotions you are having without trying to control the emotions. Be willing to simply have those feelings while moving forward with valuable actions.

4. Prepare to simply notice thoughts that arise while moving forward with your valued actions. Let those thoughts go if they are not helpful. Treat distracting thoughts as disconnected from action while choosing to act in a meaningful manner.

At the end of the mindful plan table, there are a few tips, replicated from the original MAP (Daniel J. Moran & Siri Ming, 2020) for participants to develop a stronger sense of mindfulness. In addition to promote participants to be constantly aware of their present actions and future pur-

pose, these tips emphasize the focus on current actions and acceptance of any emotions.

All the information above is presented in Chinese in order to provide participants better understandings.

2.2.2 Self-reported Productivity Questionnaire

Table 3 Baseline questions	
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1. It is easy for me to concentrate on what I am doing.
2. *I am preoccupied by the future
3. I often plan my daily activities
4. I reflect on my day and on how many tasks I have completed
5. *I prefer to live by flowing without having a daily plan
6. I design daily activities in detail so that my goals/tasks are achieved
7. *It is very difficult for me to complete daily tasks according to planning
8. I complete daily targets every day
9. I feel that reviewing what I've done that day before bed enhances my sense of pleasure and helps me gain control in my life.

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10. It is easier for me to complete tasks that are aligned with my values and goals

11. I get fully immersed in what I am doing when I am completing a task

12. I am able to continue completing my tasks even if I notice thoughts or emotions associated to it

13. I perceive my feelings and emotions without having to react to them

14. *I find myself doing things without paying attention

15. I generally feel satisfied with my productivity at the end of the day

16. I find that I am more productive when I have daily plans

17. I find that having clearly defined goals helps me complete my tasks

18. I always follow activities that will support the achievement of my goals

19. *I believe that coercive monitoring by others is more effective than self-monitoring (self-discipline) in carrying out tasks.

20. If I make a plan for myself, then I will follow it.

Response scale:

1: Strongly Disagree

- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly Agree

Higher scores indicate higher productivity/mindfulness/self-efficacy *Reversed items

*These questions are self-created and inspired or pertaining to the following questionnaires/paper: Baer, R. A. et al. (2006), Brown, K. W., & Ryan, R. M. (2003), Feldman, G. et al. (2007), Moran, D. J., & Ming, S. (2022), Thalib, T. et al. (2019), Schwarzer, R., & Jerusalem, M. (1995)

Table 4 Follow-up questions

1. In comparison to last week, I feel more productive now

2. *I did not notice any changes in my behavior from last week to now

3. I feel more satisfied with my productivity now

4. It's planning that helped me become more productive

5. Having to send my reports to the researcher made me more likely to complete my tasks

6. I plan on continue planning my tasks daily

7. I feel more aware of my feelings and thoughts when completing tasks now

8. Writing the report to the researcher helped me reflect on my day and achievements

9. I plan on continue reflecting on my achievements daily

10. In comparison to last week, I find it easier to concentrate on my tasks

Response scale:

1: Strongly Disagree

2: Disagree

3: Neutral

4: Agree

5: Strongly Agree

Higher scores indicate higher productivity/mindfulness/self-efficacy *Reversed items

The specific use of these two Self-reported Productivity Questionnaires will be discussed in the procedure part.

2.3 Procedure

This study was conducted entirely online. It was sin-

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gle-blinded. Participants were told that this study was a study related to making plans and finishing them. They did not know the existence of the variable *mindfulness*. After all the participants agreed to join the study, they completed baseline questions of the *Self-reported Productivity Questionnaire* and then got a score indicating their baseline level of productivity and mindfulness according to their responses.

They were divided into two groups regarding their scores. First 10 people who had higher scores were in one group, and the rest 10 were allocated to the remaining group. Then we randomly chose 5 people in two groups respectively to form a new set of two groups, in order to have people with relatively equal average level of initial productivity in two groups to continue the study. The two new groups were the control group and the experimental group.

The experimental group was asked to complete a list of 7 tasks every night preceding the day they needed to do tasks. In addition, they had to write done why these tasks were important for them to do, what was their longterm goal, and how could they finish each task in detail following the *Mindful Plan Table*. They had to do this in handwriting, since under the condition of handwriting, participants would have better free recall of words and information (Smoker, T. J. et al., 2009), which provided cognitive benefit (Anne Mangen et al., 2015) and promoted mindfulness.

The control group was simply asked to list 7 tasks they

wanted to finish without answering those reflective questions using *Table 1*. The plans from both groups had to be sent by WeChat to the researcher before the day they would follow their plan to do their tasks.

At the end of each day, participants had to photo their plan or send a pdf to the researcher in order to find out whether they had finished all their tasks. In the experimental group, participants had to write about the difficulties they were facing during the completion of tasks and how they overcame those difficulties. It was fine to fail to finish their tasks, but they had to provide their reasons. The control group, conversely, just needed to mark the tasks they finished without a reflection.

After a-week period, participants were asked to complete the *Self-reported Productivity Questionnaire* again. The scores were recorded and analysed. In addition, they completed the *Follow-up questions*, which aimed to trace the effect of making plans for a week on participants' behaviour changes comparing to the previous week.

3. Results

3.1 Data tables

Before in the column indicates the score of Baseline questions before the experiment.

After in the column indicates the score of Baseline questions after the experiment.

Participants (coded)	Gender	Before	After	Change	%Change	Follow-up
А	F	83	86	3	0.036	45
В	М	76	74	-2	-0.026	35
С	F	69	61	-8	-0.116*	37
D	М	60	73	13	0.217	39
Е	М	57	62	5	0.088	39
F	F	51	53	2	0.039	28
G	F	50	52	2	0.040	34

Table 5 The score of self-report questionnaires of the control group

Table 6 The score of self-report questionnaires of the experimental g	roup
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Participants (coded)	Gender	Before	After	Change	%Change	Follow-up
Н	F	83	76	-7	-0.084*	42
Ι	F	75	78	3	0.040	41
J	F	73	80	7	0.096	40
К	F	63	70	7	0.111	38
L	F	61	68	7	0.115	38

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М	F	57	60	3	0.053	29
Ν	М	55	64	9	0.164	35

* Noticing that there are two participants (C and H) presenting abnormal decrease in their productivity after a mindful practice. Therefore, they are considered outliers and are not incorporated in the following analysis.

3.2 Data analysis

Data analyses was conducted using JASP software version 0.17.1 JASP Team (2024). JASP (Version 0.17.1) [Computer software]

3.2.1 Within-group analyses

Add raincloud plots for controls and experimental group (based on visual inspection, one outlier in each group was removed, then N=6 in each group).

Parametric tests (Student t-test) were conducted following assumption checks to analyse the normality (Shapiro-Wilk) of the data.

Raincloud plots depict paired sample t-tests for the control group (outlier excluded) (M before = 62.8; SD=13.6) (M after = 66.7, 13.3). No significant differences were found between time-points (t(5)= -1.864, p=0.12, d= -0.76).



Figure 1 Raincloud plots of the productivity change in control group before and after the study



Dots indicate individual scores. Box plots represent median scores. Curves depict density of data.

A significant difference was found between time-points for the experimental group (t(5)=-6.000, p=0.002, d=-2.45). Means and standard deviations before and after were respectively M=64; SD=8.3, and M=70; SD=7.8.

Figure 2. Raincloud plots of the productivity change in experimental group before and after the study

Dots indicate individual scores. Box plots represent medi-
an scores. Curves depict density of data. *:p<0.05</th>**3.2.2 Between-group analyses**
Linear Mixed Model is used.

Effect	df	F	р
Group	1, 10.00	0.127	0.729
Time-point	1, 10.00	18.496	0.002
Group *Time-point	1, 10.00	0.898	0.366

Table 7 ANOVA Summary



Figure 3 LMM of the productivity change in both groups across time-point

A linear mixed model (LMM) was conducted to assess the effect of groups, time-line and the combination of two. p value indicates that there's only significant difference between time-point, while there's no significant difference of productivity between groups.

3.2.3 Follow-up

Each question from *Follow-up Questionnaire* scales from 1-5, higher scores indicate higher benefit.

For the control group, M=36.67, SD=5.75. For the experimental group, M=36.83, SD=4.35. No differences were

found between-groups on the follow-up scores (t(10)= -0.057, p=0.956, d= -0.033). Therefore, other measures were taken to investigate the characteristics of the scores of follow-up questions among groups.

After calculating the mean value of the score of each question, researcher found that the scores of each question in the experimental group were generally higher than those in the control group. However, in questions 3 and 5, the scores of the control group were higher than those of the experimental group. (In question 3, M_c =3.67, M_e =3.17; In question 5, M_c =3.67, M_e =2.67)







Figure 5 Detail scores of control (left) and experimental (right) groups in Question 5

4. Discussion

It is meaningful that the results of this study suggest that mindful planning had a significant impact on the productivity of adolescents within the experimental group. However, some findings did not reach statistical significance, particularly in the between-group analysis and follow-up comparisons.

The lack of significant difference between the experimental and control groups on the baseline and follow-up scores raises questions about the overall effect of mindful planning across different groups. One possible explanation is that teenagers nowadays often lack the habit of making visual plans. Therefore, since the control group also engaged in task planning, though without mindfulness, which may have still encouraged a degree of self-regulation and reflection, reducing the observable gap between groups since the action of making plan could be a useful practice itself. Moreover, another possibility is that participants were told that this study was a study related to making plans and finishing them. So, as those in the control group did not know the exist of the variable *mindfulness*, they could mistakenly assume that they are in the experimental group, or, they are being watched. According to the observer effect, which refers to changes in a subject's behaviour due to their awareness of being observed (Adair, 1984), knowing that oneself is being watched can lead to social desirability bias: participants alter their behaviour to align with what they think is expected of them, which makes them report a higher score of productivity.

Another phenomenon is that participant B, C and H from both the control and experimental groups showed a *decrease in their reported productivity* after making a plan for a week. This phenomenon can be attributed to an increased awareness of incomplete tasks: When participants engage in mindful planning or regular task planning, they become more aware of the tasks they have not completed. This heightened awareness, especially among individuals who struggled to meet their goals, creates a sense of frustration or stress, leading them to report a lower sense of productivity. Even though they may have been productive, the perception of not meeting their full potential or leaving tasks unfinished could influence their self-reported outcomes. Also, making a plan can raise expectations about productivity. If participants set overly ambitious goals or misjudge their ability to complete tasks, they may perceive their actual productivity as lower than they expected. This mismatch between assumption and performance could result in a lower productivity score, even if it was effectively improved during the week.

In addition, in Follow-up questionnaire, the scores of Question 3 and Question 5 reflected some confusing aspects. In Q5 "Having to send my reports to the researcher made me more likely to complete my tasks" (a reverse question), 4 participants (67%) in control group get a score 4 and 5 (after reversing), which are high scores, while only 2 participants (33%) in experimental group scored 4 and 5; more of them (50%) scored 2. This result diverged from the expected outcome. The reason for this difference might be that mindful planning requires a shift in cognitive methods and time for internalization. Although the intervention aims to promote self - regulation, it may inadvertently highlight the experimental group's dependence on external monitoring since they want to seek for more feedback, as they followed the instruction and made more self-managing plans, which can also explain why they scored lower on items measuring the impact of external accountability. The lower scores of the experimental group reflect their need for external validation, which may indicate that the mindfulness practice of the experimental group has not fully developed the internal procedures necessary to complete tasks independently. Another interesting phenomenon is although the difference in the content of Question 1 "In comparison to last week, I feel more productive now" and Question 3 "I feel more satisfied with my productivity now" is rather subtle, merely lying in qualitative evaluation and emotional awareness, the choices of the control group and the experimental group are quite different for these two questions: In Question 1, all participant scored 2 or 4 in control group, while participants in experimental group scored 3 or 4 or 5. But in Question 3, all participant scored 3 or 4 in control group, while participants in experimental group scored 2 or 3 or 4, leading to a lower mean score.



Figure 6 Detail scores of control (left) and experimental (right) groups in Question 1

This difference may be explained by the complex relationship between productivity perception and self-confidence, and how each group perceived their progress and emotional engagement with the task. In Question 1, which directly assessed productivity with a focus on objective comparison, the experimental group may have been more optimistic about their perceived productivity. Mindfulness-based interventions often foster positive self-reflection (Shapiro et al., 2006), which can enhance individuals' perceptions of their productivity, even when the increase is subtle. As a result, the experimental group may have a stronger recognition of their improvement, leading to higher self-reported productivity.

On the other hand, Question 3, which assessed satisfaction with productivity, presents an interesting contrast. Satisfaction tends to be more emotionally driven. Even if participants in the experimental group reported feeling more productive in Question 1, they may feel exhausted due to the meticulous plans. Even as they feel they've made progress in self-management, they still sense there's ample room for improvement, or they may not have felt satisfied with the quality. It's possible that the experimental group's mindful planning led them to focus on process and internal growth, rather than merely the outcome. As a result, while they may have seen some progress, their satisfaction might not have been as high as their perception of productivity.

One of the most notable things is that there is a *significant* decrease in sample size after one week (N=10 to N=6 in each group). This might due to a high demand on participants' time and effort: Both groups were required to create daily plans and submit them for a week. For the experimental group, this process involved not only listing tasks but also writing detailed reflections on task importance, long-term goals, and reflects. Such extensive and complex

practices may have caused participant fatigue or a loss of interest in continuing the study. Locke, E. A., & Latham, G. P., 2002, page 705, helps explain this: Task difficulty is related to the performance. "The highest level of effort occurred when the task was moderately difficult, and the lowest levels occurred when the task was either very easy or very hard."

5. Limitations

This study has several limitations that must be taken into consideration when interpreting the results.

The study's sample size was relatively small (N=20, with N=6 completing the final experiment in each group), which limits the generalizability of the findings. The power to detect slight effects was also reduced, possibly explaining the lack of significant in between-group differences.

The one-week duration of the study may not have been sufficient to observe long-term effects of mindful planning on productivity. Longer studies could reveal more about how mindfulness influences productivity over time and whether the effects are sustainable.

Finally, the reliance on self-reported questionnaires might cause response bias, as participants might have over or under report their productivity levels. Objective productivity assessments may be needed to provide a more accurate evaluation of performance.

6. Conclusion

This study explored the effect of mindful planning on the academic productivity of adolescents. The results showed that mindful planning significantly improved productivity within the experimental group, as measured by self-re-

ported questionnaires, but no significant differences were found between the experimental and control groups or in follow-up assessments. These findings suggest that while mindful planning may offer short-term benefits, the effect may not be substantially different from non-mindful planning in the context of academic productivity.

Future studies should include larger sample sizes, longer intervention periods, and more rigorous control conditions to better isolate the effects of mindful planning on productivity. Nevertheless, this study highlights the potential of mindfulness-based interventions to enhance self-efficacy and productivity in adolescents in self-regulated learning.

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