The psychological need development model influences students' intentions to physical activity

El modelo de desarrollo de necesidades psicológicas influye en las intenciones de los estudiantes hacia la actividad física

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Abstract

Objective. This study aims to construct a comprehensive model that can explain and predict Chinese college students' intentions to engage in physical activity based on Self-Determination Theory (SDT) and the Theory of Planned Behavior (TPB).
Methods. This study selected four colleges from Chengdu, China for random sampling, with a total of 512 college students completing the questionnaire. Structural equation modelling (SEM) was used to examine the research hypotheses.
Result. Psychological need, which includes autonomy, relatedness and competence facilitates intrinsic motivation to to exercise among students. Furthermore, psychological need and intrinsic motivation also play important role in influencing student attitude and behaviour on physical activities.
Conclusions. Students who experience greater autonomy in choosing their workouts, competence in their abilities, and relatedness through peer support are more likely to develop long-term exercise habits. This study contributes theoretically by extending TPB with SDT components, providing a more comprehensive understanding of exercise motivation. It offers insights for universities, fitness professionals, and health organizations to design interventions that foster motivation, social engagement, and accessibility in exercise programs.

Keywords

Behavioral intentions; Intrinsic motivation; Psychological needs; Physical activity

Resumen

Objetivo. Este estudio tiene como objetivo construir un modelo integral que pueda explicar y predecir las intenciones de los estudiantes universitarios chinos de participar en actividad física, basado en la Teoría de la Autodeterminación (SDT) y la Teoría del Comportamiento Planeado (TPB).
Métodos. Este estudio seleccionó cuatro universidades de Chengdu, China, para un muestreo aleatorio, con un total de 512 estudiantes universitarios completando el cuestionario. Se utilizó el modelado de ecuaciones estructurales (SEM) para examinar las hipótesis de investigación.
Resultados. La necesidad psicológica, que incluye autonomía, relación y competencia, facilita la motivación intrínseca para hacer ejercicio entre los estudiantes. Además, la necesidad psicológica y la motivación intrínseca también juegan un papel importante en la influencia de la actitud y el comportamiento de los estudiantes hacia las actividades físicas.
Conclusiones. Los estudiantes que experimentan una mayor autonomía en la elección de sus entrenamientos, competencia en sus habilidades y relación a través del apoyo de sus compañeros son más propensos a desarrollar hábitos de ejercicio a largo plazo. Este estudio contribuye teóricamente al extender la TPB con componentes de la SDT, proporcionando una comprensión más integral de la motivación para el ejercicio. Ofrece perspectivas para universidades, profesionales del fitness y organizaciones de salud para diseñar intervenciones que fomenten la motivación, el compromiso social y la accesibilidad en los programas de ejercicio.

Palabras clave

Intenciones conductuales; Motivación intrínseca; Necesidades psicológicas; Actividad física.

Introduction

Technology development and social networking sites (SNS) have transformed human interactions, lifestyles, and health habits. While they offer numerous benefits, they also present significant challenges to both physical and mental well-being (Junaidi et al., 2020; Rafique et al., 2022). Many individuals utilize SNS to access workout routines, diet plans, and mental health support, while mobile apps facilitate physical activity tracking and motivation through virtual challenges. SNS also help maintain social connections, reducing loneliness and promoting emotional well-being (Muliadi et al., 2024; Trejo et al., 2025). In addition, online communities provide accessible mental health resources, allowing users to seek help anonymously and connect with professionals. However, excessive SNS use may lead to reduced physical activity, exposure to negative interactions, and emotional distress, particularly among teenagers. There is substantial evidence linking physical inactivity to the development and progression of metabolic diseases. Furthermore, SNS addiction can decrease focus, productivity, and real-life social interactions (Bermudez, 2023; Durstine et al., 2013).

Today, there has been a noticeable decline in physical activity levels among university students worldwide. Several factors contribute to this trend, including academic pressure, technological advancements, and lifestyle changes (Bray & Born, 2004; Lonati et al., 2024). One primary factor is the demanding academic workload, which often leads students to prioritize studies over exercise, resulting in prolonged sedentary behavior. The modern technology, including smartphones, social media, and streaming services, has encouraged passive leisure activities, replacing outdoor sports and exercise. The convenience of online food delivery, ride-sharing services, and automated facilities further reduces daily movement (Chaput et al., 2020). To counteract these trends, universities should promote active lifestyles by implementing accessible fitness programs, encouraging movement breaks, and raising awareness about the importance of physical activity.

Psychological needs play a crucial role in student motivation for exercise, influencing their willingness to engage in and maintain physical activity (Yang & Qian, 2024). The three fundamental psychological needs autonomy, competence, and relatedness directly impact motivation levels (Wang et al., 2019). Autonomy, or the ability to make an independent choice, increases motivation when students can choose activities. It makes some people enjoy rather than being forced into rigid workout routines. Competence, or the feeling of mastery and achievement, is essential in sustaining motivation, as students who perceive progress in their fitness levels are more likely to continue exercising (Corder et al., 2019; Hagger et al., 2003; Ting et al., 2023). Despite extensive research on exercise motivation and behavior among students, several gaps remain that limit a comprehensive understanding of the factors influencing physical activity. Moreover, most existing research relies on self-reported surveys, which are subject to social desirability bias and recall errors in assessing students' physical activity levels and motivation. Lack of studies have explored their combined influence on exercise motivation and behavior intentions (Chatzisarantis et al., 2007; Hagger et al., 2009).

The findings of this study will contribute in three significant ways. First, by integrating Self-Determination Theory (SDT) and the Theory of Planned Behavior (TPB), it offers a comprehensive framework for understanding students' exercise intentions. Second, it addresses existing gaps by exploring the interaction between psychological needs, motivation types, and TPB constructs. Third, it expands prior research by investigating the role of digital technology and SNS in shaping exercise motivation and adherence. Therefore, the aims of this study to examine the psychological, social, and technological factors efffect on university students' exercise behavior intentions towards offer research questions how social networking sites (SNS) and digital technology influence students' physical activity and exercise behavior intentions? How psychological needs influences students' exercise behavioral intention directly and indirectly towards attitude, subjective norm and perceived behaioral control?

Theoretical Base

Self-determination theory

Self-Determination Theory (SDT) explains how different types of motivation influence students' attitudes toward exercise and their exercise behavior intentions (the likelihood of engaging in physical activity) with regard to three fundamental psychological needs autonomy, competence, and relatedness shape students' motivation and their willingness to participate in regular exercise (Ntoumanis et al.,

2020; Yang & Qian, 2024). When students feel a sense of autonomy (control over their exercise choices), they develop a more positive attitude toward physical activity and are more likely to form strong exercise behavior intentions (Deci & Ryan, 1985; Guay et al., 2019; Hagger et al., 2009). Competence, or the belief in one's ability to perform exercises successfully, enhances self-efficacy, increasing the intention to maintain an active lifestyle (Gall et al., 2020; Vallerand & Reid, 1984). Similarly, relatedness, the need for social support and connection, reinforces positive exercise behaviors, as students who engage in group workouts or team sports often feel more motivated.

SDT distinguishes between intrinsic motivation (exercising for enjoyment and personal fulfillment) and extrinsic motivation (exercising for external rewards or social approval). Research suggests that intrinsic motivation is more strongly correlated with long-term exercise behavior intentions, whereas extrinsically motivated students may engage in exercise only temporarily. Studies also show that students with high levels of intrinsic motivation and psychological need satisfaction demonstrate greater exercise adherence and consistency. Therefore, fostering an environment that supports autonomy, competence, and relatedness can enhance students' exercise intentions and long-term engagement in physical activity, leading to improved physical and mental well-being.

H1: Psychological needs have a positive and significant effect on intrinsic motivation

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) explains how attitudes, subjective norms, and perceived behavioral control (PBC) shape individuals' exercise behavior intentions, and psychological needs autonomy, competence, and relatedness play a crucial role in strengthening these components (Ajzen, 1991). Psychological needs directly influence attitudes toward exercise, as students who experience autonomy (freedom to choose their preferred workouts) tend to develop positive attitudes toward physical activity, increasing their likelihood of forming strong behavioral intentions (Armitage & Conner, 2001). Likewise, competence, or the belief in one's ability to perform exercises effectively, enhances self-confidence and fosters a proactive approach to exercise. When students see progress in their fitness levels, they are more likely to develop favorable attitudes and maintain a long-term commitment to physical activity.

Relatedness, or the need for social connection, strongly impacts subjective norms, which in TPB refer to perceived social pressure to engage in exercise. Students who feel supported by their peers, family, or fitness communities are more likely to view exercise as a socially valued behavior, increasing their motivation to participate regularly. Moreover, competence significantly affects perceived behavioral control (PBC), which reflects an individual's confidence in their ability to engage in and sustain physical activity (Alali, 2023). Higher competence leads to greater self-efficacy, making students more likely to set exercise goals and follow through with their intentions. When psychological needs are satisfied, they enhance TPB components, leading to stronger exercise behavior intentions and higher adherence to physical activity. Therefore, fostering an environment that supports autonomy, competence, and relatedness can improve students' motivation, strengthen exercise behavior intentions, and promote long-term engagement in physical activity, contributing to better overall health and well-being.

TPB and SDT each have advantages and limitations in terms of their perspectives on behavior research. If they are integrated to form a new theoretical model, the prediction of physical activity behavior may be more comprehensive and accurate (Al-Jubari, 2019; Sihombing & Pramono, 2021). The integration is based on the connection between self-determination motivation and belief cognitive systems, and the belief system is reinforced by the proximal antecedent variables of attitude, subjective norm, and perceived behavioral control and also explain mechanism for how individual motivation influences individual behavior decision-making processes and transforms future behavior. Motivation is an important factor in an individual's effort to complete a task, including IM and extrinsic motivation, which means completing the task under the drive of both internal and external motivation. The SDT psychological needs are mainly composed of autonomy, relatedness, and competence, and when individuals meet these three needs, they are more likely to act (Vansteenkiste et al., 2020). However, from the basic definitions of the three needs, there is a corresponding correlation with the TPB's attitude, subjective norm, and PBC. Autonomy is the individual's right to make behavioral decisions independently, without being influenced by the outside world, which reflects the individual's true opinion or evaluation of the behavior

H2: Psychological needs have a positive and significant effect on students' attitude

H3: Psychological needs have a positive and significant effect on students' subjective norm

H4: Psychological needs have a positive and significant effect on students perceived behavioral control

Students' motivation plays a critical role in shaping the Theory of Planned Behavior (TPB) components attitudes, subjective norms, and perceived behavioral control (PBC) which, in turn, influence exercise behavior intentions (Ali et al., 2023; Huang & Kee, 2024). Intrinsic motivation (engaging in exercise for enjoyment and personal satisfaction) and extrinsic motivation (exercising for external rewards or social approval) impact how students perceive and commit to physical activity. Motivation strongly influences attitudes toward exercise, as intrinsically motivated students tend to develop more positive and sustainable attitudes, increasing their likelihood of forming strong behavioral intentions. In contrast, extrinsically motivated students may only engage in exercise when rewards or social validation are present, leading to inconsistent exercise behaviors. Additionally, motivation affects subjective norms, which refer to perceived social pressure to engage in physical activity.

Highly motivated students, especially those who value social aspects of exercise, are more likely to be influenced by peer support, fitness communities, and social trends, reinforcing their intention to exercise (Lee et al., 2024). Moreover, motivation plays a significant role in perceived behavioral control (PBC), which reflects a student's confidence in their ability to engage in and sustain physical activity. Students with high intrinsic motivation and strong self-efficacy perceive fewer barriers to exercise and are more likely to follow through with their fitness goals. When motivation is high, all TPB components are strengthened, leading to greater exercise behavior intentions and long-term adherence to physical activity. However, low motivation can weaken attitudes, reduce perceived social support, and create self-doubt, ultimately decreasing exercise participation. Therefore, fostering a motivational environment that supports intrinsic enjoyment, social encouragement, and self-efficacy can significantly enhance students' exercise intentions and promote lifelong physical activity habits.

H6: Students' intrinsic motivation has a positive and significant effect on students' attitude

H6: Students' intrinsic motivation has a positive and significant effect on students' subjective norm

H7: Students' intrinsic motivation have a positive and significant effect on students' perceived behavioral control

The Theory of Planned Behavior (TPB) explains how three key dimensions attitudes, subjective norms, and perceived behavioral control (PBC) influence students' behavioral intentions to engage in exercise (Lee et al., 2024; Pečiuliauskienė, 2019). Attitudes toward exercise refer to students' positive or negative evaluations of physical activity. When students associate exercise with health benefits, enjoyment, and personal achievement, they are more likely to form strong behavioral intentions to stay active. Conversely, negative attitudes, such as perceiving exercise as tiring or time-consuming, weaken their commitment to regular physical activity. Subjective norms represent the perceived social pressure from peers, family, or society to engage in exercise. If students believe that important people in their lives value and engage in physical activity, they are more likely to adopt similar behaviors.

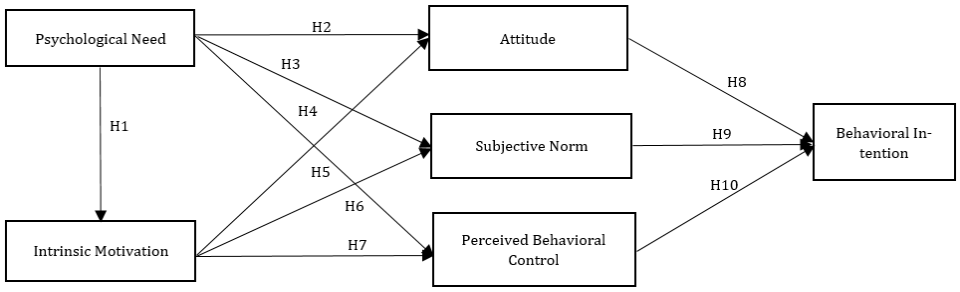
Social influence from friends, workout groups, or social media fitness trends can strengthen students' motivation to exercise. Perceived behavioral control (PBC) reflects a student's confidence in their ability to perform and sustain exercise despite potential barriers. Students with high PBC believe they have the necessary skills, resources, and time to engage in exercise, leading to stronger behavioral intentions (Si et al., 2020). In contrast, those who perceive exercise as difficult or inaccessible due to lack of time, facilities, or fitness knowledge may struggle to commit. Overall, when attitudes, subjective norms, and PBC are strong and positive, students are more likely to develop firm behavioral intentions, increasing their likelihood of maintaining regular physical activity. Therefore, interventions promoting positive exercise attitudes, social support, and self-efficacy can effectively enhance students' motivation and commitment to an active lifestyle.

H8: Students' attitude has a positive and significant effect on students' behavioural intention on exercise.

H9: Students' subjective norm has a positive and significant effect on students' behavioural intention on exercise.

H10: Students perceived behavioral control has a positive and significant effect on students' behavioural intention on exercise.

Figure 1 Research framework



Method

Research Procedure

The data collection was carried out using a formal letter to the company before the questionnaires were sent to the participants. Conversely, control was anonymous, and a random sampling was carried out to avoid bias and enhance the validity. The purpose of this approach was to ensure that the participants fit the two basic constraints, namely, active students' and exercise activity, which directly has a personal experience in the social media and exercise activities. An English-China language translator reviewed the wordings. They completed the questionnaires, which were used to determine the factors that influenced students' physical activities. The study was conducted inaccordance with the Declaration of Helsinki and approved by the institutional Review Board (or ethicscommittee) of Rajamangala University of Technology Krungthep, Thailand (protocol code R. 778/2024) for studies involving humans. Written informed consent was obtained from all respondents.

A pre-test and pilot-test were applied during the study. The pre-testing suggested the deletion and modification of specific statements to assure that it was completely understood in the China context. Subsequently, a pilot test was carried out to confirm the final wordings of the formal investigation. The pilot test aims to identify various responses and implications of the participants related to the questions in the pre-test. A total of 20 participants were recommended for each construct to increase the quality of the instruments (Hair Jr et al., 2019). The pilot test aims to identify various responses and implications of the participants related to the questions in the pre-test.

The recent study adopted the anticipation and post-detection procedures to reduce certain issues associated with the common method variance *(*CMV*) (*Podsakoff et al., 2003). *Eichhorn (2014) offered the* Harman *'s* single-factor analysis to validate the common latent factor (CLF) for post-detection to carry out post-detection to detect the CMV. The result of the first factor was 41.50% which is less than 50.00*%.* Besides, the factor loading of CLF was 0.48, which implies a 35.67% variance of CMV. It showed that no significant problem was associated with the CMV. Therefore, the use of CFA and hypotheses tests is justified towards structural equation modeling (SEM). SEM was chosen for its ability to address complex decision-making problems that require simultaneous consideration of multiple factors or criteria (Podsakoff et al., 2003).

Participants

The psychological needs refer to Al-Jubari (2019). There are a total of 7 questions in this section, which measure three dimensions. This study selected five questions related to IM from the BREQ-2 questionnaire (Cavicchiolo et al., 2022) to investigate the IM of college students to engage in physical activity, such as "I enjoy the process of my physical exercise" and "I think exercise is a pleasurable activity". The BREQ-2 is still utilized due to its established psychometric properties and effectiveness in assessing exercise motivation (Liu et al., 2020). While the BREQ-3 includes additional features, the BREQ-2 remains a valuable tool in various research contexts, particularly where its specific structure is preferred. The BREQ-2 also has been widely validated and used in numerous studies, making (Havnen et al., 2023). In this case, specific populations may respond better to the BREQ-2, leading researchers to choose it for

consistency in measurement. A total of 15 items of the Chinese version of the "Theory of Planned Behavior Scale" developed by Hu (2008). Students' behavioral intention on exercise refers to Liang (1994).

This study applied an online survey, which lasted from August 1 to October 31, 2024. This study randomly selected college from 65 colleges in Chengdu, China, which are divided into four different types of schools: public undergraduate, private undergraduate, public vocational, and private vocational. The sampling was conducted according to the proportion of the number of students. A total of 626 questionnaires were collected. The median age of the college students participating in the survey was 20 years old, with the youngest being 19 years old and the oldest being 24 years old. Table 1 shows the respondents' demographics.

Table 1. Respondent demographics

Demographic Items	Frequency	Percentile (%)
Gender		
Male	269	52.5
Female	243	47.5
Age		
19-20 years old	211	41.3
21~23 years old	158	30.8
24~25 years old	143	27.9
Student year level		
1st yera	112	21.8
2nd year	127	24.9
3rd year	135	26.4
4th year	138	26.9

Results

Pearson correlation

The following table shows the correlation matrix between several constructs related to this study. The correlations between these constructs show a fairly close relationship between psychological needs, factors, intrinsic motivation, behavioral intension. Each correlation number listed below the diagonal is a Pearson correlation indicating the strength and direction of the relationship between the constructs. The diagonal shows the square root of the Average Variance Extracted (AVE) for each construct.

Table 2. Correlation matrix for measurement scales

Constructs	Mean	SD	PN	IM	AT	SN	PB	BI
PN	5.394	0.827	0.808					
IM	5.460	0.747	0.298**	0.774				
AT	5.583	0.776	0.742**	0.296**	0.779			
SN	5.651	0.720	0.586**	0.273**	0.610**	0.785		
PB	5.870	0.704	0.603**	0.305**	0.585**	0.546**	0.774	
BI	5.504	0.796	0.341**	0.712**	0.285**	0.258**	0.306**	0.796

Note: PN: Psychological Needs, IM: Intrinsic Motivation, AT: Attitude, SN: Subjective Norms, PB: Perceived bahvioral control
Diagonal elements are the square roots of the AVE for each construct
Pearson correlations are shown below the diagonal
Significant at *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Measurement Results

The results given in Table 2 show that all the items of all the variables loaded significantly, and, therefore, no item was deleted [54]. The values of Cronbach's alpha, composite reliability, and average variance extracted (AVE) are significantly above the threshold value, indicating that inter-item reliability exists among the items of each variable in this study (See Tables 3).

Table 3. Measurement results

Constructs	MLE estimates factor loading/ measurement error		Squared multiple correlation (SMC)	Composite reliability (CR)	Average variance extracted (AVE)	Cronbach's α
Psychological Needs				0.938	0.653	0.932
PN1	0.812	0.341	0.659			
PN2	0.761	0.421	0.579			
PN3	0.841	0.293	0.707			
PN4	0.827	0.316	0.684			
PN5	0.844	0.288	0.712			
PN6	0.819	0.329	0.671			
PN7	0.822	0.324	0.676			
Intrinsic Motivation				0.881	0.600	0.877
IM1	0.818	0.331	0.669			
IM2	0.880	0.226	0.774			
IM3	0.855	0.269	0.731			
IM4	0.666	0.556	0.444			
IM5	0.619	0.617	0.383			
Attitude				0.885	0.608	0.883
AT1	0.795	0.368	0.632			
AT2	0.836	0.301	0.699			
AT3	0.799	0.362	0.638			
AT4	0.723	0.477	0.523			
AT5	0.739	0.454	0.546			
Subjective Norm				0.865	0.616	0.860
SN1	0.793	0.371	0.629			
SN2	0.851	0.276	0.724			
SN3	0.788	0.379	0.621			
SN4	0.701	0.509	0.491			
Perceived Behavior Control				0.900	0.600	0.898
PB1	0.728	0.470	0.530			
PB2	0.804	0.354	0.646			
PB3	0.751	0.436	0.564			
PB4	0.781	0.390	0.610			
PB5	0.829	0.313	0.687			
PB6	0.748	0.440	0.560			
PB7	0.645	0.584	0.416			
Behavioral Intention				0.874	0.634	0.902
BI1	0.762	0.419	0.581			
BI2	0.866	0.250	0.750			
BI3	0.758	0.425	0.575			
BI4	0.795	0.368	0.632			

Note. Model fit: $\chi 2/df = 2.806$, GFI = 0.883, NFI = 0.910, CFI = 0.940, TLI = 0.934, IFI = 0.940, and RMSEA = 0.054.

Structural Model

The fit of data to the proposed model was adequate (Hair Jr et al., 2019) $\chi^2/df = 4.234$, GFI = 0.883, NFI = 0.863, CFI = 0.941, TLI = 0.882, IFI = 0.940, and RMSEA = 0.072 (see Figure 2 and Table 4).

Figure 1. Structural model result

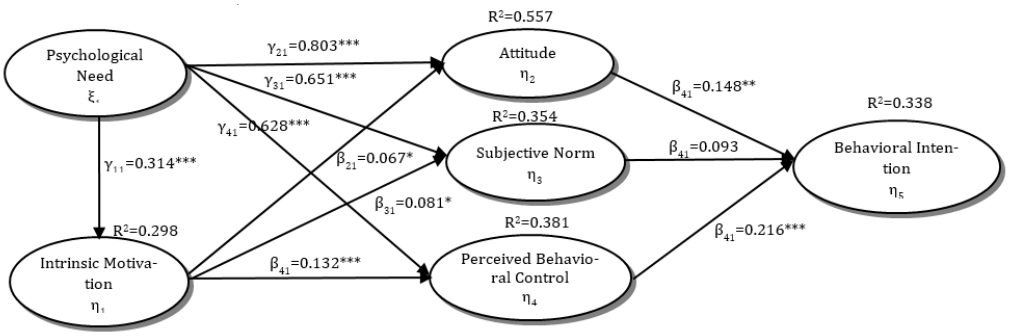


Table 4. Proposed model results

Hypotheses	Symbol	Path			Coefficients	Test results
H1	γ_{11}	Psychological Needs	→	Intrinsic Motivation	0.314***	Supported
H2	γ_{21}	Psychological Needs	→	Attitude	0.803***	Supported
H3	γ_{31}	Psychological Needs	→	Subjective norm	0.651***	Supported
H4	γ_{41}	Psychological Needs	→	behavioral control	0.628***	Supported
H5	β_{21}	Intrinsic Motivation	→	Attitude	0.067*	Supported
H6	β_{31}	Intrinsic Motivation	→	Subjective Norms	0.081*	Supported
H7	β_{41}	Intrinsic Motivation	→	Behavioral conrol	0.132***	Supported
H8	β_{21}	Attitude	→	Behavioral Intension	0.148**	Supported
H9	β_{31}	Subjective Norms	→	Behavioral Intension	0.093	Unsupported
H10	β_{4}	Behavioral control	→	Behavioral Intension	0.216***	Supported

Note: Significant at *: $p < 0.05$. **: $p < 0.01$. ***: $p < 0.001$

The psychological needs have a positive effect on intrinsic motivation (0.314, $p < 0.001$) to support H1. This finding suggests that when individuals' psychological needs such as the need for autonomy, competence, and relatedness are met, they are more likely to experience heightened intrinsic motivation. Intrinsic motivation refers to engaging in activities for their inherent satisfaction and enjoyment rather than for external rewards. The strong support for this hypothesis underscores the importance of addressing psychological needs in various contexts, such as education, workplace environments, and leisure activities, to foster greater intrinsic motivation. Hence, the organizations and educators can create environments that encourage individuals to pursue activities with enthusiasm and commitment, ultimately leading to improved performance and satisfaction towards prioritizing the fulfillment of personal needs. This result consistent with prior studies which found that psychological needs play an important role in influencing students' intrinsic motivation on education, psychology, and organizational behavior. It means that, psychological needs are essential to consider individual differences. Factors such as personality traits, cultural background, and prior experiences can influence how psychological need's role on intrinsic motivation (Schunk & Zimmerman, 2008).

The psychological needs positively affect on students' attitudes towards exercise (0.144, $p < 0.001$) hence H2 is supported. It aligns with existing literature on motivation and physical activity, which in turn fosters a more positive attitude towards exercise (Deci & Ryan, 2000). For instance, a study by Teixeira et al. (2012) found that when students feel a sense of autonomy in their exercise choices, they are more likely to engage in physical activities willingly and with enthusiasm. Some studies also suggest that external factors, such as peer influence and environmental conditions, can also significantly impact students' attitudes towards exercise, even when their psychological needs are not fully met. Furthermore, the relationship between psychological needs and exercise attitudes may vary based on individual differences, such as personality traits and cultural backgrounds. Students with higher levels of self-determination are more likely to have positive attitudes on exercise.

The finding that psychological needs significantly influence subjective norms (0.651, $p < 0.001$) to support H3 and underscores the critical role that psychological factors play in shaping social perceptions and behaviors. Subjective norms refer to the perceived social pressures individuals feel regarding whether to engage in a particular behavior, such as exercise or healthy living. When psychological needs specifically autonomy, competence, and relatedness are satisfied, individuals are more likely to perceive positive social expectations and support from their peers and community, thereby enhancing their subjective norms. This finding aligns preliminary studies, which posits that fulfilling psychological needs fosters intrinsic motivation and positive social interactions. It proves that when students feel a sense of autonomy in exercise decision, they are more likely to engage in behaviors that align with the values and the expectations of social circles. It also demonstrating that individuals who experience higher levels of autonomy and competence are more likely to perceive supportive social norms, which in turn encourages them to adopt healthier behaviors.

The relationship between psychological needs and perceived behavioral control is a critical area of study in understanding motivation and behavior. The finding that psychological needs significantly influence perceived behavioral control (0.081, $p < 0.05$) to support H4. It suggests that when individuals' psychological needs have a crucial role on students' exercising control. This in line with prior studies which found that psychological needs enhance intrinsic motivation, which in turn can lead to a greater sense

of control over one's behavior. The sense of competence directly contributes to their perceived behavioral control, as they feel equipped to navigate challenges and make choices aligned with their goals. Furthermore, students' who experience higher levels of autonomy and competence report greater perceived behavioral control. It means when psychological needs are satisfied, individuals are more likely to develop a strong sense of self-efficacy, which enhances their perceived control over their behaviors.

Intrinsic motivation plays a crucial role in shaping students' attitudes, subjective norms, and perceived behavioral control regarding exercise (0.067, $p < 0.05$; 0.081 $p < 0.05$ and 0.132, $p < 0.001$) respectively to support H5, H6 and H7. It proves that when students are intrinsically motivated, they engage in physical activities for the inherent enjoyment and satisfaction they derive from them, rather than for external rewards or pressures. This internal drive significantly influences their overall approach to exercise. This result supported by prior studies which indicates that students who are intrinsically motivated tend to view exercise as a valuable and enjoyable part of their lives, leading to a greater likelihood of regular participation. This positive attitude can foster a lifelong commitment to physical activity, as students associate exercise with personal fulfillment and well-being. This alignment between intrinsic motivation and personal values can strengthen students' resolve to engage in exercise, regardless of social influences. Furthermore, this students' sense of competence is crucial, as it directly impacts perceived control on exercise. Contrastingly, when students lack intrinsic motivation, their attitudes may become negative, subjective norms may be influenced by peer pressure, and perceived behavioral control may diminish. Students who exercise solely for external rewards or to avoid negative consequences may struggle with commitment and consistency, leading to a cycle of disengagement.

Students' attitudes and perceived behavioral control are critical factors that significantly influence their intentions to engage in exercise (0.148, $p < 0.1$; 0.216, $p < 0.001$) to support H8 and H10. Meanwhile, subjective norm has less effect (0.093, $p > 0.05$) hence H9 is unsupported. It proves that a positive attitude towards physical activity viewing it as enjoyable, beneficial for health, and a means of social interaction encourages students to participate regularly. Some studies indicates that favorable attitudes correlate with higher levels of exercise commitment, while negative attitudes can lead to avoidance. Therefore, creating an environment that promotes enjoyable and varied physical activities is essential for fostering positive attitudes and encouraging consistent exercise routines among students. Subjective norms, which encompass the perceived social pressures from peers, family, and the community, also play a vital role in shaping students' exercise intentions. When students perceive that their friends and family value physical activity, they are more likely to feel motivated to engage in exercise themselves. Conversely, if the prevailing norm is sedentary behavior, students may be less inclined to be active. In addition, perceived behavioral control an individual's belief in their ability to perform a behavior affects their intentions.

Mediation Effect

The results of Table 5 present a mediation analysis. which evaluates how psychological needs directly and indirectly effect behavioral intention towards intrinsic motivation, attitude, subjective norm and perceived behavioral conrol. Intrinsic motivation, attitude, subjective norm, and perceived behavioral control are essential mediators in the relationship between psychological needs and behavioral intention to exercise among students. It means that students are more likely to experience intrinsic motivation, which is the drive to engage in an activity for its inherent satisfaction rather than for external rewards when their psychological need is satisfied. This intrinsic motivation significantly influences intention to exercise, as students who find joy and fulfillment in physical activity are more likely to commit to regular exercise routines. Attitude plays a crucial role in shaping behavioral intentions. A positive attitude towards exercise viewing it as enjoyable and beneficial can enhance intrinsic motivation and lead to a stronger intention to engage in physical activity. Subjective norms, or the perceived social pressures from peers and family, also mediate this relationship. If students believe that their social circle values physical activity, they are more likely to feel motivated to exercise.

Table 5. Mediation result

Direct effect				B	*T*	95% CI
Psychological Needs	→	Behavioral Intention		0.104	4.521***	(0.059, 0.150)
Indirect effect				B	SE	95% CI
Psychological Needs	→	Intrinsic Motivation	Behavioral Intension	0.223***	0.033	(0.157, 0.289)
Psychological Needs	→	Attitude	Behavioral Intension	0.051*	0.041	(0.033. 0.130)
Psychological Needs	→	Subjective Norm	Behavioral Intension	0.049	0.029	(0.067. 0.108)
Psychological Needs	→	Perceived Behavioral control	Behavioral Intension	0.091**	0.029	(0.033. 0.149)

Note: Significant at *: $p < 0.05$. **: $p < 0.01$. ***: $p < 0.001$

Discussion

Key Findings

The findings of this study confirm that psychological needs have a significant positive influence on intrinsic motivation. This result is in line with previous research which emphasises the importance of fulfilling psychological needs in fostering motivation (Chen et al., 2020; Corbin, 2021; Wang, 2016; Yang & Qian, 2024). In addition, social pressures and reward mechanisms, such as recognition, grades, or even employment advantages, tend to outweigh intrinsic enjoyment, further diminishing the role of intrinsic motivation in shaping exercise behavior. Given these findings, it is essential to explore alternative strategies, such as integrating enjoyable and self-directed physical activities, to enhance students' long-term engagement in exercise beyond mere academic obligations. Psychological needs, toward autonomy, competence and relatedness, are crucial in shaping intrinsic motivation, as individuals who feel in control, capable and related to others are more likely to engage in activities with genuine interest and enthusiasm (Al-Jubari, 2019; Bermudez, 2023). It uncovers the role of students' psychological need, which states that intrinsic motivation is driven mostly through fulfilment of basic psychological needs. When individuals feel that the environment supports autonomy and competence, these individuals are likely to develop intrinsic motivation that sustains long-term exercise activity". However, previous studies such as Trigueros & Garcia-Mas (2025) or Miquelon et al., (2017) give more weight to the integrated and identified regulation for the maintenance of the person's commitment to the regular practice of physical activity. In this sense, intrinsic motivation is related to an individual's commitment to practice for the enjoyment he or she feels, but this interest is volatile, and another activity may appear to replace the inherent interest in physical activity.

Similarly. psychological needs and instrinsic motivation positively influence factors contributing to students' TPB dimensions. This suggests that individuals with strong psychological needs are more likely to develop attitudes. beliefs. and competencies that support goal-directed behaviors. This finding is particularly relevant in educational and professional settings. where fostering a supportive environment can enhance individuals' motivation to pursue aspirations. This aligns with prelimibary studies which demonstrated that the presence of a structured and encouraging environment can enhance individuals' confidence. thereby facilitating willingness to take initiative and explore opportunities (Chaput et al., 2020; Sihombing & Pramono, 2021; Yang & Qian, 2024). It proves that, the combination effects of extrinsic motivation, academic and employment pressures, and environmental constraints, which collectively shape students' exercise behaviors. In contrast to Western contexts, where intsinsic motivation plays a central role in sustaining physical activity, Chinese students often prioritize external motivators such as academic requirements, social expectations, and institutional policies over personal enjoyment (Cavicchiolo et al., 2022; Huang & Kee, 2024). Some students engage in physical activity primarily to fulfill university-mandated course requirements rather than from a genuine passion for fitness.

Moreover. the significant positive relationship between intrinsic motivation and factors highlights the role of motivation in shaping behavioral determinants. This supports the notion that intrinsically motivated individuals are more likely to engage in proactive behaviors. develop resilience. and persist in goal attainment despite challenges. The positive effect of psychological needs on behavioral intention further reinforces this idea that fulfilling psychological needs fosters individuals' willingness to take action toward goals (Chen et al., 2020; Junaidi et al., 2020). The findings also reveal that factors positively influence behavioral intentions. indicating that these elements play a crucial role in shaping decision-making processes. Individuals who perceive favorable external and internal conditions are more likely to develop strong intentions toward specific behaviors. such as career choices or entrepreneurial ventures.

The strong and significant influence of intrinsic motivation on behavioral intention suggests that motivation serves as a key driving force in translating aspirations into concrete actions. Individuals with high intrinsic motivation are more likely to take initiative. demonstrate persistence. and actively seek opportunities that align with interests and goals. However. the results also indicate that psychological needs do not have a significant direct effect on behavioral intention. This finding suggests that while psychological needs are essential in fostering motivation. direct influence on behavioral intention may be limited. Instead. psychological needs may exert effect through other mediating factors. such as intrinsic motivation and external influences. This highlights the complexity of motivational processes. where multiple interacting elements contribute to individuals' decision-making and behavior.

The direct amd indirect effect of psychological needs on behavioral intention was not significant. the indirect effect through intrinsic motivation was found to be significant. This suggests that psychological needs primarily operate through motivational processes rather than directly shaping behavior. Individuals who experience strong psychological needs may not immediately develop behavioral intentions but instead cultivate intrinsic motivation. which subsequently influences willingness to take action. On the other hand. the mediation analysis reveals that psychological needs do not significantly affect behavioral intention through factors. This implies that while psychological needs contribute to shaping certain influencing factors. these factors alone may not be sufficient to drive behavioral intention. Instead. intrinsic motivation plays a more central role in translating psychological needs into concrete actions. This finding emphasizes the importance of fostering an environment that nurtures intrinsic motivation. as it serves as a critical bridge between psychological needs and behavioral outcomes.

Theoretical Implications

The findings of this study contribute to the theoretical understanding of motivation and behavioral intention emphasizing the indirect role of psychological needs. The results align with Self-Determination Theory (SDT). which posits that intrinsic motivation is critical for sustained behavioral engagement. The lack of a direct effect of psychological needs on behavioral intention suggests that motivation must be sufficiently developed before individuals translate needs into actual behavior. Moreover. the study provides insights into the role of external factors in shaping behavioral outcomes. While previous research has often highlighted the significance of contextual influences. this study suggests that external factors alone may not be sufficient to mediate the effects of psychological needs. This calls for an integrative approach that considers both intrinsic and extrinsic motivational forces.

Practical Implications

The findings of this study have several practical implications for policymakers. educators. and organizations aiming to foster motivation and behavioral engagement. First. initiatives designed to enhance behavioral intention should focus on fulfilling psychological needs as a foundation for motivation. This could involve creating environments that support autonomy. competence. and relatedness. as these elements have been shown to enhance intrinsic motivation. Second. interventions should prioritize strategies that strengthen intrinsic motivation. as it serves as the primary driver of behavioral intention. Programs should incorporate elements that encourage self-determined motivation rather than relying solely on external rewards or pressures. Third, while external factors remain important in shaping behaviour, the role of them as mediators of psychological needs should not be overstated. Instead, these should be integrated as complementary components that enhance, rather than replace, the effects of intrinsic motivation. Therefore, organisations and institutions should design interventions that simultaneously address both internal motivational drivers and external support structures.

Conclusions

This study underscores the intricate relationship between psychological needs. intrinsic motivation. external factors. and behavioral intentions. The findings confirm that psychological needs positively influence intrinsic motivation and other relevant factors. which in turn shape behavioral engagement. However. the absence of a direct effect of psychological needs on behavioral intention highlights the need for motivation as a mediating mechanism. Additionally. These findings suggest that although external factors contribute to behavioural intentions, these do not serve as significant mediators of psychological needs. This emphasizes the importance of intrinsic motivation in driving behavior and suggests that

motivational interventions should focus on fostering self-determined motivation rather than relying solely on external influences.

While this study provides valuable insights. it has several limitations that should be considered in future research. First. the study focuses on a specific population. which may limit the generalizability of the findings to other contexts. Future research should explore whether these relationships hold across different cultural and demographic settings. Second. the reliance on self-reported data introduces the possibility of response bias. Future studies could incorporate objective measures or longitudinal approaches to capture behavioral changes over time. Third. while this study examined the mediating role of intrinsic motivation and external factors. other potential mediators or moderators were not explored. Future research should investigate additional psychological constructs. such as resilience or self-efficacy. to gain a deeper understanding of the mechanisms driving behavioral engagement. Finally. qualitative research could provide richer insights into how individuals perceive and internalize psychological needs and motivation. Combining quantitative and qualitative methodologies would enhance the robustness of findings and provide a more comprehensive understanding of the factors influencing behavioral intentions.

Appendix

Psychologican Need

Autonomy

1. I feel that I am free to make my own choices in my exercise activities.
2. I have a say in how I engage in physical activities.
3. I feel that my exercise routine reflects my personal interests and values.

Competence

4. I am confident in my ability to perform various physical activities.
5. I feel that I am improving my skills through my exercise efforts.

Relatedness

6. I feel a sense of connection with others when I engage in physical activities.
7. I feel supported by others in my exercise endeavors.

Intrinsic Motivation

1. I enjoy exercising because it makes me feel good.
2. I find physical activity to be a rewarding experience.
3. I feel a sense of personal growth when I engage in physical activities.
4. I enjoy learning new skills through exercise.
5. I feel energized and revitalized after exercising.

TPB dimensions

Attitude

1. I believe that regular exercise can help reduce my reliance on social media.
2. I think that engaging in physical activities is a better use of my time than scrolling through social media.
3. I feel that exercising regularly improves my overall well-being more than using social media.
4. I believe that exercise can help me develop healthier habits and reduce my screen time.

Subjective Norm

Most of my friends believe that I should engage in regular exercise.

2. My family encourages me to participate in physical activities instead of spending time on social media.

3. I feel that my peers would approve of me spending more time exercising rather than using social media.

4. I think that my social circle would support me if I decided to reduce my social media use in favor of exercising.

Perceived Behavioral Control

1. I feel confident in my ability to stick to a regular exercise routine.

2. I believe I can find time to exercise, even with my busy schedule.

3. I feel capable of making healthy choices that support my exercise goals.

4. I can easily find ways to incorporate physical activity into my daily life.

5. I believe I can resist the temptation to spend time on social media instead of exercising.

6. I feel that I can set and achieve realistic exercise goals for myself.

Behavioral Intentions

1. I plan to reduce my time spent on social media in favor of physical activity.

2. I will make an effort to incorporate more physical activity into my daily routine.

3. I plan to track my exercise progress to stay accountable to my goals.

4. I will prioritize exercise as a way to improve my overall well-being.

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