Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7, 636-647
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

The impact of self-determination theory on academic engagement among vocational college students: An empirical study in Guangdong, China

Zixia Zheng[1*], Nik Hanis Zuraihan Rahimi[1], Norhisham Binti Mohamad[3]
[1,2,3]Management and Science University, Shah Alam, Malaysia; zhengzixia315@gmail.com (Z.Z.)
nikhanis_zuraihan@msu.edu.my (N.H.Z.R.) norhisham_mohamad@msu.edu.my (N.B.M.)
[1]Guangdong Maoming Health Vocational College, Maoming, China.

Abstract: This study, based on Self-Determination Theory (SDT), employs a cross-sectional research design and uses a questionnaire survey to investigate 297 students in a vocational college in Guangdong Province, China. It aims to explore the impact of the three basic psychological needs—autonomy, competence, and relatedness—on academic engagement among vocational college students. The results show that these three dimensions are significantly and positively correlated with academic engagement (autonomy: $r = 0.875$, $p < 0.001$; competence: $r = 0.810$, $p < 0.001$; relatedness: $r = 0.802$, $p < 0.001$) and can significantly predict it (autonomy: $\beta = 0.571$, $p < 0.001$; competence: $\beta = 0.194$, $p < 0.001$; relatedness: $\beta = 0.167$, $p = 0.001$). The study validates the applicability of Self-Determination Theory in vocational education and provides evidence for educational practice. It is recommended that vocational colleges pay attention to students' psychological needs to enhance academic engagement.

Keywords: *Academic engagement, Basic psychological needs, Self-determination Theory, Vocational college.*

1. Introduction

Vocational education is a vital component in enhancing labor productivity and optimizing workforce allocation. With the global push for vocational education reform, China's higher vocational education has undergone a transformation, shifting from expansion in numbers to a focus on improving quality. The Chinese government has introduced several policies, such as the 2019 National Vocational Education Reform Implementation Plan, which officially recognizes vocational education as a distinct educational category [1]. However, despite these policy advancements, challenges such as uneven student quality, lack of academic interest, and insufficient motivation persist, negatively affecting academic engagement and graduate employability [2, 3].

Self-Determination Theory (SDT), proposed by Deci and Ryan [4] suggests that individuals have three fundamental psychological needs: autonomy, competence, and relatedness. Studies have shown that when these needs are met, students are more likely to exhibit intrinsic motivation and actively engage in their studies De Loof, et al. [5]. On the contrary, when students' perceptions of these needs are unmet, their motivation and academic engagement tend to significantly decline [6]. Academic engagement has been shown to have a substantial impact on students' academic outcomes [7, 8] and is also a crucial predictor of reduced dropout rates and increased graduation rates [9].

For students in vocational colleges, academic engagement is not only reflected in classroom learning but also in practical training, which plays a critical role in developing professional skills and improving overall competencies [10]. As vocational education becomes more widespread, the issues of inconsistent student quality, lack of interest, and low motivation have become more pronounced, resulting in decreased class attendance, lower focus, and a subsequent impact on the overall quality of education and talent cultivation [11]. These challenges highlight the importance of understanding the

© 2025 by the authors; licensee Learning Gate
History: Received: 16 May 2025; Revised: 18 June 2025; Accepted: 23 June 2025; Published: 8 July 2025
* Correspondence: zhengzixia315@gmail.com

psychological factors that drive academic engagement, especially within the context of vocational education.

This study aims to explore how the three core dimensions of SDT—autonomy, competence, and relatedness—affect the academic engagement of vocational college students in Guangdong, China. By providing empirical data, this research seeks to fill a gap in the current literature and offer practical insights into improving academic engagement through psychological need fulfillment.

2. Literature Review

2.1. Self-Determination Theory (SDT) Overview

Self-Determination Theory (SDT), proposed by Deci and Ryan [4] aims to explain the motivational mechanisms behind human behavior. According to this theory, individuals' actions are driven by three basic psychological needs: autonomy, competence, and relatedness. Autonomy refers to the ability to make choices and take actions based on one's own values and desires. Competence involves the feeling of being capable and effective when facing challenges. Relatedness refers to the emotional connections and support individuals experience in social interactions [12]. Fulfilling these basic needs not only enhances intrinsic motivation but also significantly improves learning motivation and academic performance [13].

In the field of education, research has shown that satisfying students' basic psychological needs can significantly improve their academic engagement and performance [14, 15]. Specifically, SDT emphasizes that when students perceive more choice, control, and emotional support during their learning process, their motivation and academic engagement are notably enhanced [16]. For example, studies have found that teaching styles that support autonomy help boost students' willingness to engage in self-directed learning, thereby increasing academic involvement [17]. In practice, supporting autonomy, enhancing competence, and fostering relatedness together play a crucial role in promoting students' academic participation [18].

2.2. The Definition and Influencing Factors of Academic Engagement

Academic engagement reflects students' active participation in learning activities. It includes not only observable behaviors such as class attendance, assignment completion, and classroom interaction, but also emotional and cognitive engagement. Schaufeli, et al. [19] proposed that academic engagement consists of three characteristics: vigor, dedication, and absorption. Behavioral engagement refers to students' visible actions in classroom learning and practical activities; emotional engagement reflects students' interest, sense of belonging, and emotional states such as pleasure, pride, or satisfaction; cognitive engagement focuses on deep thinking and active learning [20]. Additionally, academic engagement also encompasses the proactive behaviors students exhibit during their learning process, such as expressing opinions and influencing course content design [21].

Academic engagement is influenced by a variety of factors, including teachers' teaching behaviors, teacher-student relationships, task design, and students' autonomy, competence, and relatedness. Research shows that positive teacher-student relationships can directly enhance academic engagement, while also indirectly fostering student involvement by increasing perceived social support [11]. Moreover, the support students receive from teachers and peers can shape their positive school experiences and enhance learning motivation [22]. When students feel they have control over their skills and experience enjoyment, they are more likely to engage in classroom activities and show higher levels of participation Sadoughi and Hejazi [23] and Zhao and Yang [24].

Mystkowska-Wiertelak [25] analyzed the factors affecting student engagement through interviews and found that fulfilling students' needs for autonomy, competence, and relatedness can effectively enhance engagement, while controlling teaching methods tend to lead to dissatisfaction and disengagement. Similarly, Holzer, et al. [26] supported the core hypothesis of Self-Determination Theory (SDT), suggesting that fulfilling basic psychological needs (autonomy, competence, relatedness) influences academic engagement through intrinsic learning motivation.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

Furthermore, Mercer and Dörnyei [27] pointed out that setting clear learning goals and offering structured courses can help improve learning efficiency and enhance academic engagement. Effective task design is also a key factor in increasing academic motivation. Amerstorfer and Freiin von Münster-Kistner [28] found that engaging task designs can enhance students' academic motivation. Budzińska and Majchrzak [29] emphasized that a positive learning atmosphere significantly boosts students' academic behaviors (e.g., engagement), and such an atmosphere relies on the close and harmonious relationship between teachers and students. Lastly, Wang and Tahir [30] conducted a systematic literature review and found that gamified teaching not only improves learning performance but also enhances students' motivation, engagement, and learning experience. Ma and Wang [31] further proposed that spiritual intelligence plays an important role in promoting students' academic engagement in the classroom. These findings highlight that academic engagement is a multi-faceted process, influenced by teachers' behaviors, course design, and the fulfillment of students' psychological needs.

2.3. Academic Engagement of Vocational College Students

The educational challenges faced by vocational college students differ from those of regular undergraduates. Their academic engagement is not only reflected in classroom learning but also in practical training, skill development, and the enhancement of professional qualities. Vocational education emphasizes practical learning, which not only includes theoretical teaching but also a significant amount of skill training and internships [32]. Therefore, academic engagement is particularly important for vocational students, especially in contexts where the proficiency in skill operation is closely related to the frequency and duration of practice Sang, et al. [33].

Cheng [10] points out that the practical education model plays a crucial role in vocational colleges. It not only helps students acquire knowledge but also allows them to gain professional skills and experience through hands-on activities, which deepens their understanding of theory and fosters deep learning abilities. This helps students establish a strong connection between academic tasks and professional competencies [34]. However, academic engagement among vocational college students is generally low, with many students lacking sufficient academic motivation, leading to issues such as low class attendance and a lack of interest in learning [24].

Research shows that fulfilling students' basic psychological needs is an effective way to enhance academic engagement among vocational students [16]. Meeting the need for autonomy can enhance students' interest in and motivation for learning [35]. In vocational education, which is highly practice-oriented, the fulfillment of a sense of competence is crucial for students' self-confidence and academic engagement [34]. Moreover, the establishment of a sense of belonging comes not only from the support of teachers but also from emotional connections among peers [36]. In vocational colleges, interactions among students have a significant impact on academic participation [37].

2.4. Research Gaps and Hypotheses

Although Self-Determination Theory (SDT) has been widely applied in the field of education, cultural differences significantly impact the satisfaction and expression of basic psychological needs [1]. This is particularly true in vocational colleges in China, especially in Guangdong, where the collectivist cultural context makes students' need for relatedness particularly prominent. Research shows that, in collectivist cultures, students tend to place greater emphasis on emotional connections and social support with others, while the expression of the need for autonomy may be more subtle [1]. Therefore, teacher support and peer emotional connections in vocational colleges in Guangdong, China may have a more significant impact on academic engagement than in Western cultures.

These cultural differences offer a new perspective for understanding the dynamics of academic engagement among vocational students in Guangdong, China. Although existing research has explored the impact of Self-Determination Theory on academic engagement, studies specifically focusing on vocational colleges in China, particularly in Guangdong, remain insufficient. This study aims to fill this

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

gap by investigating how the core dimensions of Self-Determination Theory—autonomy, competence, and relatedness—affect academic engagement among students in vocational colleges in Guangdong, China.

Building upon the discussion of Self-Determination Theory in the literature review and its application to academic engagement, this study proposes the following hypotheses, aiming to further explore the specific roles of these core dimensions in academic engagement among vocational college students in Guangdong, China:

Hypothesis 1 (H1): Perceived competence positively influences academic engagement among vocational college students in Guangdong, China.

Hypothesis 2 (H2): Perceived autonomy positively influences academic engagement among vocational college students in Guangdong, China.

Hypothesis 3 (H3): Perceived relatedness positively influences academic engagement among vocational college students in Guangdong, China.

3. Research Methodology

3.1. Research Design

This study adopts a cross-sectional research design, aiming to explore the impact of three basic psychological needs—autonomy, competence, and relatedness—within Self-Determination Theory (SDT) on academic engagement among students in vocational colleges in Guangdong Province, China. A cross-sectional design is suitable for capturing a comprehensive snapshot of students' academic engagement and psychological needs at a specific point in time. This design helps researchers understand the current state of academic engagement and the fulfillment of students' psychological needs. Therefore, a cross-sectional approach effectively reveals the status of academic engagement and the influence of psychological needs on engagement at a given moment.

3.2. Sample Selection

The sample for this study was drawn from a vocational college in Guangdong Province, with 297 valid questionnaires collected. A simple random sampling method was used to ensure that each student had an equal chance of participating, ensuring the representativeness of the sample. In terms of gender distribution, 47.1% of the participants were male (140 students), and 52.9% were female (157 students). Regarding grade distribution, first-year students comprised 32.3% (96 students), second-year students made up 33.3% (99 students), and third-year students accounted for 34.3% (102 students). This sample provides a comprehensive reflection of the academic engagement and psychological needs of vocational college students.

Prior to data collection, all participants were informed of the purpose of the study and were told that participation was voluntary. All responses were kept strictly confidential and used only for research purposes.

Choosing Guangdong Province as the study site is highly relevant due to its representative nature. As a leading region in China's economic development, Guangdong's educational environment and cultural context are highly representative. Moreover, its educational reforms and development serve as a model for the rest of the country, providing valuable regional data for this study.

3.3. Data Collection Tools

This study utilizes a structured questionnaire survey for data collection. The design of the questionnaire is based on validated scales from existing literature, with appropriate adjustments made to align with the objectives of this study. The questionnaire includes the following main scales:

Academic Engagement Scale: This study adopts the four-dimensional academic engagement scale proposed by Reeve and Tseng [21] and Giang, et al. [38] which covers behavioral, emotional, cognitive, and agentic participation. These dimensions provide a comprehensive measure of students'

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

engagement in learning activities, ensuring a multi-faceted understanding of their academic engagement.

Basic Psychological Needs Scale: The Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS), developed by Chen, et al. [1] and Liu, et al. [11] is used to measure the satisfaction of basic psychological needs. This scale has been validated in various cultural contexts and effectively measures the three dimensions of perceived autonomy, perceived competence, and perceived relatedness.

To ensure the validity and reliability of the questionnaire, the study employs the translation-back translation method [39] to translate the questionnaire, ensuring its cultural appropriateness and accuracy. The questionnaire consists of three sections: (1) research background, objectives, and instructions for completing the survey; (2) demographic information collection (such as gender, grade level, etc.); (3) measurement of core variables—basic psychological needs (perceived autonomy, perceived competence, perceived relatedness) and academic engagement.

The questionnaire is distributed via the "Wenjuanxing" online platform, and participants receive the survey through email and WeChat. To improve the response rate and reliability of the data, the researcher will send periodic reminders during the data collection phase and ensure that all participants complete the survey anonymously, reducing the impact of social desirability bias on the results.

3.4. Data Analysis Methods

Data analysis will be conducted using SPSS software. Descriptive statistics will first be applied to understand the sample's demographic characteristics, such as gender and grade level. Pearson correlation will be used to explore the relationships between perceived autonomy, competence, relatedness, and academic engagement. To control for the influence of gender and grade level, partial correlation analysis will be performed, revealing the true relationships between the main variables. Additionally, multiple linear regression analysis will be employed to examine the predictive role of perceived autonomy, competence, and relatedness on academic engagement. All analyses will be conducted with a significance level set at $p < 0.05$ to ensure the reliability and validity of the results.

4. Results

4.1. Descriptive Statistics

A total of 297 valid questionnaires were collected for this study. Among the sample, 140 participants (47.1%) were male and 157 (52.9%) were female. Regarding grade distribution, 96 first-year students (32.3%), 99 second-year students (33.3%), and 102 third-year students (34.3%) were included. The average academic engagement score of the sample was 3.8067 (SD = 0.78371), indicating a slightly above-average level of academic engagement. The average scores for autonomy, relatedness, and competence were 3.7365 (SD = 0.80737), 3.7854 (SD = 0.80644), and 3.7828 (SD = 0.77218), respectively, suggesting that participants' fulfillment of these basic psychological needs was also at a moderately high level.

Table 1.
Descriptive Statistics of the Sample.

Variable	Percentage (%)	Mean	Std. Deviation
Male	47.1	-	-
Female	52.9	-	-
Freshmen	32.3	-	-
Sophomores	33.3	-	-
Juniors	34.3	-	-
Academic Engagement	-	3.8067	0.78371
Autonomy	-	3.7365	0.80737
Relatedness	-	3.7854	0.80644
Competence	-	3.7828	0.77218

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

4.2. Pearson Correlation Analysis

To explore the relationships between autonomy, competence, relatedness, and academic engagement, Pearson correlation analysis was conducted (see Table 2). Significant positive correlations were found between autonomy and academic engagement ($r = 0.875$, $p < 0.001$), competence and academic engagement ($r = 0.810$, $p < 0.001$), and relatedness and academic engagement ($r = 0.802$, $p < 0.001$). Additionally, significant positive correlations were observed between autonomy and relatedness ($r = 0.839$, $p < 0.001$), autonomy and competence ($r = 0.844$, $p < 0.001$), and relatedness and competence ($r = 0.802$, $p < 0.001$). These findings provide preliminary support for Self-Determination Theory (SDT), demonstrating positive correlations between basic psychological needs and academic engagement.

Table 2.
Correlation Analysis Results.

Variable	Autonomy	Competence	Relatedness	Academic Engagement
Autonomy	-	0.844*	0.839*	0.875*
Competence	0.844*	-	0.802*	0.810*
Relatedness	0.839*	0.802*	-	0.801*
Academic Engagement	0.875*	0.810*	0.801*	-

Note: * indicates p<0.001.

4.3. Partial Correlation Analysis

To control for the effects of gender and grade level on the analysis, partial correlation analysis was performed (see Table 3). After controlling for gender and grade level, significant positive correlations remained between academic engagement and autonomy ($r = 0.874$, $p < 0.001$), relatedness ($r = 0.801$, $p < 0.001$), and competence ($r = 0.808$, $p < 0.001$). Furthermore, significant positive correlations were found between autonomy and relatedness ($r = 0.838$, $p < 0.001$), autonomy and competence ($r = 0.843$, $p < 0.001$), and relatedness and competence ($r = 0.799$, $p < 0.001$). These results further support Self-Determination Theory, highlighting the important role of basic psychological needs in academic engagement.

Table 3.
Partial Correlation Analysis Results (Controlling for Gender and Grade).

Variable	Autonomy	Competence	Relatedness	Engagement
Autonomy	-	0.843*	0.838*	0.874*
Competence	0.843*	-	0.799*	0.808*
Relatedness	0.838*	0.799*	-	0.801*
Academic Engagement	0.874*	0.808*	0.801*	-

Note: * indicates p<0.001.

4.4. Regression Analysis

To explore the predictive role of autonomy, competence, and relatedness in academic engagement, multiple linear regression analysis was conducted. Academic engagement was set as the dependent variable, and autonomy, competence, and relatedness were treated as independent variables, with the stepwise method used for the regression analysis. The results of the regression model are shown in Table [4]. The R^2 value of the regression model was 0.791, and the adjusted R^2 value was 0.789, indicating that autonomy, competence, and relatedness together explained 78.9% of the variance in academic engagement. The F-test result showed that the overall regression model was significant ($F = 369.004$, $p < 0.001$).

Specifically, autonomy was found to significantly predict academic engagement ($\beta = 0.571$, $p < 0.001$), competence also significantly predicted academic engagement ($\beta = 0.194$, $p < 0.001$), and relatedness had a significant predictive effect on academic engagement as well ($\beta = 0.167$, $p = 0.001$). These results suggest that the dimensions of Self-Determination Theory can significantly predict

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

academic engagement, thereby validating the hypotheses (including Hypothesis 1, Hypothesis 2, and Hypothesis 3) of this study.

Table 4.
Regression Analysis Results.

Variable	B	Std. Error	β	t	Sig.	Tolerance	VIF
(Constant)	0.376	0.108	-	3.472	0.001	-	-
Autonomy	0.554	0.056	0.571	9.864	0	0.576	1.737
Relatedness	0.163	0.05	0.167	3.226	0.001	0.599	1.67
Competence	0.197	0.053	0.194	3.69	0	0.756	1.322

Note: Model Summary: R=0.889, R^2=0.791, Adjusted R^2=0.789, F=369.004, Sig.=0.000.

4.5. Residual Statistics

The residual statistics provide insights into the regression model's fit. The predicted values for academic engagement ranged from 1.2896 to 4.9439, with a mean of 3.8067 and a standard deviation of 0.69689, closely aligning with the actual mean, indicating accurate predictions.

The residuals, showing the differences between observed and predicted values, had a mean of nearly zero (-0.0000001) and a standard deviation of 0.35853. This suggests the model's predictions are, on average, very close to the actual values, with small deviations centered around zero.

The standardized predicted values and residuals had means of 0 and standard deviations of 1 and 0.995, respectively, indicating conformance to normality assumptions. The range of standardized residuals, from -4.347 to 3.766, shows most values fall within the expected range, with some larger discrepancies, which is normal in any dataset.

Table 5.
Residual Statistics.

Residual Type	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.2896	4.9439	3.8067	0.69689	297
Residual	-1.56647	1.35696	0	0.35853	297
Std. Predicted Value	-3.612	1.632	0	1	297
Std. Residual	-4.347	3.766	0	0.995	297

Overall, the residual statistics confirm that the regression model reliably represents the relationship between basic psychological needs and academic engagement, with the model's assumptions being met and predictions aligning well with observed data.

5. Discussion

The results of this study show a significant positive correlation between the satisfaction of basic psychological needs—autonomy, competence, and relatedness—and academic engagement among vocational college students. This validates the applicability of Self-Determination Theory (SDT) in the context of vocational education and provides empirical support for mechanisms that promote academic engagement. The following sections will further explore the relationship between each psychological need and academic engagement, and offer more targeted suggestions based on relevant theories and practices.

5.1. Perceived Autonomy and Academic Engagement

This study found a significant positive correlation between the satisfaction of perceived autonomy and academic engagement. This result validates and extends the SDT perspective within the context of vocational colleges, confirming that autonomy support can stimulate intrinsic motivation and promote academic engagement. Specifically, when students perceive more choice in their learning, their academic engagement in behavioral, emotional, and cognitive aspects significantly improves, consistent with

© 2025 by the authors; licensee Learning Gate

studies by Holzer, et al. [26]; Tadesse, et al. [40]. Amerstorfer [41] found that enhancing student autonomy through problem-based learning (PBL) significantly increased academic engagement, aligning with this study's findings that allowing students to control the content and pace of their learning leads to higher engagement.

However, Vansteenkiste, et al. [35] noted that the impact of autonomy on academic engagement may vary across cultural and educational contexts. In this study, within Guangdong vocational colleges in China, while autonomy had a positive effect on academic engagement, the influence of perceived relatedness was even more pronounced. This may be due to the stronger need for relatedness in collectivist cultures. The teaching style and educational environment play a critical role in enhancing students' perceived autonomy. De Loof, et al. [5] pointed out that teachers' autonomy-supportive styles significantly promote students' perceived autonomy, while controlling teaching behaviors diminish intrinsic motivation and hinder academic engagement. Cheon and Reeve [42] also found that autonomy-supportive teaching styles significantly improved students' learning satisfaction and classroom engagement.

Future research could further investigate the differences in the effect of perceived autonomy on academic engagement across different educational backgrounds and cultural environments. For example, students' need for autonomy and its expression may differ in individualistic versus collectivist cultures, potentially affecting the relationship between autonomy and academic engagement. Additionally, studies could analyze how different teaching methods (such as project-based learning, case-based teaching, etc.) can better support student autonomy and how to balance autonomy with curriculum standards and teaching objectives in vocational education.

5.2. Perceived Competence and Academic Engagement

This study found a significant positive correlation between the satisfaction of perceived competence and academic engagement, further supporting the core role of perceived competence in promoting academic engagement. When students feel that their abilities in academic tasks are recognized and enhanced, their academic engagement in behavioral, emotional, and cognitive aspects becomes more active. Feng, et al. [43] found that teacher support, by enhancing students' ICT self-efficacy, significantly promotes online academic engagement, indicating that perceived competence not only directly drives students' participation in academic activities but also indirectly influences it through psychological mechanisms such as increased self-efficacy. Waqas, et al. [44] verified the importance of perceived competence in vocational college settings, finding that in practice-oriented vocational education, an increase in perceived competence significantly enhances academic engagement, particularly in academic activities related to practical tasks and problem-solving.

It is also important to note that the fulfillment of perceived competence is related to emotional support. Holzer, et al. [26] conducted a cross-national study that showed that perceived competence indirectly promotes academic engagement through intrinsic motivation and positive emotions while reducing procrastination behaviors. This suggests that perceived competence not only directly enhances academic engagement by improving confidence and focus but also boosts academic motivation by stimulating positive emotions. This emotional support is particularly crucial in vocational colleges. Nguyen-Viet and Nguyen-Viet [45] found that the impact of perceived competence on academic engagement is not only constrained by individual ability but is also closely related to the fulfillment of other basic psychological needs, suggesting that when studying perceived competence, it is important to consider the interactive effects of relatedness and autonomy.

To further enhance students' perceived competence, vocational colleges should strengthen teaching designs and support systems to increase students' sense of competence, especially in education models that emphasize practical learning. This could be achieved by providing more practical opportunities and feedback. For example, teachers can help students build and enhance their perceived competence by designing challenging yet achievable learning tasks, offering timely and specific feedback, and creating a learning environment that encourages experimentation and allows for mistakes. Additionally, future

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

research could explore the differences in the role of perceived competence across various academic disciplines and how to provide more targeted competence support based on students' individual differences, such as learning styles and ability levels.

5.3. Perceived Relatedness and Academic Engagement

The results of this study show a significant positive correlation between the fulfillment of perceived relatedness and academic engagement, which is consistent with the basic assumptions of Self-Determination Theory (SDT). When students perceive more emotional support and a sense of belonging during the learning process, their engagement in academic activities significantly increases, especially in terms of behavioral, emotional, and cognitive participation. This finding aligns with studies by Pan, et al. [36] and Jin, et al. [37] who noted that teacher emotional support and peer interaction can significantly enhance academic engagement, highlighting the central role of relatedness in academic participation. In vocational colleges, particularly in Guangdong, the collectivist culture emphasizes teamwork and peer relationships, making the fulfillment of perceived relatedness especially important. This not only strengthens students' sense of identification with the learning environment but also enhances their motivation to participate in academic activities.

In educational practice, this finding has important implications. As one of the key dimensions of SDT, perceived relatedness has a profound impact on academic engagement. Vocational colleges should pay attention to students' emotional needs and create more supportive learning environments. Teachers can help students develop a sense of belonging by providing more emotional support, offering positive feedback, and fostering teamwork, thereby enhancing academic engagement. For example, teachers can organize group cooperative learning activities, encourage mutual support among students, and create a friendly, inclusive classroom atmosphere.

Holzer, et al. [26] found through cross-national research that the impact of perceived relatedness on academic engagement may vary across cultures, which could be related to educational models, teacher support, and students' cultural backgrounds. Future research could further explore how perceived relatedness influences academic engagement in different cultural contexts, particularly in diverse vocational education environments. Additionally, research could focus on how to promote perceived relatedness in online learning environments. As digital education continues to grow, online learning has become more prevalent, and how to establish a sense of belonging in virtual learning communities is an important area for future exploration.

In conclusion, this study has deeply explored the relationship between the fulfillment of basic psychological needs and academic engagement among vocational college students, providing both theoretical support and empirical evidence for educational practice. By further analyzing the mechanisms of each psychological need, cultural differences, and their interactions with other factors, we can better understand how to promote academic engagement in vocational colleges and create a more supportive and motivating learning environment for students.

6. Conclusion

Based on Self-Determination Theory (SDT), this study explored the impact of three basic psychological need dimensions—autonomy, competence, and relatedness—on academic engagement among vocational college students. The results indicate that the fulfillment of these three dimensions significantly promotes academic engagement, with each dimension playing a role through different mechanisms. Specifically, perceived autonomy enhances students' intrinsic motivation, perceived competence boosts their confidence, and perceived relatedness strengthens academic involvement through emotional support and social connections. These findings not only validate the application of SDT in academic engagement but also provide practical recommendations for educational practice, particularly on how to enhance academic participation by fulfilling students' basic psychological needs.

However, this study has several limitations. First, the sample was drawn from vocational colleges in Guangdong, China, which may limit the generalizability of the results. Second, the data collection

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate

method primarily relied on self-reported questionnaires, which may introduce social desirability bias and recall bias. Future research could expand to broader regions and different cultural contexts to verify the generalizability of these findings and further explore other potential influencing factors, such as teaching style and peer support. Additionally, using longitudinal or experimental designs to establish causal relationships would provide deeper insights into this area of study.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

© 2025 by the authors. This open-access article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

References

[1] B. Chen *et al.*, "Basic psychological need satisfaction, need frustration, and need strength across four cultures," *Motivation and Emotion*, vol. 39, pp. 216-236, 2015. https://doi.org/10.1007/s11031-014-9450-1

[2] X. Xu, Z. Wu, and D. Wei, "The relationship between perceived teacher support and student engagement among higher vocational students: A moderated mediation model," *Frontiers in Psychology*, vol. 14, p. 1116932, 2023.

[3] G. Cai, "Classroom transformational leadership practices on vocational students'academic motivation," *Pacific International Journal*, vol. 7, no. 1, pp. 44-51, 2024. https://doi.org/10.55014/pij.v7i1.508

[4] E. L. Deci and R. M. Ryan, *Handbook of self-determination research*. Rochester, NY, USA: University of Rochester Press, 2004.

[5] H. De Loof, A. Struyf, J. Boeve-de Pauw, and P. Van Petegem, "Teachers' motivating style and students' motivation and engagement in STEM: The relationship between three key educational concepts," *Research in Science Education*, vol. 51, pp. 109-127, 2021. https://doi.org/10.1007/s11165-019-9830-3

[6] F. M. Leo, J. J. Pulido, D. Sánchez-Oliva, M. A. López-Gajardo, and A. Mouratidis, "See the forest by looking at the trees: Physical education teachers' interpersonal style profiles and students' engagement," *European Physical Education Review*, vol. 28, no. 3, pp. 720-738, 2022.

[7] S. Aubrey, J. King, and H. Almukhaild, "Language learner engagement during speaking tasks: A longitudinal study," *RELC Journal*, vol. 53, no. 3, pp. 519-533, 2022. https://doi.org/10.1177/0033688220945418

[8] K. Mikus and K. R. Teoh, "Psychological capital, future-oriented coping, and the well-being of secondary school teachers in Germany," *Educational Psychology*, vol. 42, no. 3, pp. 334-353, 2022.

[9] J. Marôco *et al.*, "Predictors of academic efficacy and dropout intention in university students: Can engagement suppress burnout?," *PloS One*, vol. 15, no. 10, p. e0239816, 2020.

[10] X. W. Cheng, "Research on the improvement of social and emotional abilities of vocational students through participation in learning communities," *Changzhou Information Vocational and Technical College Journal*, vol. 1, pp. 76–80, 2024.

[11] Y. Liu, S. Ma, and Y. Chen, "The impacts of learning motivation, emotional engagement and psychological capital on academic performance in a blended learning university course," *Frontiers in Psychology*, vol. 15, p. 1357936, 2024.

[12] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," *Contemporary educational psychology*, vol. 61, p. 101860, 2020.

[13] S. I. Di Domenico and R. M. Ryan, "The emerging neuroscience of intrinsic motivation: A new frontier in self-determination research," *Frontiers in Human Neuroscience*, vol. 11, p. 145, 2017.

[14] S. R. Earl, I. M. Taylor, C. Meijen, and L. Passfield, "Trajectories in cognitive engagement, fatigue, and school achievement: The role of young adolescents' psychological need satisfaction," *Learning and Individual Differences*, vol. 101, p. 102248, 2023. https://doi.org/10.1016/j.lindif.2022.102248

[15] A. Alamer and F. Almulhim, "The interrelation between language anxiety and self-determined motivation: A mixed methods approach," *Frontiers in Education*, vol. 6, p. 618655, 2021. https://doi.org/10.3389/feduc.2021.618655

[16] J. Reeve, S. H. Cheon, and T. H. Yu, "An autonomy-supportive intervention to develop students' resilience by boosting agentic engagement," *International Journal of Behavioral Development*, vol. 44, no. 4, pp. 325-338, 2020.

[17] A. C. Koenka, L. Linnenbrink-Garcia, H. Moshontz, K. M. Atkinson, C. E. Sanchez, and H. Cooper, "A meta-analysis on the impact of grades and comments on academic motivation and achievement: A case for written feedback," *Educational Psychology*, vol. 41, no. 7, pp. 922-947, 2021.

[18] N. Mentzer, B. Krishna, A. Kotangale, and L. Mohandas, "HyFlex environment: Addressing students' basic psychological needs," *Learning Environments Research*, vol. 26, no. 1, pp. 271-289, 2023.

[19] W. B. Schaufeli, I. M. Martinez, A. M. Pinto, M. Salanova, and A. B. Bakker, "Burnout and engagement in university students: A cross-national study," *Journal of Cross-Cultural Psychology*, vol. 33, no. 5, pp. 464-481, 2002.

[20] J. A. Fredricks, P. C. Blumenfeld, and A. H. Paris, "School engagement: Potential of the concept, state of the evidence," *Review of Educational Research*, vol. 74, no. 1, pp. 59-109, 2004.

[21] J. Reeve and C.-M. Tseng, "Agency as a fourth aspect of students' engagement during learning activities," *Contemporary Educational Psychology*, vol. 36, no. 4, pp. 257-267, 2011.

[22] D. Martinot, A. Sicard, B. Gul, S. Yakimova, A. Taillandier-Schmitt, and C. Maintenant, "Peers and teachers as the best source of social support for school engagement for both advantaged and priority education area students," *Frontiers in Psychology*, vol. 13, p. 958286, 2022.

[23] M. Sadoughi and S. Y. Hejazi, "The effect of teacher support on academic engagement: The serial mediation of learning experience and motivated learning behavior," *Current Psychology*, vol. 42, no. 22, pp. 18858-18869, 2023.

[24] Y. Zhao and L. Yang, "Examining the relationship between perceived teacher support and students' academic engagement in foreign language learning: Enjoyment and boredom as mediators," *Frontiers in Psychology*, vol. 13, p. 987554, 2022.

[25] A. Mystkowska-Wiertelak, "Teachers' accounts of learners' engagement and disaffection in the language classroom," *The Language Learning Journal*, vol. 50, no. 3, pp. 393-405, 2022.

[26] J. Holzer *et al.*, "Adolescent well-being and learning in times of COVID-19—A multi-country study of basic psychological need satisfaction, learning behavior, and the mediating roles of positive emotion and intrinsic motivation," *PloS one*, vol. 16, no. 5, p. e0251352, 2021.

[27] S. Mercer and Z. Dörnyei, *Engaging language learners in contemporary classrooms*, 1st ed. Cambridge, UK: Cambridge University Press, 2020.

[28] C. M. Amerstorfer and C. Freiin von Münster-Kistner, "Student perceptions of academic engagement and student-teacher relationships in problem-based learning," *Frontiers in Psychology*, vol. 12, p. 713057, 2021. https://doi.org/10.3389/fpsyg.2021.713057

[29] K. Budzińska and O. Majchrzak, *Positive psychology in second and foreign language education*. Cham, Switzerland: Springer International Publishing, 2021.

[30] A. I. Wang and R. Tahir, "The effect of using Kahoot! for learning–A literature review," *Computers & Education*, vol. 149, p. 103818, 2020.

[31] Q. Ma and F. Wang, "The role of students' spiritual intelligence in enhancing their academic engagement: A theoretical review," *Frontiers in Psychology*, vol. 13, p. 857842, 2022.

[32] J. Mori, "Occupationally-stratified training strategies in Vietnamese machine manufacturing industry: Implication for general skills training in TVET," *International Journal of Educational Development*, vol. 102, p. 102849, 2023.

[33] C. Sang *et al.*, "Pulmonary vein isolation with optimized linear ablation vs pulmonary vein isolation alone for persistent AF: the PROMPT-AF randomized clinical trial," *Jama*, vol. 333, no. 5, pp. 381-389, 2025.

[34] A. Prianto, U. N. Qomariyah, and F. Firman, "Does student involvement in practical learning strengthen deeper learning competencies?," *International Journal of Learning, Teaching and Educational Research*, vol. 21, no. 2, pp. 211-231, 2022.

[35] M. Vansteenkiste, B. Soenens, and R. M. Ryan, "Basic psychological needs theory: A conceptual and empirical review of key criteria," *The Oxford handbook of self-determination theory*, pp. 84-123, 2023.

[36] Z. Pan, Y. Wang, and A. Derakhshan, "Unpacking Chinese EFL students' academic engagement and psychological well-being: The roles of language teachers' affective scaffolding," *Journal of Psycholinguistic Research*, vol. 52, no. 5, pp. 1799-1819, 2023.

[37] W. Jin, X. Zheng, L. Gao, Z. Cao, and X. Ni, "Basic psychological needs satisfaction mediates the link between strengths use and teachers' work engagement," *International Journal of Environmental Research and Public Health*, vol. 19, no. 4, p. 2330, 2022.

[38] T. T. T. Giang, J. Andre, and H. H. Lan, "Student engagement: Validating a model to unify in-class and out-of-class contexts," *Sage Open*, vol. 12, no. 4, p. 21582440221140334, 2022.

[39] R. W. Brislin, "Back-translation for cross-cultural research," *Journal of Cross-Cultural Psychology*, vol. 1, no. 3, pp. 185-216, 1970. https://doi.org/10.1177/135910457000100301

[40] E. Tadesse, C. Gao, J. Sun, S. Khalid, and C. Lianyu, "The impact of socioeconomic status on self-determined learning motivation: a serial mediation analysis of the influence of Gaokao score on seniority in Chinese higher vocational college students," *Children and youth services review*, vol. 143, p. 106677, 2022.

[41] C. M. Amerstorfer, "Problem-based learning for preservice teachers of English as a foreign language," *Colloquium: New Philologies*, vol. 5, no. 1, pp. 75–90, 2020. https://doi.org/10.23963/cnp.2020.5.1.4

[42] S. H. Cheon and J. Reeve, "A classroom-based intervention to help teachers decrease students' amotivation," *Contemporary Educational Psychology*, vol. 40, pp. 99-111, 2015. https://doi.org/10.1016/j.cedpsych.2014.06.004

© 2025 by the authors; licensee Learning Gate

[43] L. Feng, L. He, and J. Ding, "The association between perceived teacher support, students' ICT self-efficacy, and online English academic engagement in the blended learning context," *Sustainability*, vol. 15, no. 8, p. 6839, 2023. https://doi.org/10.3390/su15086839

[44] M. Waqas, T. Fatima, and Z. U. Z. Anjum, "Does basic need satisfaction foster engagement by serving as a personal demand? A mediation model based on a self-determination perspective," *Asia-Pacific Journal of Business Administration*, vol. 16, no. 4, pp. 1015-1036, 2024.

[45] B. Nguyen-Viet and B. Nguyen-Viet, "The synergy of immersion and basic psychological needs satisfaction: Exploring gamification's impact on student engagement and learning outcomes," *Acta Psychologica*, vol. 252, p. 104660, 2025.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 7: 636-647, 2025
DOI: 10.55214/25768484.v9i7.8686
© 2025 by the authors; licensee Learning Gate