Effects of Perceived Teachers' Autonomy Support on Motivation of Japanese Undergraduate With Mild Difficulties in Learning

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Abstract
Research has suggested that students' motivation plays a critical role in achieving educational success. However, some students struggle to maintain their motivation for various reasons. Motivational research has revealed the effects of teachers' autonomy support on students' learning. This study examined the effect of perceived teachers' autonomy support on academic motivation among university students with and without mild difficulties in learning. The participants were 201 Japanese undergraduate students, all of whom were freshmen. The hypothetical model posited that perceived teachers' autonomy support is positively associated with students' intrinsic motivation and metacognition, which, in turn, is positively associated with their self-evaluated achievement. Based on self-rated scores of difficulties in academic learning, two groups were created: students with and without mild difficulties. A multi-group structural equation modeling analysis revealed that perceived teachers' autonomy support had a larger effect on intrinsic motivation in students with mild difficulties. The effect of autonomy support on metacognition did not differ between the two groups. Intrinsic motivation was associated with self-evaluated achievement in students without difficulties, whereas metacognition was associated with self-evaluated achievement in students with mild difficulties. The findings demonstrated teachers' role in supporting struggling learners in higher education. Teachers' autonomy support can promote intrinsic motivation and metacognition in students with mild difficulties in learning.

Keywords: Autonomy Support, Motivation, Mild Difficulties in Learning, Undergraduates

Introduction

University-level learning requires a high level of motivation. Students are expected to be self-motivated in their academic learning and manage their own learning activities. Additionally, students' motivation affects their educational success. Students' motivation plays a significant role in determining their educational outcomes (e.g., Robbins et al., 2004). However, some students struggle to maintain their motivation for various reasons. Therefore, it is essential for higher education teachers to support diverse students' motivation.

Autonomy support is a type of interpersonal context that fosters intrinsic motivation and encourages people to make their own choices (Deci & Ryan, 1987). According to Black and Deci (2000), autonomy support means that an individual in a position of authority (e.g., an instructor) takes the other's (e.g., a student's) perspective, acknowledges the other's feelings, and provides the other with pertinent information and opportunities for choice, while minimizing the use of pressure and demand. Reeve et al. (2022) identified the following seven aspects of autonomy-supportive teaching in classroom: (a) taking the students' perspective, (b) inviting students to pursue their personal interests, (c) presenting learning activities in need-satisfying ways, (d) providing explanatory rationales, (e) acknowledging and accepting negative feelings, (f) relying on invitational language, and (g) displaying patience. Teachers can motivate students to learn by autonomy supportive teaching.

Several studies have verified the effects of teachers' autonomy support in the context of higher education. Teachers can conduct lectures in a manner supporting students' autonomy, which, in turn, motivates undergraduate students to engage in academic learning. Okada (2023) examined the effects of teachers' autonomy support on undergraduate students' educational gains through a meta-analysis. As teachers' autonomy support has primarily been measured in terms of students' perceptions (e.g., Filak & Sheldon, 2008; Levesque et al., 2004), the effect sizes yielded by perceived autonomy support were integrated into the meta-analysis. The findings revealed that perceived autonomy support was positively related to academic performance (r=.18) and intrinsic motivation (r=.41). Furthermore, teachers' autonomy support leads to self-efficacy (Overall et al., 2011), metacognitive activities (Okada, 2021), collaborative learning (Summers et al., 2009), and self-regulated learning (Miao & Ma, 2023). This suggests that teachers' autonomy support affects undergraduate students' academic success.

Some students struggle with academic learning for several reasons. One reason is learning difficulties or related characteristics. The Japan Student Services Organization (2023) reported that 254 undergraduates had specific learning disabilities. Although this number is very small compared with the overall student population, it is increasing annually. Additionally, some university students exhibit difficulties studying even though they have not been formally diagnosed. Some studies have reported that the percentage of undergraduates who have difficulties with learning (e.g., reading and writing) ranges from 10% to 16% (Itoi & Hanazuka, 2017; Matsuyama, 2022). Research addressing the relationship between learning difficulties and academic motivation (e.g., Deci & Chandler, 1986; Louick & Muenks, 2022) has found that some students face difficulties in sustaining motivation.

The effects of autonomy support on motivation have been verified in samples of general undergraduate students. By contrast, few studies have focused on undergraduate students who struggle or have difficulties with academic learning. Teachers' autonomy support can promote the motivation of struggling students in secondary education (e.g., Deci et al., 1992;

Patrizia et al., 2018). However, how teachers' autonomy support affects undergraduate students with mild academic difficulties has not yet been confirmed.

Therefore, this study examined the effects of perceived teachers' autonomy support on the academic outcomes of undergraduate students with mild difficulties in academic learning. It focused on students' intrinsic motivation and metacognition when examining the effects of teachers' autonomy support. Following Okada (2021), a model was hypothesized wherein teachers' autonomy support leads to self-evaluated achievement, mediated by intrinsic motivation and metacognition. This model was tested on a sample of undergraduate students with and without mild academic difficulties.

Method

Participants

The participants were 201 Japanese university students. All participants were freshmen.

Procedures

A questionnaire survey was administered using Microsoft Forms. All the participants were volunteers. The students were informed about the survey during a lesson. The aim, content, and anonymity of the participants were explained. Additionally, they were informed that their participation and the survey outcome would not affect their course grades. Students who agreed to participate accessed the page and filled out a web-based questionnaire. After completing the survey, participants were given quick feedback on the results during another lesson. By the time the survey was conducted in June, the students had experienced learning at university for approximately two months.

Measures

Target Lessons.

First, the participants were asked to select a lesson for evaluation. They were given the following instruction: "Remember the most impressive lesson you attended this week." As varied responses from the participants would best allow an examination of the effects of perceived teachers' autonomy support, the "most impressive lesson" was decided upon so that students could recall both positive and negative impressions, and rate them unequivocally. For ease of selection, lesson categories (e.g., language course, liberal arts course, etc.) were presented as options. These procedures followed Okada (2021).

Perceived Teachers' Autonomy Support.

Participants were asked to rate the teacher's autonomy-supportive behavior in the selected lesson. Okada's (2021) five items were used and were slightly modified to match the lesson in this study (e.g., "Teacher tries to listen to the opinions of each student," "Teacher tries to listen to how students feel and think," and "Teacher tries to make students think by giving quizzes and asking questions."). Each item was rated on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*true*). Confirmatory factor analysis (CFA) was conducted to examine the one-factor structure. CFA using the maximum-likelihood method resulted in an acceptable fit as a whole: $\chi^2(5)=17.06$ ($p=.004$), CFI=0.95, RMSEA=0.11, and SRMR=0.05. The estimated

reliability coefficient (alpha coefficient) was .77. The RMSEA value was not acceptable; however, because the other fit indices and the alpha coefficient reached acceptable levels, the one-factor model was adopted. The descriptive score was calculated by averaging the scores of the five items.

Intrinsic Motivation.

Intrinsic motivation for the selected lesson was measured using Okada's (2021) intrinsic motivation scale. Four items were used (e.g., "I enjoy the lesson" and "I am interested in the content of the lesson"). Each item was rated on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*true*). CFA was conducted using the maximum-likelihood method. The fit indices indicated an acceptable fit as a whole: $\chi^2(2)=39.95$ ($p<.001$), CFI=0.91, RMSEA=0.31, and SRMR=0.06. The alpha coefficient was .87. The RMSEA value was not acceptable; however, because the other fit indices and the alpha coefficient reached acceptable levels, the one-factor model was adopted. The descriptive score was calculated by averaging the scores of four items.

Metacognition.

Metacognition during the selected lesson was measured using Okada's (2021) metacognition scale. This scale measures metacognition at the beginning, during, and at the end of the selected lessons. Sample items include, "I try to remember what I learned last lesson (beginning of lessons)," "I try to think backward when I cannot understand something (during lessons)," and "I try to confirm the new things I learned in today's lesson (end of lessons)." Each item was rated on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*true*). CFA using the maximum-likelihood method was conducted to confirm a three-factor structure corresponding to the three phases of the lesson. The fit indices reached a sufficient level: $\chi^2(24)=96.67$ ($p<.001$), CFI=0.89, RMSEA=0.12, and SRMR=0.08. Although the fit indices were low, they were acceptable overall. Thus, the three-factor model was adopted. Interfactor correlations ranged from .61 to .85. The descriptive scores of three subscales were calculated by averaging the scores of the three items (alpha coefficients ranged from .65 to .77).

Self-Evaluated Achievement.

Participants were asked to evaluate their level of achievement during the lesson (Okada, 2021) using two items: "I understood the content of the lesson" and "I'll be able to attain a high grade on this lesson." Each item was rated on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*true*). The Spearman-Brown reliability coefficient was .78. The descriptive score was calculated by averaging the scores of the two items.

Difficulties in Learning.

Students' difficulties in learning were measured using four items proposed by Sato et al. (2012): "I make typos and omissions," "I misread letters and sentences," "I can't take notes while listening to a lecture," and "I find it difficult to write a report that includes my own opinions." Participants were instructed to think about academic learning in general and rate each item on a 4-point Likert scale ranging from 1 (*never*) to 4 (*often*). CFA was conducted using the maximum-likelihood method. The fit indices indicated an acceptable fit as a whole: $\chi^2(2)=18.41$ ($p<.001$), CFI=0.94, RMSEA=0.20, and SRMR=0.07. The alpha coefficient was

.77. The RMSEA value was not acceptable; however, because the other fit indices and the alpha coefficient reached acceptable levels, the one-factor model was adopted. The descriptive score was calculated by averaging the scores of the four items.

Analytic Procedures

A model showing the relationship between perceived teachers' autonomy support and self-evaluated achievement, mediated by intrinsic motivation and metacognition, was tested using multi-group structural equation modeling (SEM; Figure 1). Scale scores were used in the model, which was examined in students with and without mild difficulties in learning. Students who obtained scores higher than the mean + 1 *SD* (e.g., 2.95) in difficulties in learning were referred to as the difficulties group (*N*=31). The remaining students were referred to as the non-difficulties group (*N*=170). First, a model with no equality constraints on all paths and covariances was tested (Model 1). Next, a model with equality constraints on all paths and covariances was tested (Model 2). The analysis was conducted using the *lavaan* package in R version 4.3.3.

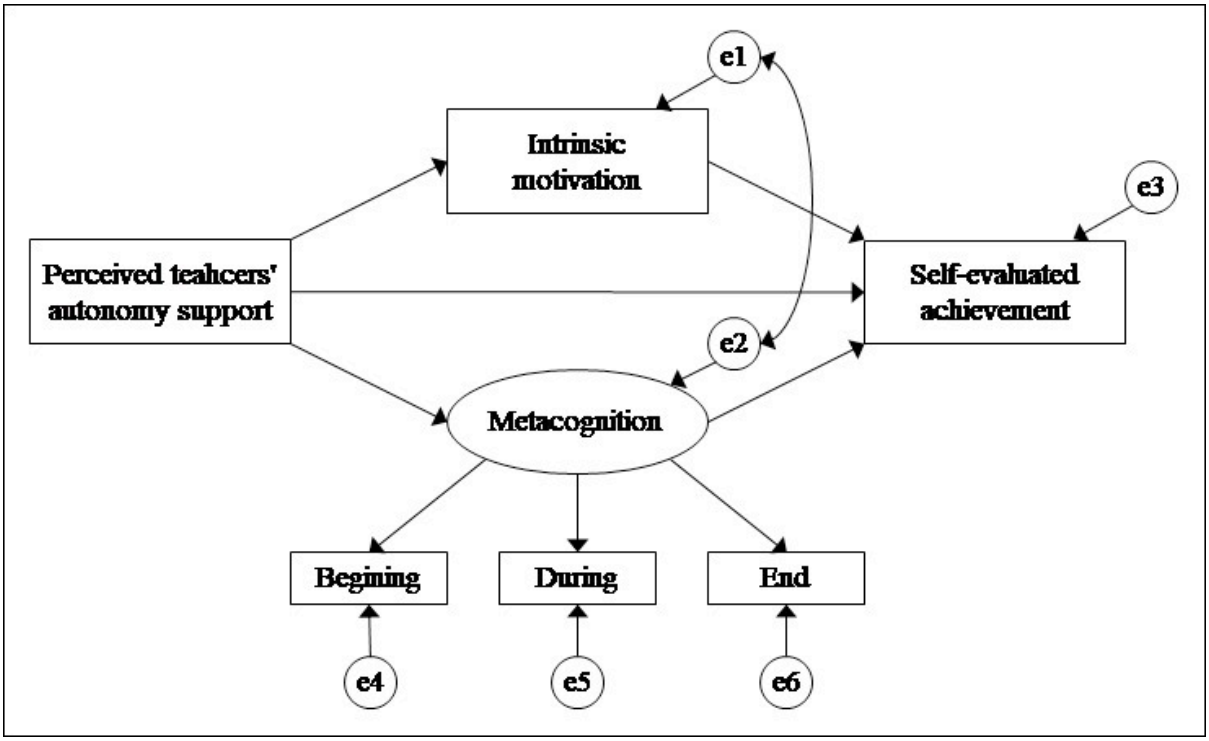

Figure 1: Hypothetical Model

Results

Frequencies of Difficulties in Learning

The frequencies and percentages of each response indicating difficulties in learning are presented in Table 1. The percentages of participants who answered "often" were 6.97% for "I make typos and omissions," 7.96% for "I misread letters and sentences," 3.98% for "I can't take notes while listening to a lecture," and 18.91% for "I find it difficult to write a report that includes my own opinions."

Table 1: Frequencies of Each Response Category in Difficulties in Learning

	Never	Rarely	Sometimes	Often
I make typos and omissions	44 (21.89)	73 (36.32)	70 (34.83)	14 (6.97)
I misread letters and sentences	40 (19.90)	79 (39.30)	66 (32.84)	16 (7.96)
I can't take notes while listening to a lecture	74 (36.82)	79 (39.30)	40 (19.90)	8 (3.98)
I find it difficult to write a report that includes my own opinions	38 (18.91)	48 (23.88)	77 (38.31)	38 (18.91)

Note. The values in brackets are percentages of categories.

Descriptive Statistics and Correlations Among Variables

Descriptive statistics and correlations between variables are presented in Table 2. Perceived teachers' autonomy support was positively related to intrinsic motivation (r=.31, p<.001), metacognition (rs=.26 to .31, ps<.001), and self-evaluated achievement (r=.35, p<.001). Additionally, intrinsic motivation (r = .51, p < .001) and metacognition (rs=.20 to .34, ps<.01) were positively related to self-evaluated achievement. Difficulties in learning was not significantly related to any variable (rs=−.07 to .07, ps=.31 to .78) except self-evaluated achievement (r=−.18, p=.01).

Table 2: Descriptive Statistics and Correlation Coefficients

	Mean	*SD*	1	2	3	4	5	6
1. Perceived teachers' autonomy support	3.60	0.83						
2. Intrinsic motivation	3.75	0.94	.31***					
3. Metacognition-beginning of lessons	3.20	0.95	.26***	.28***				
4. Metacognition-during lessons	3.59	0.84	.27***	.22**	.54***			
5. Metacognition-end of lessons	3.18	0.99	.31***	.34***	.64***	.51***		
6. Self-evaluated achievement	3.54	0.90	.35***	.51**	.26***	.20**	.34***	
7. Difficulties in learning	2.26	0.69	.07	−.07	−.06	.02	−.05	−.18*

Note. * p < .05, ** p < .01, *** p < .001.

Effects of Perceived Teachers' Autonomy Support

The model that showed the relationship between perceived teachers' autonomy support and self-evaluated achievement, mediated by intrinsic motivation and metacognition, was tested using SEM. To examine the effects of teachers' autonomy support between the difficulties and non-difficulties groups, a multi-group SEM was adopted. Models with no equality constraints (Model 1) and with equality constraints (Model 2) were tested.

The fit indices were compared between Models 1 and 2. AIC was lower in Model 1 (2920.12) than in Model 2 (2923.23). Conversely, BIC was lower in Model 2 (3035.54) than in Model 1

(3058.86). The difference in chi-square values between the models was significant ($\Delta\chi^2$=19.11, *df*=8, *p*=.01), suggesting that Model 1 exhibits a better fit than Model 2. Therefore, Model 1, with no equality constraints, was adopted. The other fit indices of Model 1 showed adequate values: CFI=1.00, RMSEA=0.00, and SRMR=0.03.

The results of multi-group SEM are presented in Table 3. The paths from perceived teachers' autonomy support to intrinsic motivation were significant for both groups (difficulties group: *B*=0.62, *p*<.001, 95% CI [0.25, 0.99]; non-difficulties group: *B*=0.32, *p*<.001, 95% CI [0.16, 0.48]). The paths from teachers' autonomy support to metacognition were significant for both groups (difficulties group: *B*=0.35, *p*=.03, 95% CI [0.04, 0.65]; non-difficulties group: *B*=0.33, *p*<.001, 95% CI [0.18, 0.48]). Regarding self-evaluated achievement, the paths from perceived teachers' autonomy support (*B*=0.51, *p*=.002, 95% CI [0.18, 0.85]) and metacognition (*B*=0.51, *p*=.003, 95% CI [0.24, 1.14]) were significant in the difficulties group. Conversely, the paths from perceived teachers' autonomy support (*B*=0.16, *p*=.03, 95% CI [0.02, 0.31]) and intrinsic motivation (*B*=0.42, *p*<.001, 95% CI [0.29, 0.55]) were significant in the non-difficulties group. In summary, the path coefficients from perceived teachers' autonomy support to intrinsic motivation and self-evaluated achievement were larger in the difficulties group than in the non-difficulties group although they were significant in both groups. Self-evaluated achievement was associated with metacognition in the difficulties group and intrinsic motivation in the non-difficulties group.

Table 3: Results of Multi-Group SEM

			Difficulties group		Non-Difficulties group	
			B	*β*	*B*	*β*
Perceived teachers' autonomy support	→	Intrinsic motivation	0.62 [0.25, 0.99]	.51**	0.32 [0.16, 0.48]	.29***
Perceived teachers' autonomy support	→	Metacognition	0.35 [0.04, 0.65]	.42*	0.33 [0.18, 0.48]	.35***
Perceived teachers' autonomy support	→	Self-evaluated achievement	0.51 [0.18, 0.85]	.44**	0.16 [0.02, 0.31]	.16*
Intrinsic motivation	→	Self-evaluated achievement	0.00 [−0.26, 0.26]	.00	0.42 [0.29, 0.55]	.44***
Metacognition	→	Self-evaluated achievement	0.51 [0.24, 1.14]	.44**	0.13 [−0.06, 0.31]	.11

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

Present Findings

This study examined the effects of perceived teachers' autonomy support on the academic outcomes of undergraduate students with mild difficulties in academic learning. Difficulties and non-difficulties groups were created based on participants' self-rated difficulties in learning, and the effects of perceived teachers' autonomy support were examined in each group.

Perceived teachers' autonomy support was associated with intrinsic motivation and metacognition in both groups. These findings are consistent with previous studies that have revealed that teachers' autonomy support positively affects learners' intrinsic motivation and metacognition (Howard et al., 2024; Okada, 2023). However, the association between perceived teachers' autonomy support and intrinsic motivation was stronger among students with mild difficulties. Autonomy support includes taking students' perspectives and presenting learning activities in need-satisfying ways (Reeve et al., 2022). This study measured students' perceived autonomy support as teachers taking students' perspectives and encouraging them to think in their own way. Such teacher attitudes can satisfy struggling students' basic psychological needs (i.e., autonomy, competence, and relatedness; Ryan & Deci, 2017), which, in turn, promote their intrinsic motivation. In other words, struggling students may require more need-satisfying support. They may face difficulties in the uniform manner in which all students learn. Thus, allowing such students to learn in their own way makes them perceive their needs as being satisfied, further motivating them.

In this study, struggling students' intrinsic motivation was not related to their self-evaluated achievement. This suggests that they may not expect to achieve their academic goals even if they are intrinsically motivated. Extant research on the relationship between intrinsic motivation and academic achievement in students with LD is inconsistent although most of the findings have focused on school children (Deci et al., 1992; Sanir et al., 2022). For undergraduate students with some difficulties, being intrinsically motivated in daily classes is important. However, they need additional support to obtain the academic skills that lead to academic achievement.

Perceived teachers' autonomy support positively affected metacognition in both groups in this study, consistent with previous studies (González & Paoloni, 2015; Okada, 2021). However, the effect of metacognition on self-evaluated achievement was found only in the difficulties group. A previous meta-analysis found a weak positive relation between metacognition and performance after controlling for the effect of intelligence (β=.17; Ohatani & Hisasaka, 2018). Although the relationship in the present study was not significant in the non-difficulties group, the results were consistent with previous findings. Notably, metacognition had a stronger effect on students with mild difficulties. This suggests that students who can cover their deficits in academic abilities by engaging in daily classes utilizing their metacognitive abilities feel their progress, which, in turn, leads to self-evaluated achievement.

Limitations

This study has some limitations. First, perceived teachers' autonomy support was measured using five items based on an existing scale (Okada, 2021). While they capture some aspects

of autonomy support in the context of higher education, the construct of autonomy support comprises seven aspects (Reeve et al., 2022), some of which seemed difficult to capture using a self-rated questionnaire. Future studies should measure teachers' autonomy support more comprehensively, incorporating additional measurement methods. Second, this study did not measure actual performance. As the questionnaire survey was administered during the academic term, the study focused on self-evaluated achievement rather than actual course grades. Although self-evaluated achievement can be a predictive variable for actual performance, future studies should include other performance indices, such as course grades or test performance.

Conclusions

This study addresses the importance of teachers' autonomy support in fostering motivation among struggling students. When students perceive teachers' autonomy support, they can become intrinsically motivated and metacognitively engage in their classes, even if they have mild difficulties in learning. Therefore, higher education teachers should manage their classes and interact with students in an autonomy-supportive manner. Such teaching can compensate for struggling students' academic motivation.

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