

Effect of Teacher Autonomy Support on College Students' Autonomous Motivation in Physical Education: The Mediating Role of Self-Efficacy

Qi Guo¹, Shamsulariffin Samsudin^{2*}, Mohd Aswad Ramlan³, Xiaofei Lin⁴, Yubin Yuan⁵

Abstract

This is important not only for sustaining but also for further improving educational effectiveness. It has also been suggested that teacher autonomy support constitutes one critical environmental factor contributing to the development of this kind of motivation. However, related research in physical education contexts is still scant. The objective of this study was to find out how much personal support helped Chinese college students be more motivated to do well in physical education classes and how much this was due to self-efficacy playing a role. This study sampled 406 Chinese college students to collect data on perceptions toward teacher autonomy support, autonomous motivation, and self-efficacy in physical education settings. The two theoretical models analysed data using different statistical techniques to test mediated effects. Results showed that teacher-provided autonomy support, self-efficacy, and autonomous motivation are highly interrelated. Moreover, autonomy support predicts autonomous motivation indirectly through self-efficacy. In addition, the mediation model did not vary across gender groups. These findings suggest that physical educators can create increases in students' self-efficacy and autonomous motivation by enhancing the levels of autonomy support. This could lead to better quality in physical education and help people come up with effective methods to help students who are having trouble with their classes at the college level.

Keywords: College Students, Self-Determined Motivation, Autonomy Support, Self-Efficacy.

Introduction

Motivation is considered to be the psychological drive or inner compulsion which enables one particular individual to act in response to a need, want, or challenge, and it initiates, directs, and reinforces behaviour, according to Xia (2018). A student should be motivated positively. Motivation itself is indispensable in promoting learning outcomes in physical education, since students cannot learn effectively without appropriate motivation (Sun, 2016). According to the Self-Determination Theory (SDT), motivation is viewed as developed in a dynamically changing process. The larger-scale variation progresses from amotivation through a controlling types of motivation phase and finally to autonomous motivation. Amotivation implies an absolute lack of interest or even being unwilling to do the activity when the feeling of not wanting to do anything is strong and the intention to start

or continue the behaviour does not exist. Controlled motivation is established when one feels compelled by forces outside one's control, such as through guilt or obligation. However, autonomous motivation concerns behaving out of choice, interest, or value considerations (Deci & Ryan, 2000; Deci, Ryan, & Vansteenkiste, 2008). In this way, independent motivation can be broken down into three groups: identified regulation, intrinsic motivation, and integrated regulation. Autonomous motivation needs to be encouraged in physical education because the outcomes of students' commitment as well as heightened concentration are the engagement in extra-curricular gym activities (Cox et al., 2011; Maldonado et al., 2019; Wang et al., 2017).

The majority of physical education classes in colleges in China are monotonous, while teaching methods are dominantly control oriented. Thus, students receive passive learning processes and have low motivation for

¹ Department of Sports Studies, Faculty of Educational Studies, University Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Email: gs60639@student.upm.edu.my

² Department of Sports Studies, Faculty of Educational Studies, University Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Email: shamariffin@upm.edu.my

³ Department of Recreation and Ecotourism, Faculty of Forestry and Environment, University Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Email: m.aswad@upm.edu.my

⁴ Department of Sports Studies, Faculty of Educational Studies, University Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Email: gs60230@student.upm.edu.my

⁵ Department of Sports Studies, Faculty of Educational Studies, University Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Email: gs60175@student.upm.edu.my

*Correspondence: shamariffin@upm.edu.my

physical education. Some universities still cling to traditional teaching philosophies that contribute to inflexible class structures and limited attention to guiding students in their learning of physical education. As a result, physical education classes become just one more requirement, which further reduces students' eagerness to actively participate in such processes (Wang, 2022). Physical education in colleges and universities very often serves as the last step in the educational process of physical literacy (Guo & Niu, 2021; Huang, 2022). Lack of motivation during physical education classes might result in burnout and further gradual movement toward disengagement and thus position students in a less privileged group of individuals.

Conversely, meta-analysis has identified that autonomous motivation significantly improves health behaviour (Sheeran et al., 2021). However, at the moment, motivation in physical education for Chinese college students is very low and presents one of the major challenges to their health. Report of the Ministry of Education, 2021 The 8th Chinese Students' Physical Fitness and Health Research reported that the improvements in physical fitness standards among junior high school, high school, and college students were 5.1%, 1.8%, and 0.2%, respectively; thus, college students have demonstrated the least progress compared with other age groups so far (Huang & Cheng, 2024). Some of the specific physical health indicators show continuing deterioration in lung capacity, flexibility, strength, speed, and endurance in college students (Kong, 2024). Other common complaints among students include myopia, obesity, and reduced physical fitness. These problems reflect the failure of appropriate effectiveness of the physical education program at the colleges in China because it is too inadequate to support and improve motivational development among the students.

Physical education instructors are crucial in fostering motivation (Shen et al., 2009). SDT highlights that autonomous motivation is a vital psychological resource influenced by external contexts, with autonomy support being a key factor (Black & Deci, 2000). Teacher autonomy support consists of taking the students' perspective, being empathic about their feelings, and offering opportunities for independent decision-making (Black & Deci, 2000). This support is increasingly valued for enhancing student motivation. Using SDT and building on prior research, this article investigated the relationship between teacher support for autonomy and autonomous motivation and estimated the mediating role of self-efficacy. The research underlines the very important role that teacher support plays in developing student autonomy. The results are expected to give practical implications to physical

educators and administrators on how to provide a supportive teaching and learning environment that would enhance the autonomous motivation of the students, thus enabling them to sustain their engagement in physical education.

Literature Review

That is, it is only when the basic psychological needs are satisfied that learning motivation is positively influenced by internalization according to SDT. More precisely, in the case of teaching activities which are well-conducted, intrinsic motivation can be enhanced while shifting from extrinsic to autonomous motivation might be possible as long as needs regarding autonomy, competence, and relatedness are met (Ryan & Deci, 2020). While the satisfaction of all these psychological needs is important, autonomy support is identified as the most critical factor in eliciting self-determined motivation (Jang, Kim, & Reeve, 2012). SDT emphasizes that environmental factors from out there directly contribute to the internalization process of individual motivation to further our thinking regarding how various environmental contexts influence motivational processes. Teacher autonomy support encompasses reducing controlling behaviours, demonstrating empathy towards students, providing opportunities for students to make and act on their choices, and fostering a sense of self-determination in decision-making (Chen & Huang, 2016). A meta-analysis has highlighted teacher autonomy support as crucial for enhancing student autonomous motivation (Hagger & Chatzisarantis, 2016). Various forms of autonomy support in physical education—namely cognitive, organizational, and procedural—have been shown to indirectly impact students' internal motivation (Koka et al., 2021).

Teacher autonomy support also influences student self-efficacy (Gutiérrez & Tomás, 2019; Zimmermann et al., 2021). Teachers who provide autonomy support share characteristics with those who enhance self-efficacy, such as offering timely feedback, appropriate encouragement, and positive verbal interactions (Zimmermann et al., 2021). Teachers can motivate students' self-efficacy much more if they encourage student activity, prompt students to choose strategies, and offer an autonomy-supportive learning environment. In term of teachers autonomy support several studies confirm the self-efficacy among various population, such as (Ng, Liu, & Wang, 2016) found that teacher authority support and students' self-efficacy were related in a good way. They did this by surveying 782 secondary school students in Singapore. Duchatelet and Donche (2019) also found that undergraduate students

who had more liberty felt more confident in their own abilities. It's becoming clearer that teacher autonomy support and learner self-efficacy are linked, which shows how important it is in educational studies. However, there isn't a lot of research on physical education yet. This study tries to fill that gap.

Individual motivation varies with changes in self-awareness, with enhanced self-efficacy leading to increased intrinsic motivation. Alivernini and Lucidi (2011) identified academic self-efficacy as a significant predictor of high school students' motivation. In sports contexts, self-efficacy serves as a critical intrinsic motivator for learning, with students' beliefs in their abilities impacting their motivation and performance in sports and motor learning (Huang & Cheng, 2024). Students' self-efficacy in learning can stimulate interest and achievement motivation in physical education, contributing to the development of autonomous motivation. Research has also explored the indirect effects of self-efficacy; for example, teachers' intellectually stimulating behaviours can indirectly influence students' intrinsic motivation through their self-efficacy (Shin & Bolkan, 2021). Komarraju and Dial (2014) found that self-efficacy mediates the relationship between academic identity and autonomous motivation among U.S. undergraduate students. Collectively, the literature suggests that self-efficacy can either directly influence autonomous motivation or serve as a mediating variable in this relationship.

In other words, though much research has been conducted on the effect of autonomy support on autonomous motivation, there is decidedly limited research into how autonomy support internalizes autonomous motivation among Chinese college students. On account of their high level of competence and engagement in their subjects, teachers in higher education are favourably positioned to foster students' autonomous motivation. However, the connection between autonomy support and self-efficacy is not well explained in the context of physical education. The current study intends to fill this gap by empirical investigation within the physical education settings and give insights into college instructors on how to create a positive teaching environment. Hence, the current study is majorly for the purpose of investigating whether physical education teachers' levels of autonomy support is related to autonomous motivation among Chinese college students and confirm self-efficacy as a mediator. Figure 1 presents the hypotheses of the investigation and the conceptual framework of this research.

H1: *Autonomy support positively influences on autonomous motivation.*

H2: *Autonomy support positively influences self-efficacy.*

H3: *Self-efficacy positively influences autonomous motivation.*

H4: *Self-efficacy significantly mediates the link between autonomy support and autonomous motivation.*



Figure 1: Conceptual Framework of Variables.

Methodology

Participants and Procedures

This study employed a cross-sectional design, and the data were collected by carrying out questionnaire surveys across four colleges with different educational levels in Jiangxi Province, China. Located in central China, Jiangxi Province has complex and multifaceted higher education institutions. Besides, Jiangxi Province is the only province that distinguishes universities, for the purpose of administration, as "research-oriented" and "application-oriented". This research in the process of selection of colleges, has taken care of this possibility of homogeneity by targeting different types and levels of education of colleges within Jiangxi Province. Ensuring this will bring diversity within the pool of participants and increase the representative nature of the sample.

The stratified random sampling method was adopted for selecting the respondents by choosing one class each from freshmen, sophomores, and juniors from each institution after approval from college authorities. The students in their fourth year were excluded because most of their commitments are usually out of class and involve an internship. To avoid the possible confounding variable, participants were included based on the following: (1) aged between 17 and 25, (2) enrolled as a first-, second-, or third-year student, (3) participating in compulsory PE courses, and (4) did not major in physical education. All participants were treated as volunteers and signed informed consent before taking the survey. The sample population consisted of 450 college students and were administered with questionnaires before their physical education classes. The privacy and confidentiality of information provided were clearly stated in the instructions of the questionnaires that took about 10 minutes to fill out, distributed immediately before class and collected immediately afterwards.

To ensure the reliability of data, 44 questionnaires due to incompleteness or inconsistency in responses were discarded, hence leaving 406 valid responses with an efficiency rate of 90.2%. The participants were between 17

and 22 years. The average age for the population was 18.83±0.93 years. The sample included 215 males (53%) and 191 females (47%). Of the total, 159 (39%) were freshmen, 130 (32%) were sophomores, and 117 (29%) were juniors. The study obtained ethical approval from the Ethics Committee of Universiti Putra Malaysia with Approval No.: JKEUPM-2023-685.

Instrument

The survey used well-known scales that are known for being reliable and useful in many situations. A 15-item part of the Physical Education Autonomy Support Scale was taken from the revised Learning Climate Questionnaire by Standage, Duda and Ntoumanis (2005). This questionnaire was first made by Williams and Deci (1996) and has been used a lot in sports study since it was first made. The General Self-Efficacy Scale (GSES), which is made up of ten items and was created by Schwarzer and Jerusalem (1995), was used to measure self-efficacy. This measure is widely used to test the mental health of middle school and college students, and it has been proven to work in Chinese schools. Wilson et al. (2006) created the Behaviour Regulation Exercise Questionnaire-3 (BREQ-3), which has three parts: defined regulation, integrated regulation, and intrinsic motivation. Each part has four items and was used to measure autonomous motivation. A prior study tested the BREQ-3 with college students and found that it works in the Chinese setting. So, all of the scores were translated back into English by two experts who speak both languages to make sure that the meanings were the same in both. These tools made up the final questionnaire, and the answer options ranged on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Analytical Approach

Descriptive statistics, reliability, validity, and correlation assessments were executed using SPSS 26.0, whereas the structural equation model was developed by using AMOS 26.0-which has been developed specifically for handling complicated multivariate data and performing covariance structure analysis; therefore it has a few benefits over conventional statistical techniques (Kline, 2023). After that, hypotheses were tried, bias-corrected percentile bootstrap methods were used to look at how self-efficacy acted as a mediator, and a multi-group analysis was conducted to determine if the model remained identical.

Results

Reliability and Validity

Internal consistencies for the scales of AS, SE, and AM were 0.921, 0.928, and 0.895 respectively and all of them

have outstripped the threshold set at 0.7 hence ensuring internal consistency of the scales used was very strong (Table 1). We utilised confirmatory factor analysis to verify whether the questionnaire scores were valid for both convergent and discriminant validity. Five items with factor loadings less than 0.5 were taken out after the basic CFA. The resulting standardised factor loadings for all variables were greater than or equal to 0.5, with values ranging from 0.680 to 0.860. We used the concepts from Bagozzi and Yi (1988) to make Table 1. All of the values for Composite Reliability (CR) were above 0.70, and all of the values for Average Variances Extracted (AVE) were above 0.50. This shows that the validity was very strong. Fornell and Larcker (1981) discriminant validity criterion was used in this study. Good discriminant validity of a scale is indicated by the square root of the Average Variance Extracted (AVE) for each variable being higher than the correlation values between variables. The square root of the AVE for each variable is displayed in Table 2 (on the diagonal). It was all greater than the correlation values, which means that the discriminant validity was acceptable.

Table 1

Internal Consistency and Convergent Validity

	Cronbach's α	CR	AVE
AS	0.921	0.922	0.518
SE	0.928	0.928	0.589
AM	0.895	0.817	0.605

Table 2

Discriminant Validity

	AS	SE	AM
AS	0.72		
SE	0.635***	0.767	
AM	0.401***	0.413***	0.778

***p<0.001

Common Method Bias Test

The researchers used Harman's one-factor test on self-report data to look for possible shared method bias (Zhou & Long, 2004). An unrotated exploratory factor analysis was conducted on the autonomy support, self-efficacy, and autonomous motivation scales. This gave four factors whose eigenvalues were greater than 1. It was determined that the first general factor explained only 34.96% of the variance. This is much lower than the 40% variance level that most researchers say is needed to rule out significant common method bias in the study.

Descriptive and Correlation Analyses

Table 3 also shows the study variables' mean, standard deviation, and correlation matrix. There is a statistically significant positive link between autonomy support, self-efficacy, and autonomous motivation, as shown by the correlation study. Their coefficients vary from 0.372 to 0.590. Accordingly, these results give ground for testing mediation between teachers' perceptions of autonomy support and students' autonomous motivation in physical education classes with regard to the fact that this mediation is executed by self-efficacy (Wen & Ye, 2014).

Table 3
Mean, Standard Deviation, as well as Correlation for Variables

	M±SD	AS	SE	AM
AS	3.35±1.05	1		
SE	3.32±1.13	0.590**	1	
AM	3.28±0.96	0.372**	0.391**	1

**p < 0.01

Mediating Effect Test

In order to analyse the relationship between teacher autonomy support and autonomous motivation, focusing on the mediating function of self-efficacy, a structural model was designed (see Figure 2). This model fitted well, as indicated by the following fit indices: CMIN/df = 1.832, CFI = 0.965, NFI = 0.926, TLI = 0.961, SRMR = 0.039, and RMSEA = 0.045. Summarized in Table 4, the path coefficients revealed that the supporting autonomy by teachers was positively related to both self-efficacy ($\beta = 0.635$, $p < 0.001$) and autonomous motivation ($\beta = 0.233$, $p < 0.01$). Besides, there existed a significantly positive effect of self-efficacy on autonomous motivation ($\beta = 0.266$, $p < 0.001$). The data thus supported hypotheses H1 through H3.

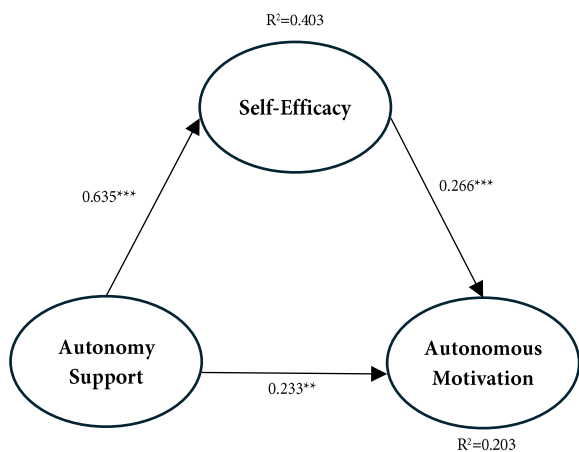


Figure 2: Mediation Effect Model.

Table 4. Path Analysis

Path	Std. Estimate (β)	Unstd. Estimate (B)	S.E.	Z	P
AS→SE	0.635	0.767	0.075	10.239	***
SE→AM	0.266	0.167	0.043	3.636	***
AS→AM	0.233	0.157	0.052	3.213	**

p < 0.01, *p < 0.001

The study used a bias-corrected percentile bootstrap method with 5000 samples and a 95% confidence interval to figure out how important the mediator effect was. If the confidence range does not include zero, a prior study asserts that the indirect effect is statistically significant. If it does include zero, the indirect effect is not significant. In particular, as presented in Table 5, the point estimate of the mediating effect was 0.121, and the bootstrap 95% CI ranged from 0.053 to 0.212; zero did not fall within this range, indicating that the effect of self-efficacy had a significant mediation effect, accounting for 42.2% of the total effect. Additionally, the 95% CI of the direct effect did not include zero, meaning that teacher autonomy support can predict the students' autonomous motivation in physical education also via partial mediation by self-efficacy, supporting hypothesis H4.

Table 5
Mediating Effect Test

Path	Point Estimate	S.E.	Z	Bias-Corrected 95% CI	
				Lower	Upper
Indirect Effect	0.121**	0.041	2.951	0.053	0.212
Direct Effect	0.167**	0.061	2.738	0.053	0.294
Total Effect	0.287***	0.058	4.948	0.187	0.411

p < 0.01, *p < 0.001

Multigroup Analysis

To assess the cross-group invariance of the mediation model in this study, a multi-group comparison was conducted based on gender using AMOS 26.0 software (Kline, 2011). This process involved performing a series of constrained models with equivalence restrictions applied to each group. The model was considered invariant if the p-value was greater than 0.05. In cases where the p-value was significant, variations in the Comparative Fit Index (Δ CFI) and the Tucker-Lewis Index (Δ TLI) were examined. According to Cheung and Rensvold (2002) and Little (1997), a Δ CFI of 0.01 or less and a Δ TLI of 0.05 or less indicate that the model differences are not statistically significant.

Table 6*Multiple-Group Analysis of Structural Model Invariance*

Model	χ^2	df	RMSEA	$\Delta\chi^2$	Δdf	P	ΔTLI	ΔCFI
Unconstrained Model	790.279	454	0.043	-	-	-	-	-
Measurement Weights Model	817.786	474	0.042	27.507	20	0.122	0.001	-0.002
Structural Weights Model	823.397	477	0.042	5.611	3	0.132	0.000	0.000
Structural Covariances Model	823.646	478	0.042	0.249	1	0.618	0.000	0.000
Structural Residuals Model	831.640	480	0.043	7.994	2	0.018	-0.001	-0.001
Measurement Residuals Model	915.775	503	0.045	84.135	23	0.000	-0.008	-0.011

From Table 6, the p-values were greater than 0.05 for the models of constrained measurement weights, structural weights, and structural covariances, that is, these models are invariant across gender demographics. Though p-values in the structural and measurement residuals models were less than 0.05, ΔTLI were less than 0.05 and ΔCFI were less than 0.01 according to criteria for model invariance. Therefore, it would be appropriate to say that through the process of invariance assessment, the structural equation model applied within this study has gained a minimum difference between male and female college students and can support the generalizability of the theoretical model across different gender groups.

Discussion

Self-efficacy was used as a mediator in this study to investigate into the link between autonomy support and autonomous drive in physical education. There is a strong link between autonomy support and autonomous drive, as shown by the results. According to the results, giving students more guidance and help at the right time may actually encourage them to learn. This aligns with [Girelli et al. \(2018\)](#), who argue that teacher endorsement of student autonomy through recognition of their perspectives can strengthen autonomous motivation. In contrast to a classroom environment characterized by strict teacher control, allowing students some degree of input during the skill acquisition phase is crucial ([Maldonado et al., 2019](#)).

Such an approach allows students to experience greater freedom within physical education activities, which therefore allows for greater autonomous motivation. Interestingly, despite the collective orientation of China, it appears that Chinese students also have a pronounced need for autonomy, thereby countering previous stereotype expectations ([Abula et al., 2020](#)). These findings further support the proposition that teachers' autonomy support in the Chinese educational context is important.

This present research underlines the universal human need for autonomy and further underlines an important role of teachers in satisfying their students' need for autonomy, which enhances autonomous motivation. Autonomy support is highlighted as a contextual factor promoting internalization of motivation. Not all learning experiences in higher education will naturally inspire intrinsic motivation; autonomy-supportive teaching strategies assist students to internalize externally regulated behaviours, which, over time, result in sustained motivation and enhanced learning ([Guo & Xu, 2023](#)).

Basically, teachers should be more focused on a student-centred approach, which gives choice to the learner over a period of time in their schooling. Considering the emotional and psychological variation across students, teachers should provide options but also explain the rationale based on the interest of the learners. This supportive teaching method, compared to the controlling approach, minimizes punishment and subsequently less pressure for students, hence developing a supportive external environment for fostering autonomous motivation. Whereas perceived autonomy support from significant others supports internal motivation, it also facilitates internalization of external regulations for the sake of maintaining mental health. In developing students' autonomous motivation, teachers should provide choices, try to meet students' reasonable expectations toward classroom activities instead of sticking strictly to some rigid teaching paradigm. In addition, it is necessary for teachers to adopt an inclusive approach in understanding the perspectives and inner psychological experiences of students and to try including the development of an autonomous learning environment within the long-term teaching objectives.

Consistent with prior research, autonomy support is positively correlated with self-efficacy ([Miao & Ma, 2023](#); [Oriol-Granado et al., 2017](#)). [Miao and Ma \(2023\)](#) found that autonomy support from instructors enhances students' self-efficacy in online learning environments. A teaching atmosphere that fosters active

student participation enables learners to feel a greater sense of control over their tasks, thereby boosting their self-efficacy (Oriol-Granado et al., 2017). Educators should adopt a student-centred approach to teaching; this will meet students' needs and help them to act independently in choosing strategies and being consistent with one's problem-solving style. This approach might subtly enhance their self-precepts of their capabilities. Physical education teachers should aim at creating a warm but autonomous learning environment characterized by timely and specific feedback to incrementally raise students' self-confidence and confirm their self-efficacy. Alivernini and Lucidi (2011) also demonstrated that self-efficacy impacts students' autonomous motivation and can predict changes in autonomous motivation levels over time. With the provision of freedom of choice, opportunities for independent expression, and timely feedback and reward, autonomy support recognizes individuals' needs for self-determination (Duchatelet & Donche, 2019). However, by helping the students create an environment that can breed self-efficacy, it is possible that support for teacher autonomy may result in a profoundly increased motivation on the part of the students to engage in physical education-related activities.

In short, autonomy support was one of the essential external variables in promoting college students' autonomous motivation in physical education classes, and self-efficacy played an important role as a mediator. Via multi-group analysis, the model was proven to be cross-gender robust, which suggested that both genders shared the same mechanism in developing autonomous motivation; therefore, interventions for enhancing autonomy in the future can identically be implemented on both male and female college students.

Conclusion

This study used self-determination theory to delve into how teacher autonomy support, student self-efficacy, and autonomous drive are related in college physical education. The current study found that self-efficacy acted as a link between teachers' support for students' autonomy and students' desire to be autonomous. The suggested model was very consistent across different groups. If teachers help students be more independent, they will be able to see things from students' points of view and help them grow. This can help students switch from external to internal drive. These results led to more research and changes that have helped improve how physical education

is taught at the college level.

Theoretical and Practical Implications

This study constitutes a meaningful contribution to the use of self-determination theory in college physical education settings in China. The development of autonomy, accordingly, lets individuals internalize extrinsic motivations, moving them from reward/punishment-driven people to those who value the activity for its worth. From the structural equation model, it can be seen that the external contributing factor for improving motivation among students was autonomy support. The findings have great implication for physical education teachers. They recommend that more autonomy-supportive practices be incorporated into the curriculum, such as hands-on skill learning, open discussions, and respect for student choices. These practices develop students' self-efficacy, which in turn builds intrinsic motivation. The setting of achievable goals, timely feedback, and positive reinforcement from teacher's further support motivation. Continuous application of autonomy-supportive strategies further promotes students' self-direction and possible selves. It is here that education leaders should ensure that the approaches are followed by training physical education teachers and providing resources, encouragement of self-reflection and improvement through constructive feedback, and planned continuous professional growth. This process will change instructors from the traditional type into active supporters of students in self-directed learning, motivating them, and the creation of a student-centred environment.

Limitations and Future Directions

There are several limitations with this present study. First of all, the design of this cross-sectional survey prevents temporal changes in motivation and restricts any possibilities of performing causal analysis. Longitudinal or experimental designs will complement the current analyses better. Further, the current study integrated intrinsic motivation together with highly self-determined extrinsic motivation into one construct called integrated regulation. This might obscure their distinct roles at various stages. These two types of motivation should be separated and analysed as such in future research. Lastly, participants were only from Jiangxi Province, China. To reinforce generalizability, future research should include varied participants from regions that vary in economic conditions and also consider increasing the sample size.

References

- Abula, K., Beckmann, J., He, Z., Cheong, C., Lu, F., & Gröpel, P. (2020). Autonomy Support in Physical Education Promotes Autonomous Motivation Towards Leisure-time Physical Activity: Evidence From a Sample of Chinese College Students. *Health Promotion International*, 35(1), e1-e10. <https://doi.org/10.1093/heapro/day102>
- Alivernini, F., & Lucidi, F. (2011). Relationship Between Social Context, Self-Efficacy, Motivation, Academic Achievement, and Intention to Drop Out of High School: A Longitudinal Study. *The Journal of Educational Research*, 104(4), 241-252. <https://doi.org/10.1080/00220671003728062>
- Bagozzi, R. P., & Yi, Y. (1988). On the Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Science*, 16(1), 74-94. <https://doi.org/10.1007/BF02723327>
- 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](https://doi.org/10.1002/1098-237X(200011)84:6<740::AID-SCE4>3.0.CO;2-3)
- Chen, Y., & Huang, S. (2016). The Relationship Between Teacher Autonomous Support and High School Students' Self-motivation and Basic Psychological Needs. *Journal of Southwest Normal University: Natural Science Edition*, 41(10), 141-145. <https://doi.org/10.13718/j.cnki.xsxb.2016.10.022>
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 9(2), 233-255. https://doi.org/10.1207/S15328007SEM0902_5
- Cox, A. E., Ullrich-French, S., Madonia, J., & Witty, K. (2011). Social Physique Anxiety in Physical Education: Social Contextual Factors and Links to Motivation and Behavior. *Psychology of Sport and Exercise*, 12(5), 555-562. <https://doi.org/10.1016/j.psychsport.2011.05.001>
- Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, 11(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Deci, E. L., Ryan, R. M., & Vansteenkiste, M. (2008). Self-determination Theory and the Explanatory Role of Psychological Needs in Human Well-being. In L. Bruni & F. Comim (Eds.), *Capabilities and Happiness* (pp. 187-223). Oxford University Press. <https://doi.org/10.1093/oso/9780199532148.003.0009>
- Duchatelet, D., & Donche, V. (2019). Fostering Self-efficacy and Self-regulation in Higher Education: a Matter of Autonomy Support or Academic Motivation? *Higher Education Research & Development*, 38(4), 733-747. <https://doi.org/10.1080/07294360.2019.1581143>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
- Girelli, L., Alivernini, F., Lucidi, F., Cozzolino, M., Savarese, G., Sibilio, M., et al. (2018). Autonomy Supportive Contexts, Autonomous Motivation, and Self-Efficacy Predict Academic Adjustment of First-Year University Students. *Frontiers in Education*, 3, 95. <https://doi.org/10.3389/feduc.2018.00095>
- Guo, K., & Niu, N. (2021). A Study on the Cultivation of Intrinsic Motivation in College Students' Physical Education Classes From the Perspective of Self-determination Theory. *Contemporary Sports Science and Technology*, 11(34), 243-245. <https://doi.org/10.16655/j.cnki.2095-2813.2109-1579-6207>
- Guo, W., & Xu, W. (2023). Evaluation of Teaching Reforms to Promote Undergraduate Students' Learning Motivation From the Perspective of Self-determined Motivation Theory. *Journal of Higher Education*, 9(14), 146-149, 154. <https://doi.org/10.19980/j.CN23-1593/G4.2023.14.035>
- Gutiérrez, M., & Tomás, J. M. (2019). The Role of Perceived Autonomy Support in Predicting University Students' Academic Success Mediated by Academic Self-efficacy and School Engagement. *Educational Psychology*, 39(6), 729-748. <https://doi.org/10.1080/01443410.2019.1566519>
- Hagger, M. S., & Chatzisarantis, N. L. D. (2016). The Trans-contextual Model of Autonomous Motivation in Education: Conceptual and Empirical Issues and Meta-analysis. *Review of Educational Research*, 86(2), 360-407. <https://doi.org/10.3102/0034654315585005>
- Huang, Q. (2022). Optimisation of Physical Education Teaching in Colleges and Universities under the Concept of Lifelong Physical Education. *Research on Innovation of Ice Snow Sports*, (20), 117-120. https://qikan.cqvip.com/Qikan/Article/Detail?id=00002HGDK74O7JP0MLD89JP06HR&from=Qikan_Article_Detail

- Huang, W., & Cheng, B. (2024). The Effect of Exercise Self-efficacy on College Students' Engagement in Technical Learning in Physical Education Classes: The Chain-mediation of Physical Education Learning Motivation and Mind-flow Experience. *Sports Science Research*, 45(1), 58-65, 77.
- Jang, H., Kim, E. J., & Reeve, J. (2012). Longitudinal Test of Self-determination Theory's Motivation Mediation Model in a Naturally Occurring Classroom Context. *Journal of Educational Psychology*, 104(4), 1175-1188. <https://doi.org/10.1037/a0028089>
- Kline, R. B. (2011). *Principles and Practice of Structural Equation Modeling* (3rd ed.). Guilford Press.
- Kline, R. B. (2023). *Principles and Practice of Structural Equation Modeling*. Guilford Publications. <https://www.guilford.com/books/Principles-and-Practice-of-Structural-Equation-Modeling/Rex-Kline/9781462551910>
- Koka, A., Tilga, H., Hein, V., Kalajas-Tilga, H., & Raudsepp, L. (2021). A Multidimensional Approach to Perceived Teachers' Autonomy Support and Its Relationship With Intrinsic Motivation of Students in Physical Education. *International Journal of Sport Psychology*, 52(3), 266-286. <https://doi.org/10.7352/IJSP.2021.52.266>
- Komarraju, M., & Dial, C. (2014). Academic Identity, Self-efficacy, and Self-esteem Predict Self-determined Motivation and Goals. *Learning and Individual Differences*, 32, 1-8. <https://doi.org/10.1016/j.lindif.2014.02.004>
- Kong, L. (2024). Innovative Research on the Implementation Path of Promoting College Students' Physical Fitness and Health in the Context of Healthy China. *Science & Technology of Stationery & Sporting Goods*, 10, 92-94. http://218.28.6.71:81/Qikan/Article/Detail?id=7112110019&from=Qikan_Search_Index
- Little, T. D. (1997). Mean and Covariance Structures (MACS) Analyses of Cross-Cultural Data: Practical and Theoretical Issues. *Multivariate Behavioral Research*, 32(1), 53-76. https://doi.org/10.1207/s15327906mbr3201_3
- Maldonado, E., Zamarripa, J., Ruiz-Juan, F., Pacheco, R., & Delgado, M. (2019). Teacher Autonomy Support in Physical Education Classes as a Predictor of Motivation and Concentration in Mexican Students. *Frontiers in Psychology*, 10, 2834. <https://doi.org/10.3389/fpsyg.2019.02834>
- Miao, J., & Ma, L. (2023). Teacher Autonomy Support Influence on Online Learning Engagement: The Mediating Roles of Self-Efficacy and Self-Regulated Learning. *Sage Open*, 13(4), 21582440231217737. <https://doi.org/10.1177/21582440231217737>
- Ng, B. L. L., Liu, W. C., & Wang, J. C. K. (2016). Student Motivation and Learning in Mathematics and Science: A Cluster Analysis. *International Journal of Science and Mathematics Education*, 14(7), 1359-1376. <https://doi.org/10.1007/s10763-015-9654-1>
- Oriol-Granado, X., Mendoza-Lira, M., Covarrubias-Apablaza, C.-G., & Molina-López, V.-M. (2017). Emociones Positivas, Apoyo a La Autonomía Y Rendimiento De Estudiantes Universitarios: El Papel Mediador Del Compromiso Académico Y La Autoeficacia. *Revista de Psicodidáctica*, 22(1), 45-53. [https://doi.org/10.1016/S1136-1034\(17\)30043-6](https://doi.org/10.1016/S1136-1034(17)30043-6)
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and Extrinsic Motivation From a Self-determination Theory Perspective: Definitions, Theory, Practices, and Future Directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-efficacy Scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in Health Psychology: a User's Portfolio. Causal and Control Beliefs* (pp. 35-37). Windsor, UK: NFER-NELSON. [https://www.drugsandalcohol.ie/26768/1/General_Self-Efficacy_Scale%20\(GSE\).pdf](https://www.drugsandalcohol.ie/26768/1/General_Self-Efficacy_Scale%20(GSE).pdf)
- Sheeran, P., Wright, C. E., Avishai, A., Villegas, M. E., Rothman, A. J., & Klein, W. M. P. (2021). Does Increasing Autonomous Motivation or Perceived Competence Lead to Health Behavior Change? A Meta-analysis. *Health Psychology*, 40(10), 706-716. <https://doi.org/10.1037/hea0001111>
- Shen, B., McCaughtry, N., Martin, J., & Fahlman, M. (2009). Effects of Teacher Autonomy Support and Students' Autonomous Motivation on Learning in Physical Education. *Research Quarterly for Exercise and Sport*, 80(1), 44-53. <https://doi.org/10.1080/02701367.2009.10599528>
- Shin, M., & Bolkan, S. (2021). Intellectually Stimulating Students' Intrinsic Motivation: the Mediating Influence of Student Engagement, Self-efficacy, and Student Academic Support. *Communication Education*, 70(2), 146-164. <https://doi.org/10.1080/03634523.2020.1828959>
- Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A Test of Self-determination Theory in School Physical Education. *British Journal of Educational Psychology*, 75(3), 411-433. <https://doi.org/10.1348/000709904X22359>
- Sun, H. (2016). Motivation as a Learning Strategy. In C. D. Ennis, K. Armour, A. Chen, A. C. Garn, E. Mauerberg-deCastro, D. Penney, S. J. Silverman, M. A. Solmon, & R. Tinning (Eds.), *Routledge Handbook of Physical Education Pedagogies* (pp. 631-645). Routledge. <https://doi.org/10.4324/9781315743561-54>

- Wang, J., Liu, R.-D., Ding, Y., Xu, L., Liu, Y., & Zhen, R. (2017). Teacher's Autonomy Support and Engagement in Math: Multiple Mediating Roles of Self-efficacy, Intrinsic Value, and Boredom. *Frontiers in Psychology*, 8, 1006. <https://doi.org/10.3389/fpsyg.2017.01006>
- Wang, Y. (2022). Exploring the Reform Path of Public Physical Education in Colleges and Universities Under the Background of a Strong Sports Country. *China Higher Education*, 21, 56-58. <http://59.75.36.213/KCMS/detail/detail.aspx?filename=ZGDJ202221019&dbcode=CJFD&dbname=CJFD2022>
- Wen, Z., & Ye, B. (2014). Analyses of Mediating Effects: the Development of Methods and Models. *Advances in Psychological Science*, 22(5), 731. <https://doi.org/10.3724/SP.J.1042.2014.00731>
- Williams, G. C., & Deci, E. L. (1996). Internalization of Biopsychosocial Values by Medical Students: a Test of Self-determination Theory. *Journal of Personality and Social Psychology*, 70(4), 767-779. <https://doi.org/10.1037/0022-3514.70.4.767>
- Wilson, P. M., Rodgers, W. M., Loitz, C. C., & Scime, G. (2006). "it's Who I Am ... Really!" the Importance of Integrated Regulation in Exercise Contexts. *Journal of Applied Biobehavioral Research*, 11(2), 79-104. <https://doi.org/10.1111/j.1751-9861.2006.tb00021.x>
- Xia, J. (2018). The Relationship Between Self-determination Motivation and Pro-antisocial Behavior in Sports: the Mediating Effect of Sports Moral Disengagement. *Journal of Chengdu Sports University*, 44(3), 88-93. <https://doi.org/10.15942/j.jcsu.2018.03.015>
- Zhou, H., & Long, L. (2004). Statistical Remedies for Common Method Biases. *Advances in Psychological Science*, 12(06), 942-942~950. <https://journal.psych.ac.cn/adps/EN/Y2004/V12/I06/942>
- Zimmermann, J., Tilga, H., Bachner, J., & Demetriou, Y. (2021). The Effect of Teacher Autonomy Support on Leisure-time Physical Activity via Cognitive Appraisals and Achievement Emotions: a Mediation Analysis Based on the Control-value Theory. *International Journal of Environmental Research and Public Health*, 18(8), 3987. <https://doi.org/10.3390/ijerph18083987>