A Priming Experiment on the Effects of Grading and Autonomy-support on Motivation

Maï Yasué, Quest University, Canada
I-Chant A. Chiang, Centre for Educational Excellence & Simon Fraser University Canada
Kelsey Chamberlin, Independent Researcher, Canada

The Asian Conference on Education 2019
The Official Conference Proceedings

Abstract
Using a survey-based priming experiment, we explored the psychological effects of letter grades (ie. A, B, C to F) and autonomy-supportive teaching practices (i.e. practices that nurture inner motivations to learn by welcoming student thoughts, feelings and actions). Psychological research suggests that extrinsic motivators such as letter grades can thwart autonomous academic motivation and increase non-autonomous academic motivation. In contrast, empirical research in Self-Determination Theory suggests that autonomy-supportive teachers can enhance autonomous academic motivation and reduce non-autonomous academic motivation. We hypothesized that priming autonomy-support would buffer the adverse effect of grades on autonomous academic motivation. We randomly sorted 392 participants at three universities into three different study conditions ('no prime', 'grade-prime', 'grade + autonomy-support prime'). In the grade-prime, students were asked questions about their grade point averages whereas in the grade + autonomy-support prime, students were primed to think about autonomy-supportive teachers in addition to the grade-prime. Contrary to our predictions, priming students to think about grades had no effect on autonomous or controlled academic motivation. Furthermore, at one of the universities, priming students to think about autonomy-supportive teachers *increased* controlled academic motivation. The results of this study suggest that in some contexts, enhancing the salience of autonomy-supportive pedagogical techniques used by teachers can inadvertently create additional extrinsic pressures on students. The results of this study point to the need to conduct more multi-institutional research on academic motivation to enhance understanding of the wide array of pedagogical factors that may affect student's motivation.

Keywords: Evaluation, Self-Determination Theory, Assessment, Crowding-out, Psychology

Introduction

Autonomy-supportive teaching

Self-Determination Theory, an empirically supported theory on motivation, differentiates between two different types of teaching practices. The first, autonomy-supportive teaching practices, nurture and support the inner motivations of students by welcoming student feelings, thoughts and actions, accepting negative feelings, using informational language, providing explanatory rational for assignments or activities and providing meaningful choices. In contrast, controlling teaching practices use pressure to coerce students to think, feel or behave in particular ways by overemphasizing extrinsic rewards, failing to provide explanatory rationales and using controlling language (e.g. "You must do X, or else Y") (Reeve, Bolt, & Cai, 1999; Reeve et al., 2014; Roth, Assor, Kanat-Maymon, & Kaplan, 2007).

Autonomy-supportive teaching practices lead to better student learning and well-being outcomes (Furtak & Kunter, 2012; Reeve et al., 1999) because they support three basic psychological needs: autonomy (sense of choice about what to do, think or feel), competence (sense of self-efficacy and ability to carry out tasks effectively) and relatedness (sense of connection and care to other people) (Ryan & Deci, 2000, 2017). Supporting these basic psychological needs also helps to enhance autonomous forms of academic motivation such as studying for the pleasure of learning or studying to attain personally endorsed meaningful goals. In contrast, controlling teaching methods thwart these basic psychological needs and enhance non- autonomous forms of academic motivation such as studying to get a high-paying job or studying only to satisfy parental expectations (Deci, Vallerand, Pelletier, & Ryan, 1991; Ratelle, Guay, Vallerand, Larose, & Senecal, 2007; Vallerand et al., 1992).

Beyond differences in individual teaching styles, that have been explored primarily in school classrooms, autonomy-supportive teaching practices and academic motivation may also vary broadly across different institutions. For undergraduate students, different universities may vary substantially in pedagogical methods, class sizes, and student demographics, which could influence autonomy-supportive teaching practices and academic motivation (Yasué, Jeno, & Langdon, 2019). Yet, few studies have explored autonomy-supportive teaching methods and academic motivation across different universities (Chamberlin, Yasué, & Chiang, 2018; Yasué et al., 2019).

Letter grades

One key difference between institutions that could influence both autonomy-supportive teaching practices and academic motivation amongst students is the method used to evaluate student performance (Rohe et al., 2006; White & Fantone, 2010). While most universities provide some kind of letter grade, a small number of universities or programs do not provide letter grades (eg. Bennington College, Evergreen State College, Prescott College). There are varying perspectives on whether letter grades support or thwart basic psychological needs and autonomous academic motivation. Some suggest that grades can thwart basic psychological needs by making salient social comparison and external forms of motivation (i.e. rewards and punishments), "crowding-out" or undermining autonomous motivation and adversely affecting relationships with teachers and peers (Deci, Koestner, & Ryan,

2001; Pulfrey, Darnon, & Butera, 2013). Conversely, others suggest that grades can "crowd-in" autonomous forms of motivation by supporting feelings of competence (Cameron, Banko, & Pierce, 2001). These conflicting studies illustrate that how grades affect autonomous academic motivation may largely depend on the social and interpersonal context (Deci, Koestner, & Ryan, 1999; Festré & Garrouste, 2014).

This study

In this study we conducted a survey-based priming experiment to explore the effects of grades and perceived autonomy-support on autonomous and controlled academic motivation at three universities in the Pacific Northwest.

We randomly sorted survey participants into three groups. The first group did not receive a prime (henceforth referred to as "no-prime" group). The second group was primed to think about grades in a controlling manner with items such as "How do you think your grade point average (GPA) compares to other student at your university?" and "Do you feel your current GPA is adequate for admission to graduate school?" (henceforth referred to as "grade-prime" group). The third group, "grade + autonomy-support prime", received both the grade-prime as well as an additional prime in which students were primed to consider how autonomy-supportive their teachers are. The autonomy-support prime contained 14 items that measure the level of autonomy-support students feel from their instructors with items such as "I feel understood by my instructor" and "My instructor answers my questions fully and carefully" (Black & Deci, 2000). After the priming questions, each participant completed two measures of academic motivation: the Academic Motivation Scale (Vallerand et al., 1992) and the Learning Self-Regulation Questionnaire (Black & Deci, 2000).

Because past research has suggested that autonomy-supportive teaching practices tend to moderate the adverse impacts of grades on autonomous motivation (Dobrow, Smith, & Posner, 2011), we hypothesized that priming students with autonomy-supportive teaching practices would buffer the impact of priming students to think about their grades. Specifically, we hypothesized that "grade-prime" participants would report lower autonomous forms of motivation and higher non-autonomous motivation compared to the "no-prime" group but that students who received the "grade + autonomy-support prime" would have higher autonomous motivation and lower non-autonomous motivation than students in the "grade-prime" group.

In order to understand how various contextual factors could influence the effect of these primes, we conducted this experiment at three universities that differed in both their pedagogical context and grading practices (Table 1). One university only provided narrative evaluations and no grades (henceforth referred to as "Narrative"), another university provided grades or narrative evaluations (henceforth "Hybrid") and a third university that provided only normative letter grades ("Grades"). End of course narrative evaluations provide written feedback of assessment tasks and also provide personalized comments with respect to growth in skills or attitudes throughout the course (Chamberlin et al., 2018). Both Narrative and Hybrid are small, primarily undergraduate liberal arts and science universities with less than 5 degrees that tend to attain high scores on the National Survey of Student Engagement (NSSE) in terms of effective teaching practices and supportive environments whereas "Grades" is a large, comprehensive university with more than 25 undergraduate and graduate programs.

	Narrative	Hybrid	Grades
Sample pop.	184	116	101
Student pop.	<5000	<1000	>30,000
Avg. class size	25	16	63
Admission requirement	No min. high-school GPA requirements, SAT considered	No min. high-school GPA requirements No min. requirement	Min. High-school GPA of 70% Other requirements vary by program
Evaluation method	Narrative assessment	Letter grades (20 to 29 of 32 courses)	Grades only
NSSE 'effective teaching practices'*	>85	>85	<25
NSSE 'supportive environment'*	>85	>85	<50

Table 1: Demographic and enrollment information for the three universities in 2016 Information was taken from publicly published data, registrar offices and directors of institutional research. *(Hutchins, 2015). The percentiles were calculated relative to 66 Canadian higher-education institutions that provided their National Survey on Student Engagement (NSSE) scores to Maclean's Magazine.

Conclusions

For autonomous motivation, there was no statistically significant difference between the three priming conditions at each of the three universities (Table 2). However, for non-autonomous motivation, there was a statistically significant interaction term between condition and university (Table 2, Figure 1). When we ran the analyses separately for each university in order to better understand the meaning of the interaction term, we found that condition had no effect on non-autonomous motivation for both Narrative ($F = 0.05$, $P = 0.95$) and Grades ($F = 1.5$, $P = 0.22$), but condition had a statistically significant effect at Hybrid ($F = 8.15$, $P = 0.0005$, eta-squared = 0.13). At Hybrid, post-hoc analyses suggested that there were statistically significant differences between no-prime and the grade + autonomy-support prime ($t = -2.7$, $P = 0.023$) and between grade-prime and the grade + autonomy-support prime ($t = 3.97$, $P = 0.0004$) but no difference between no-prime and the grade-prime ($t = 1.1$, $P = 0.52$, Figure 1).

The students from the two teaching-focused primarily undergraduate universities with high scores on the NSSE, also indicated higher levels of autonomy support as compared to the larger comprehensive university with only letter grades. Post-hoc analyses suggested that participants at Narrative and Hybrid indicated similar levels of autonomy-support (Figure 2).

Variable	DF	Sum of Squares	F Ratio	Prob > F	Eta squared
DEPENDENT VAR = AM					
Age	1	1.8	2.1	0.15	0.005
University	2	30.6	18.3	<0.001	0.003
Condition	2	0.85	0.50	0.60	0.085
DEPENDENT VAR = NAM					
Age	1	0.75	0.89	0.34	0.002
University	2	4.5	4.5	0.012	0.0001
Condition	2	0.05	0.03	0.96	0.021
University x Condition	4	11.75	3.51	0.0078	0.033

Table 2. Results of priming experiments on the effects of age, university and priming condition
No-prime, grade-prime, grade and autonomy-support-prime on academic motivation.
AM = Autonomous motivation and NAM = Non-autonomous motivation motivation

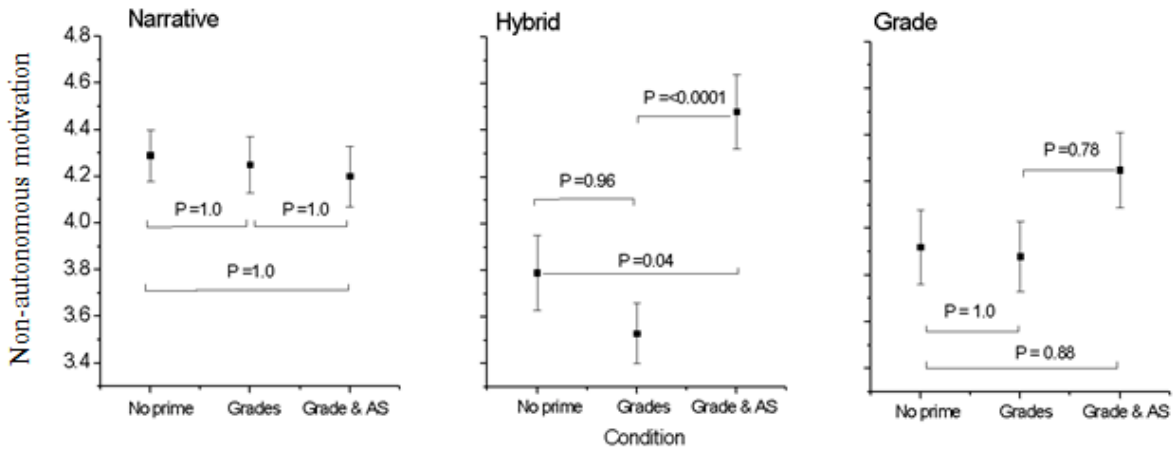

Figure 1. The effect of university and priming on non-autonomous motivation at three universities (left to right)
P-values are calculated from t-scores of post-hoc Tukey's tests. Grades = grade-prime. AS = Autonomy-support prime.

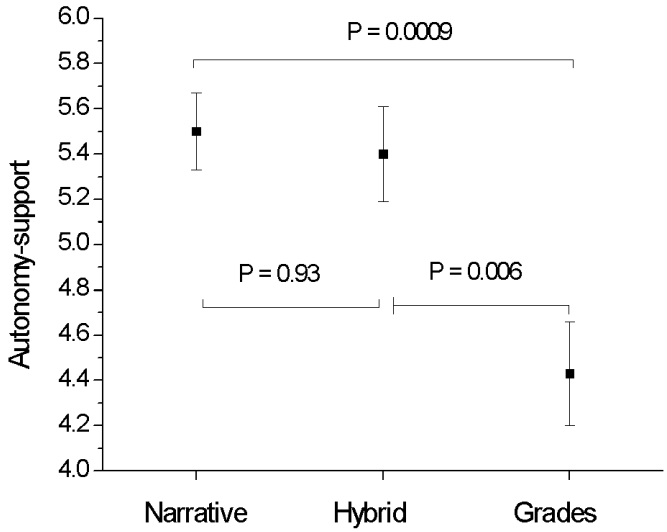

Figure. 2. The differences in autonomy-support between the three universities As only a subset of the participants filled out the autonomy-support items sample sizes were as follows for Narrative (N = 51), Hybrid (N = 36) and Grades (N = 32).

The results of this study suggested that the grade prime had no impact on academic motivation for students at any of the three universities. These results contrast with studies that suggested that grades can "crowd-out" autonomous motivation (Pulfrey, Buchs, & Butera, 2011; Pulfrey et al., 2013). Although the grade-prime was designed to enhance extrinsic pressure, social comparison and normative evaluation, it may have failed to affect self-esteem contingencies. Past research that successfully used primes to affect behaviour or goals, linked task performance with valued traits such as IQ in order to affect self-esteem contingencies (Harackiewicz & Elliot, 1993; Rawsthorne & Elliot, 1999). Furthermore, especially given the small sample sizes, there may have been too much unaccounted variation to detect a significant priming effect. In contrast to experimental studies that demonstrated adverse impacts on academic motivation to carry out a particular task after grade-primes (Pulfrey et al., 2011), we examined how the grade-prime affected the student's more generalized academic motivation (e.g. to attend university). Such motivations may be affected by a wider range of factors that we did not account for in this study (e.g. relationship with current teachers, past experiences in schools, values of parents, socioeconomic status, self-efficacy beliefs) (Dweck, 2006; Lam, Ruzek, Schenke, Conley, & Karabenick, 2015).

Contrary to our expectation, priming students to think about autonomy-supportive teachers had no positive effect on autonomous motivation and actually increased non-autonomous motivation at Hybrid despite the fact that participants at Hybrid indicated high levels of autonomy-support at Hybrid. This result suggests that students in some pedagogical contexts could be affected by external social pressures arising from thinking about an autonomy-supportive teacher. This unexpected result and especially the large effect size (even larger than the effect of differences between universities) could have been influenced by the specific educational context at Hybrid (eg. small class sizes, small university, project-based learning and collaborative

learning). Past research has suggested that students at Hybrid also cared deeply about their relationship to their peers and teachers irrespective of grades (Chamberlin et al. 2018). Social norms and trusted peers can influence attitudes and behaviours (Cialdini & Goldstein, 2004; Ham, Jeger, & Ivković, 2015; Jones, Andriamarovololona, & Hockley, 2008) relating to learning (Bartram, 2006; A. M. Ryan, 2000), however little research has focused on how interpersonal pressures can influences adult undergraduate students. The psychological impacts of interpersonal pressures from teachers or peers may be an important direction for future research at other universities with small class sizes or perhaps more interdependent cultures (Hitokoto & Uchida, 2015; Uchida, Kitayama, Mesquita, Reyes, & Morling, 2008) where relationships with other people could play a greater role in influencing academic motivation. This research is important to advance Self-Determination Theory because interpersonal "pressures" in the classroom could simultaneously enhance relatedness while also thwarting autonomy.

Given the wide-array of educational undergraduate environments and pedagogical approaches, our research points to the need to better understand academic motivation and extrinsic pressures influencing academic motivation in these different contexts (Lam et al., 2015; Urdan & Schoenfelder, 2006). Such research may help educators devise pedagogical practices that are suited to local contexts and effective in increasing autonomous academic motivation.

Acknowledgements

We thank Quest University Canada's Research, Scholarship, and Creative Works Committee for making this study possible, as well as the Directors of Institutional Research and Registrar's offices for providing university information on the three universities and J. Fukumoto for recruitment assistance.

References

Bartram, B. (2006). Attitudes to language learning: A comparative study of peer group influences. *The Language Learning Journal*, *33*(1), 47–52. https://doi.org/10.1080/09571730685200101

Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A Self-Determination Theory perspective. *Science Education*, *84*(6), 740–756. https://doi.org/10.1002/1098-237X(200011)84:6<740::AID-SCE4>3.0.CO;2-3

Cameron, J., Banko, K. M., & Pierce, W. D. (2001). Pervasive negative effects of rewards on intrinsic motivation: The myth continues. *The Behavior Analyst*, *24*(1), 1–44. Retrieved from PMC. (PMC2731358)

Chamberlin, K., Yasué, M., & Chiang, I. A. (2018). The impact of grades on student motivation. *Active Learning in Higher Education*, *In Press*.

Cialdini, R. B., & Goldstein, N. J. (2004). Social Influence: Compliance and Conformity. *Annual Review of Psychology*, *55*(1), 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*, 627–688.

Deci, E. L., Koestner, R., & Ryan, R. M. (2001). Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. *Review of Educational Research*, *71*(1), 1–27.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The Self-Determination perspective. *Educational Psychologist*, *26*(3–4), 325–346. https://doi.org/10.1080/00461520.1991.9653137

Dobrow, S. R., Smith, W. K., & Posner, M. A. (2011). Managing the grading paradox: Leveraging the power of choice in the classroom. *Academy of Management Learning and Education*, *10*(2), 261–276.

Dweck, C. S. (2006). *Mindset—The New Psychology of Success*. New York: Ballantine Books.

Festré, A., & Garrouste, P. (2014). Theory and evidence in psychology and economics about motivation crowding out: A possible convergence? *Journal of Economic Surveys*, *29*, 339–356.

Furtak, E. M., & Kunter, M. (2012). Effects of autonomy-supportive teaching on student learning and motivation. *The Journal of Experimental Education*, *80*, 284–316.

Ham, M., Jeger, M., & Ivković, A. F. (2015). The role of subjective norms in forming the intention to purchase green food. *Economic Research-Ekonomska Istraživanja*, *28*(1), 738–748. https://doi.org/10.1080/1331677X.2015.1083875

Harackiewicz, J. M., & Elliot, A. J. (1993). Achievement goals and intrinsic motivation. *Journal of Personality and Social Psychology*, *65*, 904–915.

Hitokoto, H., & Uchida, Y. (2015). Interdependent Happiness: Theoretical Importance and Measurement Validity. *Journal of Happiness Studies*, *16*(1), 211–239. https://doi.org/10.1007/s10902-014-9505-8

Jones, J. P. G., Andriamarovololona, M. M., & Hockley, N. (2008). The Importance of Taboos and Social Norms to Conservation in Madagascar. *Conservation Biology*, *22*(4), 976–986. Retrieved from JSTOR.

Lam, A. C., Ruzek, E. A., Schenke, K., Conley, AM. M., & Karabenick, S. A. (2015). Student perceptions of classroom achievement goal structure: Is it appropriate to aggregate. *Journal of Educational Psychology*, *107*(4), 1102–1115. https://doi.org/DOI: 10.1037/edu0000028

Pulfrey, C., Buchs, C., & Butera, F. (2011). Why grades engender performance-avoidance goals: The mediating role of autonomous motivation. *Journal of Educational Psychology*, *103*(3), 683–700. http://dx.doi.org/10.1037/a0023911

Pulfrey, C., Darnon, C., & Butera, F. (2013). Autonomy and task performance: Explaining the impact of grades on intrinsic motivation. *Journal of Educational Psychology*, *105*(1), 39–57. https://doi.org/DOI: 10.1037/a0029376 au

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senecal, C. (2007). Autonomous, controlled and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psychology*, *99*(4), 734–746. http://dx.doi.org/10.1037/0022-0663.99.4.734

Rawsthorne, L. J., & Elliot, A. J. (1999). Achievement goals and intrinsic motivation: A meta-analytic review. *Personality and Social Psychology Review*, *3*, 326–344.

Reeve, J., Bolt, E., & Cai, Y. (1999). Autonomy-supportive teachers: How they teach and motivate students. *Journal of Educational Psychology*, *91*, 537–548. http://dx.doi.org/10.1037/0022-0663.91.3.537

Reeve, J., Vansteenkiste, M., Assor, A., Ahmad, I., Cheon, S. H., Jang, H., … Wang, C. K. J. (2014). The beliefs that underlie autonomy-supportive and controlling teaching: A multinational investigation. *Motivation and Emotion*, *2013*, 93–110. http://dx.doi.org/10.1007/s11031-013-9367-0

Rohe, D. E., Barrier, P. A., Clark, M. M., Cook, D. A., Vickers, K. S., & Decker, P. A. (2006). The benefits of pass-fail grading on stress, mood, and group cohesion in medical students. *Mayo Clinic Proceedings*, *81*(11), 1443–1448.

Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology*, *9*, 761–774. http://dx.doi.org/10.1037/0022-0663.99.4.761

Ryan, A. M. (2000). Peer Groups as a Context for the Socialization of Adolescents' Motivation, Engagement, and Achievement in School. *Educational Psychologist*, *35*(2), 101–111. https://doi.org/10.1207/S15326985EP3502_4

Ryan, R. M., & Deci, E. L. (2000). Self-Determination Theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist*, *55*, 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). *Self-Determination Theory. Basic psychological needs in motivation, development, and wellness*. New York: The Guilford Press.

Uchida, Y., Kitayama, S., Mesquita, B., Reyes, J. A. S., & Morling, B. (2008). Is Perceived Emotional Support Beneficial? Well-Being and Health in Independent and Interdependent Cultures. *Personality and Social Psychology Bulletin*, *34*(6), 741–754. https://doi.org/10.1177/0146167208315157

Urdan, T., & Schoenfelder, E. (2006). Classroom effects on student motivation: Goal structures, social relationships, and competence beliefs. *School of School Psychology*, *44*(5), 331–349.

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A Measure of Intrinsic, Extrinsic, and Amotivation in Education. *Educational and Psychological Measurement*, *52*(4), 1003–1017. https://doi.org/10.1177/0013164492052004025

White, C. B., & Fantone, J. C. (2010). Pass–fail grading: Laying the foundation for self-regulated learning. *Advances in Health Sciences Education*, *15*(4), 469–477. https://doi.org/10.1007/s10459-009-9211-1

Yasué, M., Jeno, L. M., & Langdon, J. L. (2019). Are autonomously motivated university instructors more autonomy-supportive teachers? *Scholarship of Teaching and Learning*, *13*(2).

Contact email: maiyasue@gmail.com