

Psychosocial Factors and Change in Time Spent Studying by Students in Japan during the COVID-19 Pandemic

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Abstract

This study examines predictive associations between psychosocial variables as independent variables and “Change in Time Spent Studying by Students” as the dependent variable. Data collected by the Cabinet Office of Japan amid the COVID-19 pandemic are analyzed with multivariate models to screen for the best combination of variables that can account for the effects on the dependent variable. A series of binary logistic regression analyses illuminates that the model with motivation to study, anxiety, life satisfaction, satisfaction with health status, and satisfaction with social bonds as explanatory variables is the fittest of all tested models. In particular, the importance of motivation, anxiety, and life satisfaction is deliberated regarding their effects on study-related variables. Furthermore, these variables’ implications for evidence-based school policies and curricula are discussed.

1. Introduction

The year 2020 marked a crucial point in many areas of life for countless people worldwide. On January 30, the Director-General of the World Health Organization (WHO), Dr. Tedros Adhanom Ghebreyesus, declared COVID-19 a public health emergency of international concern (WHO, 2020). The sudden outbreak of the COVID-19 epidemic and the subsequent pandemic have had consequential effects on people. Approximately 6.5 million deaths have been counted worldwide by the end of October 2022 (WHO, 2022), while many infected people have developed mild-to-severe symptoms. Furthermore, the pandemic has affected many people’s psychosocial and physical well-being and lifestyles in various sociodemographic populations. Probably, many people had never imagined that a public health emergency of such a magnitude would occur in their lifetime.

Concurrent with the COVID-19 pandemic were social and personal tribulations of various degrees. In education, for example, students and educators in many countries were suddenly placed in situations where new behavioral norms and practices had to be adopted to adjust themselves to unprecedented circumstances. Without much prior experience, many people in higher education—students and educators alike—had no choice but to get accustomed to online lectures and classes instead of conventional face-to-face instructions. Moreover, many students found themselves not

only physically circumscribed but also—in some cases, spiritually, mentally, and intellectually— isolated from their peers and the faculty. As these changes have taken place in many parts of the world, the enormity of the pandemic’s impact on students and educators was evident.

Japan was no exception in that the country underwent changes that were not only unanticipated but also constraining. The pandemic called for preventive measures against the infection—e.g., temporary closing of schools, face mask-wearing, and social distancing—while, in retrospect, much about the disease’s pathology and epidemiology was still vaguely understood at the time. Furthermore, the pandemic affected many students’ study habits and psychosocial dynamics. For example, according to the data collected by the Cabinet Office of Japan in December 2020, the majority (81.0%) of the student sample aged between 18 and 22 years reported a change in the duration of time they spent studying (Cabinet Office of Japan, 2020). It seems reasonable to envisage that such a social tendency may have unforeseeable repercussions in the future, however subtle or noticeable they may be.

Keen and inquisitive observers of these social phenomena may ponder and conceive of some perceptive questions: e.g., some may wonder, “What made some students spend more or less time studying during the pandemic compared to the pre-pandemic period?” Others may ask, “What psychosocial changes influenced the time students spent studying during the pandemic?” Deciphering what lies beneath the changes in study habits may provide pedagogical clues for educators to better assist their current and future students with forming better study-related behaviors and strategies that facilitate regular, consistent, and—probably more importantly— effective as well as efficient learning. In an attempt to answer the preceding questions, this study appraises psychosocial variables that have affected students in Japan during the pandemic. In particular, this research addresses the specific task of identifying psychosocial variables that have influenced either an increase or a decrease in the study time students spent outside the classrooms during the pandemic.

Prior studies

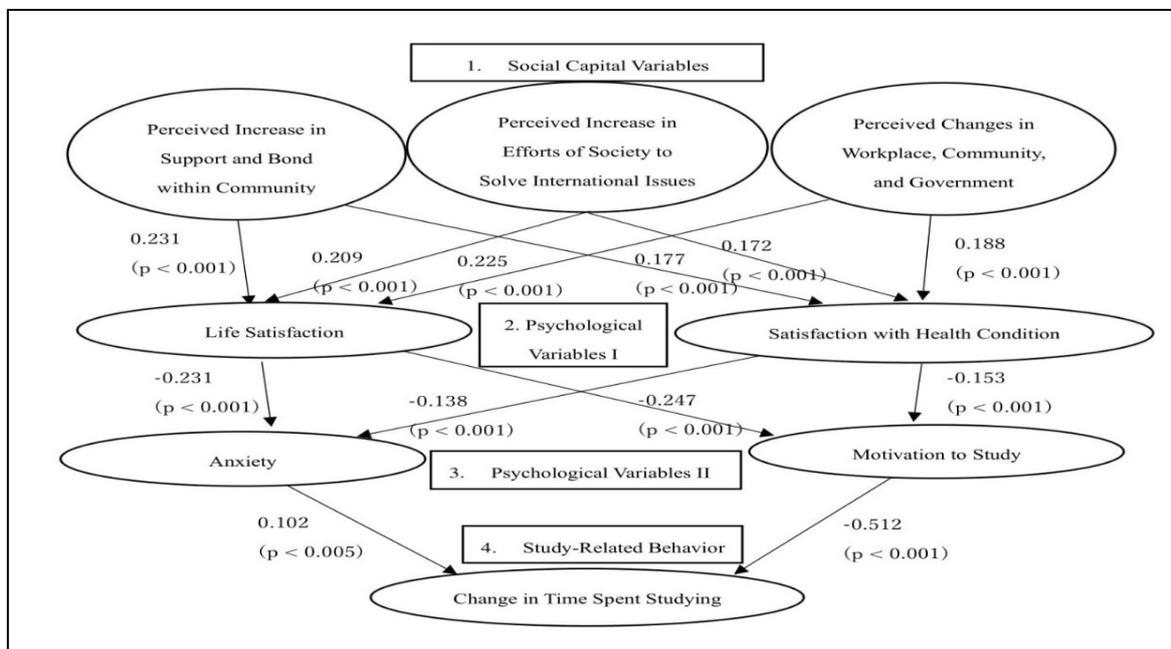
Numerous studies have been conducted on how the COVID-19 pandemic has impacted students, even though their *ad hoc* foci and target populations vary. For example, Rasmussen et al. reported that elevated anxiety levels and a lack of motivation were prominent concerns of their study participants in Australia (Rasmussen et al., 2022). On the other hand, Villani et al. found that an increase in not only anxiety but also depression was observed among university students in Italy during the national lockdown period (Villani et al., 2021). In a multi-national study utilizing resources from the United States, Cameroon, Ghana, and Nigeria, a group of researchers found that financial constraints negatively impacted students’ relationships and academic goals (Akin-Odanye et al., 2021).

Moreover, some studies have examined the effects of the pandemic on students in Japan. For instance, Matsumoto conducted a study on undergraduate students at a university in the Kansai area

and found that, during the pandemic, the durations of time students spent studying and sleeping became longer respectively; in contrast, the time they spent working at part-time jobs decreased (Matsumoto, 2022). In another study, Nakamura focused on students' motivation to study during the pandemic and reported that a high preference for online classes was linked to motivation to study (Nakamura, 2022). Furthermore, the researchers of the current study conducted a bivariate analysis of COVID-19's psychosocial impact on students and adults in Japan (Uchiyama et al., 2022). The study highlighted that the levels of motivation and anxiety were predictively associated with a change in the duration of time students spent studying (Uchiyama et al., 2022).

Figure 1

Conceptual Sequence of Predictive Associations from a Prior Study (Uchiyama et al., 2022)



Note: The above diagram shows the results of the bivariate analyses in terms of *gamma (I)* (Uchiyama et al., 2022).

Figure 1 is a diagram that summarizes the results of the study mentioned above (Uchiyama et al., 2022). In the diagram, variable names (inside of the ellipsoids) and their categorical classifications (in the rectangles) are listed according to the sequence of predictive associations in Goodman and Kruskal's *gamma (I)*, while the dependent variable, "Change in Time Spent Studying by Students" which is at the end of the chain, is placed in the ellipsoid at the bottom. The current study employs similar yet different variables from the ones analyzed in the prior study. In the present study, new variables that would be classified into the four categories in the above diagram are employed as binary variables to screen for predictive associations with the dependent variable, "Change in Time Spent Studying by Students," in multivariate logistic regression analyses.

2. Methods

2.1 Sample Descriptions

This study utilizes cross-sectional data collected by the Cabinet Office of Japan in December 2020. The Social Science Japan Data Archive (SSJDA) at the Center for Social Research and Data Archives of the Institute of Social Science at the University of Tokyo has provided the data for this study (Cabinet Office of Japan, 2020). The data are based on a nationwide survey with 10,128 respondents collected via the Internet from persons over 15 years of age residing in Japan. In this study, however, only the portions of the data collected from students with valid and relevant responses (N=715) are analyzed unless otherwise noted. The survey aimed to comprehend changes in the awareness and behavior of people in response to the spread of COVID-19 (Cabinet Office of Japan, 2020), which fits the current study's objective of extrapolating psychosocial variables that affect a study-related variable during the pandemic. See Table 1 below for sample descriptions.

Table 1

Sample Descriptions (N = 715)

Variable	Number (Percentage)
Gender	
Male	364 (50.9%)
Female	351 (49.1%)
Age	
Mean	21
Mode	22
Range	15-52

Note. It is noteworthy that, despite the wide range of age due to relatively few outliers among the student samples in this study, the vast majority (73 percent) of the student samples are within the age bracket of 18-22, and the total sample is appraised to be reasonably representative of the Japanese population. These aspects add some degree of validity to the results of this study especially being relevant and applicable to college-aged students in Japan.

2.2 Binary Variables in Binary Logistic Regression Analyses

The responses in the survey have been divided into two categories for most variables unless the variables of interest originally came as dichotomous data. For example, the dependent variable in this study, "Change in Time Spent Studying by Students," originally contained ordinal answer choices based on the tertiary Likert scale: i.e., (1) decreased a little, (2) decreased, and (3) decreased a lot, for the degree of decrease; and another Likert scale (1) increased a little, (2) increased, and (3) increased a lot, for the extent of increase. These answer choices have been collapsed into two categories: the first category aggregates the responses reporting a decrease in study time to any

degree by combining those three ordinal degrees mentioned above; the second group, on the other hand, accommodates and accounts for the responses which report any of the tertiary degrees of increase. The results are a binary variable with two categories of responses: the “Increase” and “Decrease” categories. This conversion was implemented to illuminate psychosocial variables associated with an increase or a decrease in “Change in Time Spent Studying by Students.” Moreover, invalid responses, those that cannot be classified into the previously mentioned two groups, and missing values have been excluded from the analyses. See Table 2 for the frequency distribution of the dependent variable, “Change in Time Spent Studying by Students.”

Table 2
Frequency Distribution of the Dependent Variable (N = 715)

Change in Time Spent Studying by Students	Number	Percentage
Decreased	322	45.0
Increased	393	55.0
Total	715	100.0

Note. In the new binary version of the dependent variable displayed above, the responses indicating “No change” (n=178) in the duration of study time and invalid responses are treated as missing values and excluded from calculations.

Similarly, the rest of the data used in the analyses have been transformed into binary forms unless they originally came as binary variables. They are usually divided into (1) “Increase” or “Decrease” group, (2) “High” or “Low” group, or (3) “Yes” or “No” group. For instance, the variable “Motivation to Study” is divided into two groups: the first group with those observing an increase and the second with a decrease in the motivation to study during the pandemic. The results from the prior work shown in Figure 1 are utilized as a blueprint (Uchiyama et al., 2022). Since the outcome variable in this study is dichotomous, binary logistic regression (BLR) analyses have been performed to critically appraise the models’ significance, suitability, accountability, and predictability. For the analyses, the IBM SPSS Statistics Version 27.0.1 was utilized.

3. Results

In the preliminary phase of this study, several combinations of variables corresponding to the categories of variables listed in Figure 1 have been tested to screen for the most suitable model to expound on the dependent variable. After a series of trials, the combination of independent variables that are shown in Table 3—i.e., motivation to study, anxiety, life satisfaction, satisfaction with health status, and satisfaction with social bonds—have yielded results substantiating this set of variables to be the fittest of all tested models. In particular, the results of the Hosmer and Lemeshow Test for

the model verified that the model fits the data (Chi-square = 5.954, $df = 8$, p -value = 0.652) with the significance value being greater than 0.05, which, in this case, attests to the model fit; in addition, from the Nagelkerke R Square value, as presented in Table 4, it is possible to interpret the outcome to mean that the combination of variables in this model can explain 45.6 percent of the variation in the variable “Change in Time Spent Studying by Students” (The University of Newcastle, n.d.). Moreover, the specificity of the model indicated that the model predicted 77.8 percent of the cases where a decrease in study time was observed; in contrast, the sensitivity was 82.6 percent, and the model predicted the cases with an increase in study time in the equivalent rate, which is relatively high. All in all, the model’s overall accuracy rate was 80.3 percent. In short, the results displayed in Table 3 were the most remarkable and noteworthy of all tested models when significance, accountability, and predictability are deliberated as a whole.

Table 3

Results of Binary Logistic Regression Analysis for Change in Time Spent Studying by Students

Variable	β	SE β	Wald	df	p -value	Exp (β) (OR)	95% CI	
							LL	UL
Motivation to Study	1.388***	0.118	137.769	1	0.000	4.009	3.170	5.055
Anxiety	0.616*	0.278	4.900	1	0.027	1.851	1.073	3.192
Life Satisfaction	0.649*	0.253	6.599	1	0.010	1.914	1.166	3.140
Satisfaction with Health Status	0.199	0.258	0.591	1	0.442	1.220	0.735	2.014
Satisfaction with Social Bonds	-0.128	0.257	0.248	1	0.619	0.880	0.531	1.457
Constant	-1.256	0.517	5.902	1	0.015	0.285		

Note. OR = odds ratio; CI = confidence interval; LL=lower limit; UL=upper limit. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Model Summary of the Binary Logistic Regression (BLR)

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	485.477 ^a	0.342	0.456

^a Estimation was terminated at iteration number 5, since the change in parameter estimates was less than .001.

In the BLR model, the analysis identified motivation to study, anxiety, and life satisfaction as significant predictors (chi-square = 210.586, $df = 5$, $p < 0.001$). It should be no surprise to any sensible observer that motivation demonstrated the most conspicuous association with the

dependent variable, “Change in Time Spent Studying by Students.” In effect, when its odds ratio (OR = 4.009, CI = 3.170-5.055, $p < 0.001$)—as presented earlier in Table 3—is considered, the predictive association’s robustness with the dependent variable is remarkable. One way to interpret the odds ratio for the association is that those classified into the group with an increase in the motivation to study are 4.009 times more likely to observe an increase in time he/she spent studying. Satisfaction with health status and satisfaction with social bonds were not found to be significant predictors. Nonetheless, it is essential to heed that, as far as the accountability of this particular model is concerned, the outcomes reported here can be attributed to the model with the five independent variables as a whole rather than solely to motivation, anxiety, and life satisfaction.

4. Discussions

By and large, the results of the current binary logistic regression (BLR) model are congruent with the outcomes of the prior bivariate model by the current study’s researchers (Uchiyama et al., 2022). In particular, both models identified two similar variables—that is, “Motivation to Study” and “Anxiety”—to be proximally and predictively associated with the dependent variable “Change in Time Spent Studying by Students.” Nevertheless, what differs between the results of the two studies is that the current BLR model found “Life Satisfaction” but not “Satisfaction with Health Status” to be significantly associated with the dependent variable, even though the prior study had found that the former variable was associated with “Anxiety” and the latter not only with “Anxiety” but also with “Motivation to Study.”

Furthermore, the BLR model of the current study did not discern a significant association between the social capital variable “Satisfaction with Social Bonds” and the dependent variable “Change in Time Spent Studying by Students.” In contrast, the former bivariate analysis, as shown in Figure 1, identified three variables related to social capital—namely, “Perceived Increase in Support and Bond within Community” ($\Gamma = 0.231, p < 0.001$; $\Gamma = 0.177, p < 0.001$), “Perceived Effort of Society for Solving International Issues” ($\Gamma = 0.209, p < 0.001$; $\Gamma = 0.172, p < 0.001$), and “Perceived Changes in Workplace, Community, and Government” ($\Gamma = 0.225, p < 0.001$; $\Gamma = 0.188, p < 0.001$)—to be respectively predictive of “Life Satisfaction” (whose relevant results are specified by the former values in the preceding sets of parentheses) and “Satisfaction with Health Status” (with its associated values enumerated in the latter part within the parentheses as mentioned earlier), each of which was then associated with “Level of Anxiety” and “Level of Motivation to Study” respectively (Uchiyama et al., 2022). In the current study, those three variables related to social capital in their binary forms had also been incorporated into the BLR models during the preliminary phase; however, none yielded more outstanding results than the ones reported in Tables 3 and 4. Nevertheless, it is worth pointing out that a supplementary bivariate analysis to the current study revealed a statistically significant—yet modest—association between “Satisfaction with Social Bonds” and “Change in Time Spent Studying by Students” in terms of odds ratio (OR =

1.661, CI = 1.233-2.237, $p < 0.05$). Given these seeming discrepancies, our comprehension of social capital's impacts on study-related behaviors would certainly benefit from further studies.

In contrast, the decisive role of motivation in terms of its impacts on indicators of self-disciplined behaviors, such as the duration of time students spend studying, is unambiguous as far as this study is concerned. Moreover, outcomes of many studies that have assessed motivation's role in acquiring specific skills or disciplines support the significance of motivation (Ali et al., 2011; Masgoret & Gardner, 2003; Murayama et al., 2013). In addition, many people are likely to appreciate, corroborate, and are cognizant of motivation's influence on their study-related behaviors from their first-hand personal experience. That is, our perception—which our previous experience has shaped even at neurophysiological levels (Snyder et al., 2015)—also seems to substantiate motivation's influence in our everyday life, at least subjectively. In short, many studies and experiences inform us that motivation can influence our study-related behaviors in many situations.

Motivation's significance can also be seen in its profound history as a subject of philosophical and psychological inquiries. Motivation has been contemplated and analyzed by various philosophers ranging from the ancient Greek Aristotle to the French existentialist Jean-Paul Sartre, as well as psychologists, including the foremost functionalist/pragmatist William James, who proposed the instinct theory, and another prominent scholar, Abraham Maslow. In 1943, a humanistic psychologist, Maslow, conceptualized his hierarchy of needs in which motivation is of central concern and importance (Maslow, 2022). He identified humans' basic needs and arranged them in a hierarchical and sequential order, starting with (1) physiological needs, at the bottom of the hierarchy, (2) safety needs, (3) needs for belonging and love, (4) esteem needs, and, finally, (5) self-actualization, at the top of the hierarchy (Maslow, 2022). According to Maslow's theory, each phase, beginning with the physiological needs, has to be fulfilled sufficiently to address the subsequent stage. For instance, if physiological needs, such as those caused by starvation, are not fulfilled, motivation drives the individual to satisfy hunger. Unless those physiological needs are met for the most part, the next level of needs—in this case, safety needs—does not become the principal target for the individual. Despite some criticisms on the grounds of discounting socio-cultural factors as well as diversity (King-Hill, 2015; Trigg, 2004) and individual uniqueness (Mittelman, 1991), Maslow's theory is still considered relevant even today (Adulof, 2017), especially concerning the enhancement of quality of life (Tripathi & Moakumla, 2018), which is pertinent, particularly during times of social crisis such as the COVID-19 pandemic.

Using Maslow's scheme to interpret people—among whom were students—affected by the COVID-19 pandemic, one could construe and realize that some people's safety needs or even physiological needs had been disrupted or jeopardized by the pandemic. It is logical and pragmatic to surmise that, for many, studying is an activity that quintessentially pertains to belonging, esteem, or self-actualization, each of which, according to Maslow's conceptualization, is progressively more advanced—hence, higher in the hierarchy—than physiological and safety needs. When seen through the lens of Maslow's insightful concept, one could comprehend the conceivable reason that

the decline in motivation to study was observed among many students in Japan as a social tendency during the pandemic: the spread of the infection and its repercussions affected and shook some people's senses of security and stability. In essence, the affected individuals needed to fulfill more basic needs before motivation directed them to devote more time to study.

Several studies have identified statistical associations between motivation and anxiety *vis-a-vis* general academic achievement (Khalaila, 2015; Majali, 2020; McEwan & Goldenberg, 1999). These studies and the current study provide reasonably objective and statistical grounds for the associations among motivation, anxiety, and study-related variable, even though each is unique in its target population, context, and details. For example, Majali concluded in his/her study of university students in the United Arab Emirates that the optimum level of anxiety contributes to the successful educational outcome (Majali, 2020). McEwan and Goldenberg found that trait anxiety was "the only valid predictor of academic success" among a sample of nursing students in Canada. Moreover, they concluded that "knowledge of students' anxiety levels, previous academic abilities, learning styles, motivation, and personal data" might help develop better curricula and screen for successful candidates for graduate education (McEwan & Goldenberg, 1999). Khalaila's study reported that intrinsic motivation and test anxiety were significant variables between academic self-concept and academic achievement among nursing students in Israel (Khalaila, 2015). Given the commonalities between these studies and the current research, the results of the present study are a new addition to the lines of evidence that support statistical associations among motivation, anxiety, and study-related variable, which, in this particular case, is increase or decrease in time spent studying among students in Japan during the COVID-19 pandemic.

The coexistence of anxiety (OR = 1.851, CI = 1.073-3.192, $p < 0.01$) and life satisfaction (OR = 1.914, CI = 1.166-3.140, $p < 0.05$) among the predictors of statistical significance in the BLR model is also noteworthy. To supplement the analyses, a composite variable—"The Number of Reasons for Increased Anxiety" (Range: 0 - 10; N = 10,091; M = 1.66)—has been constructed as an ordinal proxy indicator to estimate the approximate level of anxiety. The variable counts the number of reasons for increased anxiety per respondent. The categories of reasons that have been tallied are: (1) maintenance of current life, (2) job, (3) family, (4) health, (5) parents, (6) education, (7) interpersonal relationships, (8) social problems, (9) global issues, and (10) future in general. From the descriptive statistics, it was evident that the average number of reasons for increased anxiety among students was the lowest of all demographic subpopulations by occupation: it was 1.52 (n = 950) for students, while the counterpart for non-students in non-regular employment was 1.84 (n = 1,739), and that for non-students without a job in search of employment was 2.40 (n = 304), which was the highest. From the results, it could be inferred that the average level of anxiety among the study sample is neither panic nor a severe level, but more likely a mild level or possibly less since the excessive level of anxiety would generally coincide with low life satisfaction which was not observed in the current data. On the other hand, the average level of life satisfaction (Range: 0 - 10; N = 10,091; M = 5.66) was 5.51 (n = 950) for students, while the counterpart for non-students

in non-regular employment was 5.40 ($n = 1,739$) and that for non-students without a job seeking employment was 4.87 ($n = 304$). It could be hypothesized that mild anxiety and a sufficient level of life satisfaction may facilitate an increase in motivation to study, which may lead to devoting more study time and, possibly, achieving better academic performance.

It is likely not incidental that the above conjecture fits the generalized scenario of many motivated high school seniors in Japan who are anxious about their college entrance examinations. Because of their longer-term anxiety about the entrance examinations, many are motivated to study diligently day in and day out. They spend many hours studying in school and at home, particularly for tests. However, it is widely known that once they pass the examinations, many of them—with exceptions, of course—begin to relax and study dramatically less, which seems to be correlated with less anxiety and less extrinsic motivation. This scenario, in addition to the results of the current study, seems to support the notion that we tend to need motivation and some anxiety as well as an adequate level of life satisfaction to devote much time to study. The results of the abovementioned studies (Majali, 2020; McEwan & Goldenberg, 1999; Khalaila, 2015) seem consistent with the idea.

5. Conclusion

The results of this study elucidate the significant role of motivation to study, anxiety, and life satisfaction in influencing the dependent variable—i.e., “Change in Time Spent Studying by Students”—during the COVID-19 pandemic. Nonetheless, as evidenced in some of the studies referred to in this study (McEwan & Goldberg, 1999; Khalaila, 2015), motivation and anxiety are consequential even during the periods not affected by the COVID-19 pandemic, just so long as the physiological and safety needs are sufficiently met to facilitate study-related behaviors, as described in Maslow’s theory (Maslow, 2022); i.e., it is quite probable that the basic physiological needs must be met before motivation, anxiety, and life satisfaction become potent enough to direct the individual to pursue academic activities. This idea is congruent with the current study’s results because the notion offers comprehensible and cogent explanations about the variable interactions. Taking into account the outcomes of these multiple studies, one can see that it is productive and fruitful to investigate further as to how much emphasis should be placed on motivation, anxiety, and life satisfaction, respectively, in school policies and curricula to promote and elicit effective and/or efficient study-related behaviors that lead to enhanced academic performance. Furthermore, more studies need to be conducted to clarify the possible impacts of social capital on study-related behaviors. Once further studies have accumulated, a meta-analysis needs to be implemented to support and facilitate evidence-based school policies and curricula.

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