



Research Paper

Nursing Interventions and College Students' Blood Donation Intentions: A Theory of Planned Behavior Approach

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Abstract

Voluntary blood donation is essential for maintaining a stable blood supply and supporting clinical care. In the world, blood resources remain insufficient, particularly during holidays and in emergencies. College students, as a healthy and socially responsible group, exhibit high donation intention but low actual participation. This study, based on the Theory of Planned Behavior (TPB), examined the effects of attitude, subjective norm, and perceived behavioral control on blood donation intention among 221 students. All three factors positively predicted intention, with perceived behavioral control being the strongest predictor. The model explained 63.3% of the variance in intention. Findings suggest that enhancing knowledge and altruistic values strengthens positive attitudes, fostering supportive social norms improves social identification, and optimizing donation convenience increases self-efficacy. Targeted nursing education and mobilization strategies are recommended to convert intention into actual donation behavior and help alleviate blood shortages.

Keywords: Theory of Planned Behavior, voluntary blood donation, behavioral intention, blood donation nursing education, Influencing factors

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I. Introduction

1.1 Introduction

Voluntary blood donation is not only a key component in ensuring the safety and quality of clinical blood supply but also an important embodiment of social responsibility and humanitarian spirit. Every year, June 14th is celebrated as World Blood Donor Day, with the core theme “Donate Blood, Save Lives,” continuously drawing global attention to the significance of voluntary blood donation. In recent years, certain regions in China have continued to experience shortages in blood supply, which has, to some extent, affected clinical treatment and emergency medical care. Against this backdrop, expanding a stable donor population and enhancing public willingness to donate blood have become essential strategies to address the imbalance of blood resources and to respond to the global call for voluntary blood donation.

College students, as a young population with strong social responsibility, are recognized as having great potential to become stable voluntary blood donors. However, a clear gap remains between their intention to donate and their actual donation behavior. To explore the key factors influencing college students' blood donation behavior, this study adopts the Theory of Planned Behavior (TPB) as its theoretical framework and examines the effects of attitude, subjective norm, and perceived behavioral control on blood donation intention. The study aims to provide empirical evidence for nursing practice and public health promotion, offering theoretical and practical insights to encourage greater participation in voluntary blood donation—thus contributing to the humanitarian goals advocated by World Blood Donor Day.

1.2 Historical Background

Blood is an irreplaceable and non-synthetic medical resource (Lemmens et al., 2009) that plays a crucial role in emergency rescue, surgical procedures, and the clinical management of various diseases. A stable, sufficient, and safe blood supply system is not only essential for the smooth operation of medical services but also serves as a key indicator of a nation's public health capacity and level of social civilization. However, in recent years, frequent blood shortages have been reported in certain regions of China, posing a serious threat to patient safety and clinical treatment.

Against this backdrop, the question of how to effectively recruit and maintain a long-term voluntary blood donor pool has become a pressing public health concern. College students, characterized by good physical health, appropriate age, relatively high education levels, and a strong sense of social responsibility, are widely regarded as a crucial target group for establishing a sustainable and stable blood supply. Moreover, their concentrated distribution on campuses and the convenience of organizational mobilization makes them an ideal population for promoting voluntary blood donation on a regular basis.

1.3 Problem Statement: The Current Situation of Insufficient Blood Donation Among College Students

Although college students represent a population with significant potential for voluntary blood donation, their actual donation and repeat donation rates remain relatively low. For example, statistical data from a university in South China in 2024 indicated that the overall blood donation rate among students was only 22%, while the repeat donation rate was approximately 6%, both of which were considerably lower than those reported in universities in Beijing (30.98%) and Kunming (41.63%).

This disparity suggests that many students who meet the health and eligibility criteria for donation have not translated their willingness into actual or sustained blood donation behavior. Such findings reflect deficiencies in the current mechanisms of campus-based recruitment and donor retention (Shaz et al., 2010).

Against this backdrop, the present study adopts the Theory of Planned Behavior (TPB) as its theoretical framework to examine college students' behavioral intentions, attitudes, subjective norms, and perceived behavioral control related to blood donation at a university in South China. The study aims to elucidate the underlying psychological mechanisms shaping blood donation behavior among college students, provide scientific evidence for optimizing donor recruitment strategies in higher education institutions, and promote the establishment of a long-term and stable campus donor community.

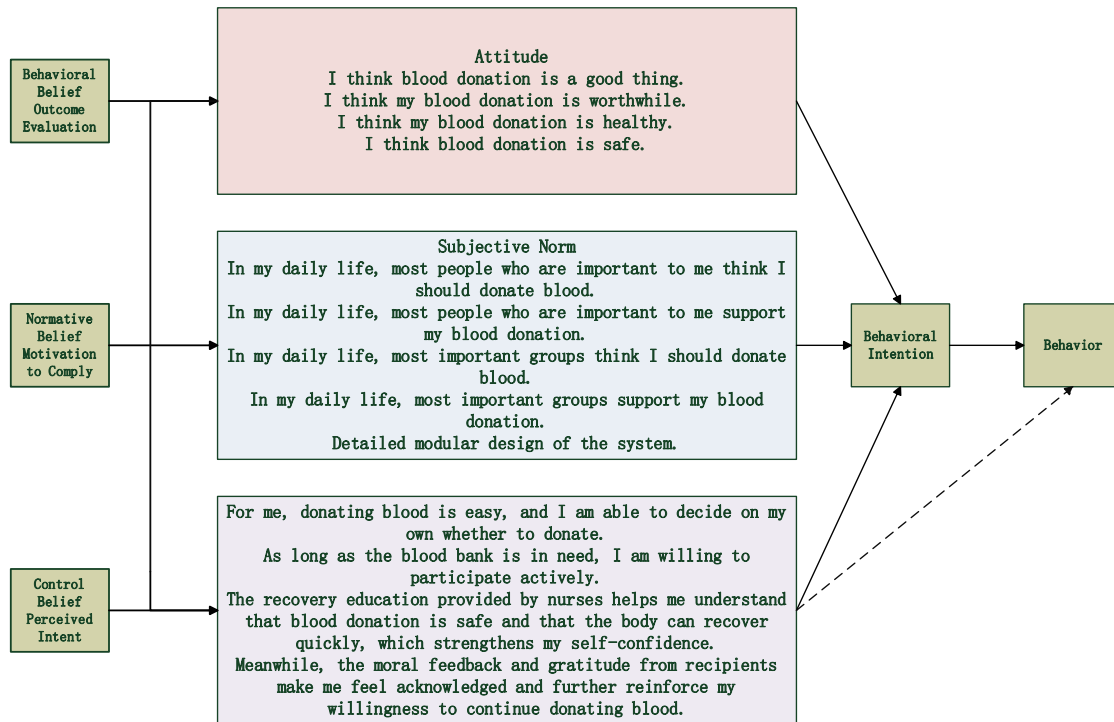


Figure 1. Schematic diagram of the questionnaire items based on the Theory of Planned Behavior



Figure 2. On-site photograph of college student blood donation

1.4 Theoretical Framework: Core Concepts of the Theory of Planned Behavior (TPB)

This study adopts the Theory of Planned Behavior (TPB) (Ajzen, 1991) to analyze the psychological mechanisms underlying college students' blood donation behavior. TPB, one of the most influential social psychology models, explains and predicts individuals' behavioral intentions and actual behaviors (Charng et al., 1988). According to the theory, behavior results from deliberate decision-making, with behavioral intention serving as its immediate determinant. Intention is shaped by three key constructs: attitude, subjective norm, and perceived behavioral control (PBC). TPB provides a systematic framework for understanding psychological processes in decision-making and has been widely applied to health-related behaviors, consumer choices, and environmental actions (Bednall & Bove, 2011). In the context of blood donation, TPB has demonstrated strong explanatory and predictive power, offering valuable insights into donors' motivations and informing recruitment strategies.

1.4.1 Attitude

Attitude refers to an individual's overall positive or negative evaluation of a specific behavior. In the context of blood donation, attitude reflects a person's recognition of and value judgment toward the act of donating blood itself. Attitude primarily originates from behavioral beliefs—the perceived outcomes of the behavior—and outcome evaluations, or the importance assigned to those outcomes.

For example, when an individual believes that donating blood can “save lives” and places a high value on this outcome, their attitude toward donation tends to be positive. Conversely, if the person is concerned that blood donation “might harm health” and considers this consequence highly significant, their attitude is likely to become negative.

Therefore, attitude serves as a crucial bridge between cognition and behavioral intention: the more positive an individual's attitude toward blood donation, the stronger their intention to engage in it.

1.4.2 Subjective Norm

Subjective norm refers to the social pressure an individual perceives when deciding whether to perform a specific behavior, reflecting the importance placed on the expectations of significant others, such as parents, friends, teachers, or classmates (Manning, 2013). It consists of two components: normative beliefs, which denote perceptions of what important others expect, and motivation to comply, which represents the willingness to align with these expectations. For example, a student who perceives strong support for blood donation from family, peers, or the school and is willing to follow these expectations is likely to have a high subjective norm, increasing their intention to donate. Previous studies have shown that subjective norm is a significant psychological determinant of college students' blood donation intention, with positive social support enhancing willingness to participate.

1.4.3 Perceived Behavioral Control

Perceived behavioral control (PBC) refers to an individual's subjective assessment of their ability to successfully perform a behavior (France et al., 2018), encompassing perceptions of behavioral difficulty and potential obstacles or facilitating factors. PBC comprises control beliefs, which reflect the conditions perceived to influence behavior, and perceived power, which indicates the significance of these conditions for behavioral execution. For instance, university students who perceive themselves as healthy, having sufficient time, and with convenient access to donation sites—and who consider these factors critical for successful donation—exhibit enhanced PBC. High PBC can promote blood donation intentions even when attitudes are neutral or social pressure is minimal, and may also serve as a predictor of actual donation behavior. In blood donation research, PBC is often assessed alongside self-efficacy to capture individuals' confidence in their capacity to perform the donation behavior.

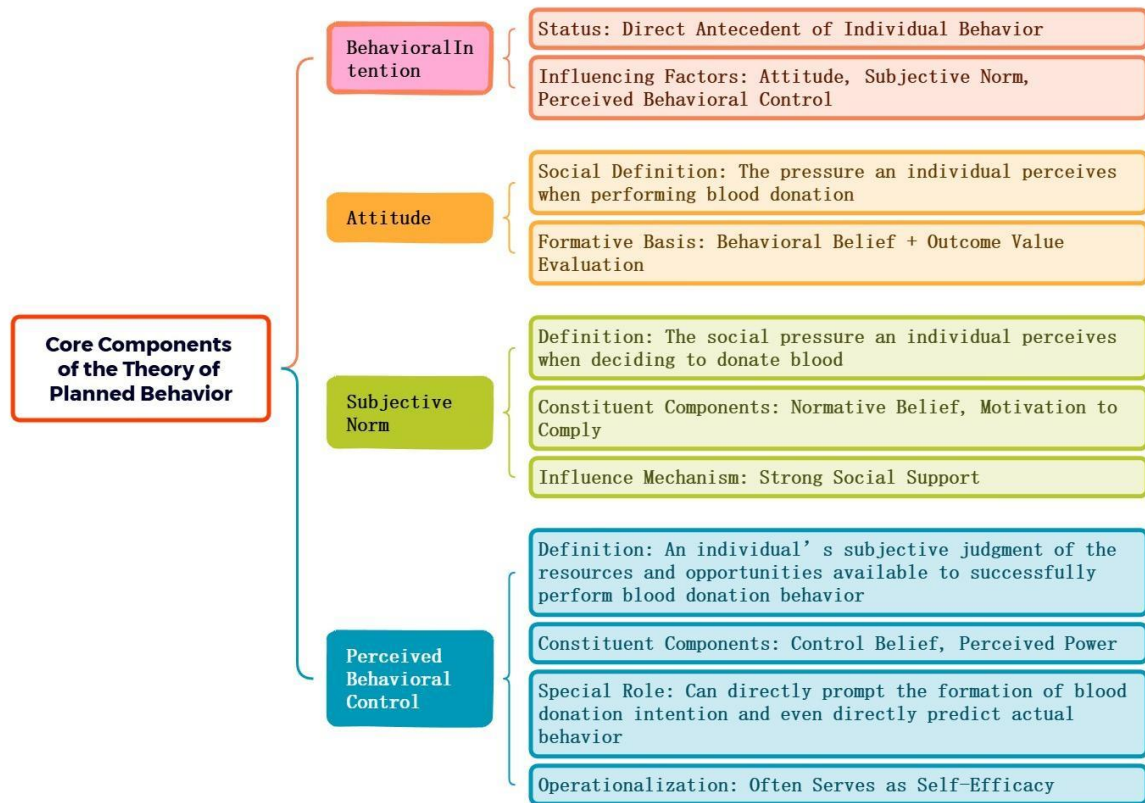


Figure 3: Conceptual diagram of the Theory of Planned Behavior

1.4.4 Research Objectives and Hypotheses

Grounded in the Theory of Planned Behavior (TPB), this study aims to construct a systematic model to explore the formation of college students' blood donation intentions and empirically examine the roles of core psychological factors. It seeks to provide a comprehensive understanding of the psychological processes underlying donation decisions and offer a theoretical basis for universities and blood centers to develop effective strategies for promoting and sustaining blood donation. The specific objectives are:

- A. To describe the current status of college students regarding blood donation intention, attitude, subjective norms, and perceived behavioral control.
- B. To examine the predictive effects and relative influence of attitude, subjective norms, and perceived behavioral control on donation intention.
- C. To evaluate the overall explanatory power of the TPB model for college students' donation intentions.
- D. To provide theoretical and practical guidance for designing targeted strategies to motivate and sustain donation behavior.

Based on these objectives, the study proposes the following hypotheses:

- H1: Positive attitudes toward blood donation are associated with stronger donation intentions.
- H2: Stronger perceived support from significant others increases donation intention.
- H3: Greater perceived control over the donation process enhances donation intention.
- H4: The TPB model, combining attitude, subjective norms, and perceived behavioral control, significantly predicts college students' blood donation intentions, both individually and collectively.

1.5 Literature Review

1.5.1 Application of the Theory of Planned Behavior in Blood Donation Research

The Theory of Planned Behavior (TPB) (Ajzen, 1991) has become a key framework in health behavior research due to its ability to explain and predict behavioral intentions. TPB posits that behavior originates from deliberate decision-making, with behavioral intention as its immediate determinant. Intention is shaped by three constructs: attitude (positive or negative evaluation of a behavior), subjective norms (perceived social pressure), and perceived behavioral control (judgment of one's ability and the feasibility of performing the behavior). This framework has been widely applied to health behaviors, including exercise, diet, vaccination, and blood donation, offering a systematic lens for understanding motivational mechanisms and informing intervention strategies.

Early international studies on blood donation demonstrated that attitudes, subjective norms, and perceived behavioral control significantly predict both donation intentions and behavior (Giles & McClenahan, 1990). Subsequent research extended TPB by incorporating factors such as moral norms, self-identity, and altruism. For example, Masser et al. (2009) found that repeated donors' self-identity as "blood donors" strongly predicted donation intentions, while France et al. (2017) integrated Self-Determination Theory, highlighting the role of autonomous and controlled motivations mediated through TPB constructs. These findings emphasize that fostering positive perceptions, supportive social environments, and convenient donation processes enhances both intentions and actual behavior.

In China, TPB has gradually been applied to understand blood donation behavior among university students. Jiang (2008) reported that attitude and subjective norms explained 32.8% of the variance in donation intentions, increasing to 63.3% after including perceived behavioral control. Recent studies have further refined the TPB model by integrating local contextual factors, such as outcome expectations, donation-related anxiety, environmental influences, and prior donation experience (Hu et al., 2021). Large-scale surveys confirmed that attitude, subjective norms, and self-efficacy are significant predictors, with self-efficacy exhibiting the strongest effect (Liu & Han, 2023; Chang et al., 2020).

Sociocultural factors specific to China—such as perceptions of "free access to blood," conformity tendencies, and group norms—also shape donation intention by influencing attitude and subjective norms. Evidence suggests that promoting supportive social atmospheres, providing public welfare education, optimizing donation procedures, and improving accessibility can effectively strengthen both intention and actual donation behavior among Chinese university students. Collectively, these studies validate the applicability of TPB and highlight practical strategies for enhancing voluntary blood donation.

1.5.2 Research Progress on Factors Influencing College Students' Blood Donation Behavior

College students are a critical population in blood donation research, with studies increasingly grounded in the Theory of Planned Behavior (TPB). The classical TPB model posits that donation intentions are primarily influenced by three constructs: attitude, subjective norms, and perceived behavioral control. Early domestic studies confirmed the model's applicability, showing that including perceived behavioral control significantly enhances predictive validity, reflecting the importance of overcoming practical barriers such as time constraints, accessibility, and health considerations (Jiang, 2008; Huang et al., 2022). Cross-cultural evidence suggests that the relative influence of these factors may vary; for example, subjective norms were the strongest predictor among Ethiopian university students.

Recognizing the complexity of donation behavior, scholars have extended TPB by incorporating individual traits, emotional factors (e.g., altruism, donation anxiety, expected regret, moral norms), social-cognitive factors (e.g., descriptive norms, self-identity), behavioral experience (e.g., prior donation), and knowledge. These extensions highlight that intrinsic values, emotional experiences, social environment, and prior experience jointly shape donation intentions and actual behavior (Liu & Han, 2023). Comprehensive models based on these variables provide richer explanations of the psychological mechanisms underlying blood donation.

Despite these extensions, the classical TPB framework remains theoretically robust. This study focuses on enrolled university students to examine the central roles of attitude, subjective norms, and perceived behavioral control in predicting donation intentions, thereby validating core TPB constructs. Methodologically, a large stratified random sample and structural equation modeling (SEM) are employed to enhance reliability and generalizability. Practically, the study informs nursing and health education interventions based on TPB's three-dimensional constructs—behavioral, normative, and control beliefs—providing guidance for universities and blood centers in developing targeted strategies for donor recruitment and retention.

II. Voluntary blood donation activities

Voluntary blood donation is a vital component of public welfare, serving as the cornerstone of blood supply in public health systems and playing a critical role in clinical life-saving interventions. Emergency surgeries, treatment of hematological disorders, and trauma transfusions all depend on the safe blood provided by voluntary donors, with each donation directly affecting patient survival and treatment outcomes.

Beyond its clinical significance, voluntary donation reflects societal civility and public health awareness, offering individuals a tangible means to contribute to life-saving efforts. Systematic nursing care and psychological support are essential not only for ensuring donor safety and improving the donation experience but also for enhancing donor willingness and sustaining participation. When donors feel safe and cared for throughout the process, the donor pool can expand, providing a stable and reliable blood supply for clinical use.

Based on on-site observations and donor interviews, this study divides the donation process into three stages—pre-donation, during donation, and post-donation—and, guided by the Theory of Planned Behavior (TPB) and empirical analysis, examines the critical role of nursing interventions and psychological support in promoting blood donation behavior.



Figure 4: Stages of Blood Donation Process

2.1 Pre-Donation Nursing and Psychological Preparation

The pre-donation phase primarily involves physiological preparation, psychological guidance, and behavioral motivation. Physiologically, nursing staff should rigorously implement standardized procedures, including health screening, physical examination, and assessment of blood pressure and hemoglobin levels, to evaluate donor suitability and exclude individuals at risk, thereby minimizing potential complications (World Health Organization, 2020). Skin antisepsis is a critical step to ensure collection safety and prevent local infection. Commonly used disinfectants in China include 75% medical ethanol, which rapidly inactivates bacteria and some viruses, and 0.5% povidone-iodine, which provides broad-spectrum antimicrobial activity suitable for sensitive skin. Nurses should briefly explain the safety and function of the selected disinfectant to reduce donor anxiety caused by stinging, odor, or skin reactions.

Psychological preparation is equally essential. First-time donors often experience varying degrees of anxiety, with studies indicating that 30% – 40% report moderate apprehension. Targeted psychological interventions and structured education have been shown to effectively reduce anxiety, enhance self-efficacy, and increase donation willingness (France et al., 2008). According to the Theory of Planned Behavior (TPB), attitude, subjective norms, and perceived behavioral control are critical determinants of donation intention (Masser et al., 2013). Regression analysis in this study (attitude $\beta = 0.382$; subjective norms $\beta = 0.319$; perceived behavioral control $\beta = 0.228$) confirms that all three factors significantly and positively influence intention, with attitude exhibiting the strongest effect. Accordingly, pre-donation nursing should focus on fostering positive perceptions of blood donation through education on procedural safety, altruistic value, and social significance, promoting supportive feedback from family and peers, and enhancing perceived behavioral control.

Environmental and cultural cues can further reinforce social recognition. Institutions may establish “walls of compassion” or “donation commemorative areas” to create a positive atmosphere and strengthen donors’ sense of social belonging and altruistic motivation. Positive social symbols and group identification have been shown to significantly enhance donor engagement, consistent with the present finding that subjective norms exert a significant influence on donation intention.

2.2 Nursing and Process Management During Blood Donation

The core focus of nursing during blood donation is ensuring procedural safety and managing donor emotions. Nurses strictly adhere to aseptic techniques, regulate collection speed and volume, and continuously monitor donors’ facial color, pulse, and subjective responses to promptly detect adverse reactions such as dizziness, sweating, pallor, or hypotension (World Health Organization, 2020).

Acute reactions are managed according to severity. Mild reactions are addressed by pausing collection,

positioning donor's supine or semi-recumbent with legs elevated, maintaining airway patency, providing warm or sugary drinks, and monitoring vital signs until recovery. Moderate reactions—such as pronounced hypotension, palpitations, or vomiting—require immediate cessation of donation, release of the tourniquet, maintenance of intravenous access, oxygen supplementation if necessary, and continuous observation. Severe reactions—including syncope, convulsions, or altered consciousness—necessitate activation of emergency protocols, physician notification, head-down/legs-up positioning, ECG monitoring, and intravenous support. Throughout, nurses also support the emotional stability of other donors to prevent panic. Post-event documentation and analysis help identify triggers and optimize safety management for future donations.

Psychological care and emotional guidance are essential for enhancing the donation experience and promoting repeat donations. This study found that donors' perceived safety and satisfaction are positively correlated with intention to donate again, with perceived behavioral control serving as a key predictor. Nurses can reduce donor anxiety and enhance control perception through brief communication, positive feedback, and environmental adjustments, such as soft background music, comfortable seating, and temperature regulation (Mura et al., 2024). Volunteer support and social interaction further strengthen donors' sense of safety and social connectedness, reinforcing subjective norms by signaling that donation behavior is supported and recognized, thereby increasing satisfaction and willingness to donate again.

2.3 Post-donation Nursing and Sustained Motivation

Post-donation nursing aims to prevent delayed adverse reactions, facilitate physiological recovery, and reinforce a positive donation experience. Nurses should instruct donors to apply proper pressure to the puncture site, rest for 10-15 minutes, and consume fluids or snacks to maintain blood glucose and energy. Post-donation “recovery education” should explain blood regeneration, proper nutrition, and common misconceptions, correcting the erroneous belief that donation harms health, thereby enhancing trust in donation safety and health-related self-efficacy (World Health Organization, 2020). Donors should also be advised to avoid strenuous activity and maintain adequate rest and balanced nutrition within 24 hours to prevent delayed hypotension, fatigue, or other adverse effects.

Evidence indicates that the quality of post-donation care directly affects future donation behavior. Klein et al. (2021) found a significant positive correlation between post-donation satisfaction and subsequent donation rates, consistent with this study's finding that attitude is the most critical determinant of donation intention. High-quality post-donation care mitigates physiological discomfort and reinforces positive attitudes via a “positive experience – cognitive reinforcement” pathway, increasing willingness to donate again. Zhang et al. (2021) similarly emphasize that honor and social recognition are key motivators for sustaining long-term donation behavior among Chinese university students. Accordingly, blood collection institutions and universities can enhance donors' sense of honor through certificates, badges, and donor records, and promote social recognition via campus announcements or social media, amplifying the effect of subjective norms.

The “emotional feedback mechanism” (or conscience-based feedback) further sustains motivation. Initiatives such as displaying blood usage, sharing recipients thank-you letters, or using electronic appreciation screens allow donors to perceive the life-saving impact of their actions. This mechanism strengthens self-worth and social evaluation, simultaneously influencing attitude and subjective norms by reinforcing recognition of donation's social significance and perceived social support, thereby stabilizing and enhancing future donation intention (Zhang et al., 2021).

In conclusion, post-donation nursing should adopt a three-dimensional framework of “physiological recovery-cognitive reinforcement-emotional feedback.” Scientific recovery guidance, proactive psychological support, and tangible emotional feedback together enhance donors' perceived safety, sense of achievement, and social value recognition, consolidating positive donation experiences and providing a foundation for cultivating a long-term voluntary donor pool within universities.

III. Research Methods and Implementation

3.1 Research Design

This study employed a cross-sectional design to assess the current intentions toward voluntary blood donation among university students and examine the relationships between the three core constructs of the Theory of Planned Behavior (TPB)—attitude, subjective norms, and perceived behavioral control—and donation intention. This design allows for the collection of large-scale data within a short timeframe, making it suitable for exploratory analyses and for investigating associations between psychological variables and donation intention.

Participants were full-time undergraduates at a comprehensive university. Inclusion criteria were: (1) aged 18 years or older; (2) currently enrolled; and (3) voluntary participation with signed informed consent. Exclusion criteria were: (1) health conditions precluding blood donation (e.g., infectious or severe chronic diseases); and (2) inability to comprehend or complete the questionnaire independently.

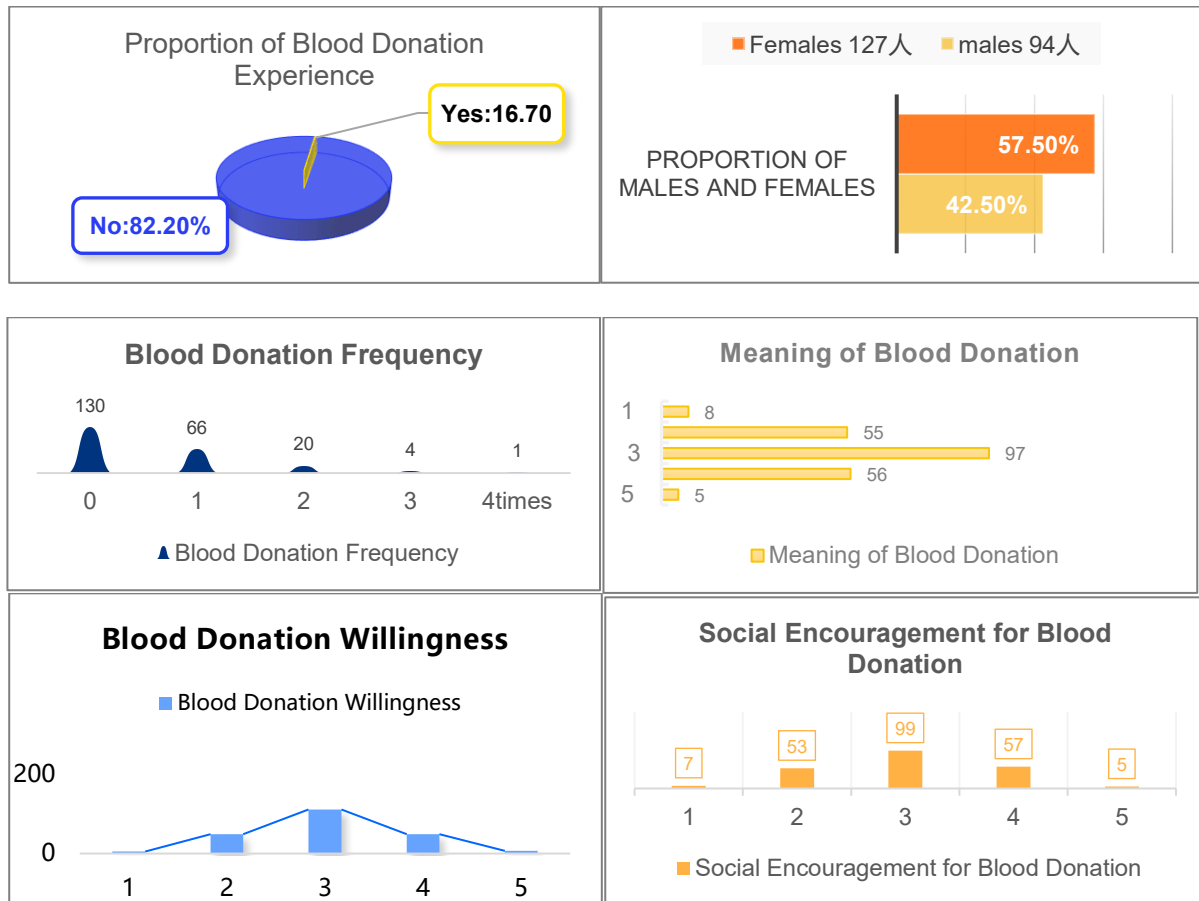


Figure 5: Data Results

3.2. Research Instrument

A self-designed structured questionnaire served as the primary research instrument. It was developed based on Ajzen's (1991) Theory of Planned Behavior (TPB) and adapted from widely used scales to ensure cultural relevance. The questionnaire comprised two sections. The first collected sociodemographic information, including gender, age, year of study, major, household registration type, and prior blood donation experience, to characterize the sample. The second measured the core TPB constructs—attitude, subjective norms, perceived behavioral control (PBC), and behavioral intention—using a five-point Likert scale (1 = strongly disagree/very unlikely, 5 = strongly agree/very likely).

Behavioral intention assessed willingness to donate blood in the future (e.g., “I plan to donate within the next six months”). Attitude captured overall evaluations, including both instrumental (e.g., “donation is beneficial”) and affective (e.g., “donation is enjoyable”) components. Subjective norms reflected perceived social expectations, and PBC measured perceived ease and control over donation.

Prior to the main survey, a pilot study ($n = 50$) was conducted to assess reliability and validity. Reliability was evaluated using Cronbach's α , with $\alpha > 0.70$ indicating acceptable internal consistency. Content validity was reviewed by 3 – 5 experts—including health psychology scholars and blood center practitioners—for relevance, clarity, and coverage, with items revised accordingly. Construct validity was examined via exploratory and confirmatory factor analyses (EFA and CFA) to verify the factor structure and alignment with the theoretical framework, ensuring strong construct validity.

3.3. Data Collection

To ensure representativeness and enhance the external validity of the results, this study adopted a stratified random sampling approach. First, the university population was stratified according to academic disciplines (liberal arts, sciences, engineering, and medicine) to achieve balanced coverage across different fields. Second, the sample size for each stratum was determined proportionally based on its population size. Finally, participants were randomly selected within each stratum to form the final study sample.

The sample size was estimated according to the statistical requirements of Structural Equation Modeling (SEM) analysis. Following Kline's (2015) recommendation, the minimum sample size should be approximately

ten times the number of observed variables or twenty times the number of estimated parameters. Given that the questionnaire in this study contained about 20 observed variables, the minimum required sample size was 200. To compensate for potential invalid or incomplete responses, a total of 500 questionnaires were distributed to ensure an adequate number of valid cases for analysis.

Data collection was conducted through an online survey platform (e.g., Google Form) distributed via official university channels, including academic advisors and student organizations. An electronic informed consent form was provided on the first page of the questionnaire, outlining the study's purpose, voluntary participation, and confidentiality assurance. To improve data quality and minimize duplicate responses, attention check items were embedded within the questionnaire, and each IP address was restricted to a single submission. After data collection, logical consistency and completeness checks were performed, and invalid or inconsistent responses were removed prior to formal analysis.

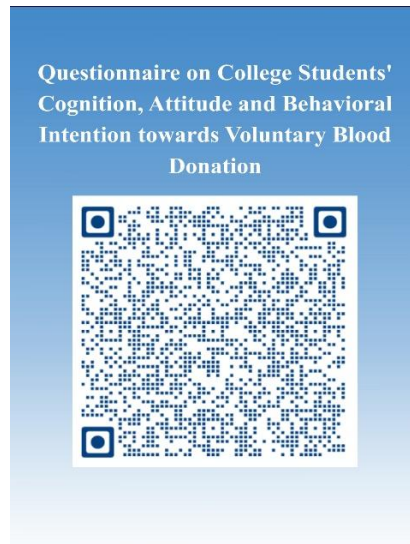


Figure 6: Questionnaire

3.4 Data Analysis

SPSS 26.0 was used to perform descriptive analyses of the sample, including frequencies and percentages for sociodemographic characteristics, providing a clear overview of sample distribution. For the core TPB constructs, descriptive statistics such as means and standard deviations were calculated to examine overall levels and distribution patterns.

AMOS 24.0 was employed to construct a structural equation model (SEM) to test the fit of the TPB framework. In this model, attitude, subjective norms, and perceived behavioral control were specified as exogenous latent variables, while behavioral intention was defined as the endogenous latent variable. Direct path coefficients were estimated to assess the effects of the three predictors on donation intention.

Model fit was evaluated using multiple indices, including the chi-square to degrees of freedom ratio (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The criteria for acceptable fit are summarized in Table 1.

Table 1. Model Fit Indices and Thresholds for SEM

Fit Index	Threshold
Chi-square to degree of freedom ratio (χ^2/df)	< 3.0
Comparative Fit Index (CFI)	> 0.90
Tucker-Lewis Index (TLI)	> 0.90
Root Mean Square Error of Approximation (RMSEA)	< 0.08

IV. Research Results

4.1 Reliability Analysis

As shown in Table 2, the Cronbach's α coefficients for all dimensions exceeded 0.70, indicating good internal consistency and reliability of the questionnaire. The attitude dimension exhibited the highest α value ($\alpha = 0.821$), suggesting stable measurement of respondents' attitudes toward blood donation. The behavioral intention dimension also demonstrated high reliability ($\alpha = 0.871$), reflecting strong consistency in participants'

responses regarding their future intention to donate blood.

Table 2. Reliability of Each Dimension

Construct	Number of Items	Cronbach's α	Reliability Judgment
Attitude (A)	3	0.821	Good
Subjective Norm	3	0.796	Good
Perceived Behavioral Control	3	0.764	Acceptable
Behavioral Intention	3	0.871	Excellent

4.2 Validity Analysis

To assess the construct validity of the questionnaire, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were conducted for all items. The results are presented in Table 3.

Table 3. KMO and Bartlett's Test Results

Test Item	Result
KMO Value	0.846
Approximate Chi-square of Bartlett's Test of Sphericity	782.415
Degrees of Freedom (df)	120
Significance (Sig.)	0.000

The KMO value was 0.846, and Bartlett's test of sphericity was significant ($p = 0.000 < 0.05$), indicating strong correlations among the variables and suitability of the data for factor analysis. Principal component analysis with Varimax orthogonal rotation extracted four common factors with eigenvalues greater than 1, explaining a cumulative variance of 74.38%. All items had factor loadings above 0.7 on their respective factors, with no substantial cross-loadings, demonstrating good construct validity of the scale.

4.3 Correlation Analysis

To examine the relationships among the TPB constructs, Pearson correlation analysis was conducted. The results are presented in Table 4.

Table 4. Correlations Among Variables

Variable	Attitude	Subjective Norm	Perceived Behavioral Control	Behavioral Intention
Attitude (A)	1			
Subjective Norm (SN)	0.512	1		
Perceived Behavioral Control (PBC)	0.438	0.479	1	
Behavioral Intention (BI)	0.624	0.586	0.551	1

The results indicated that attitude, subjective norms, and perceived behavioral control were all significantly positively correlated with blood donation intention ($p < 0.01$). Among these, attitude exhibited the strongest correlation with behavioral intention ($r = 0.624$), suggesting that the more positive university students' attitudes toward voluntary blood donation, the higher their actual intention to donate. Subjective norms ($r = 0.586$) and perceived behavioral control ($r = 0.551$) were also significant, further highlighting those social expectations from others and individuals' perceived feasibility of donation are important determinants of donation intention.

4.4 Regression Analysis

To further test the applicability of the Theory of Planned Behavior, multiple linear regression was conducted with behavioral intention (BI) as the dependent variable and attitude (A), subjective norms (SN), and perceived behavioral control (PBC) as independent variables. The results are summarized in Table 5.

Table 5. Summary of Regression Model

Model	R	R ²	Adjusted R ²	Standard Error
1	0.741	0.549	0.541	0.462

The model's coefficient of determination was $R^2 = 0.549$, indicating that the three independent variables

collectively explained 54.9% of the variance in university students' blood donation intention, demonstrating a good model fit.

Table 6. Analysis of Variance (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	56.824	3	18.941	88.276	0.000
Residua	46.654	217	0.215		
Total	103.478	220			

The regression model was statistically significant, $F = 88.276$, $p = 0.000 < 0.001$, indicating that the overall model reliably predicts blood donation intention.

Table 7. Regression Coefficients

Parameter	B	standard error	Beta	t	Sig.
Constant	0.483	0.174		2.772	0.006
Attitude (A)	0.356	0.072	0.382	4.941	0.000
Subjective Norm (SN)	0.291	0.067	0.319	4.337	0.000
Perceived Behavioral Control	0.214	0.061	0.228	3.551	0.001

Multiple linear regression was conducted with behavioral intention (BI) as the dependent variable and attitude (A), subjective norms (SN), and perceived behavioral control (PBC) as independent variables. The model was statistically significant ($F = 88.276$, $p < 0.001$) and explained 54.9% of the variance in donation intention ($R^2 = 0.549$).

All three predictors had significant positive effects on donation intention ($p < 0.01$). Attitude showed the strongest influence ($\beta = 0.382$), indicating that positive attitudes toward blood donation are the most critical determinant. Subjective norms ($\beta = 0.319$) and perceived behavioral control ($\beta = 0.228$) also contributed significantly, highlighting the roles of social expectations and individuals' perceived ability to donate. These findings confirm the applicability of the Theory of Planned Behavior in predicting university students' blood donation intentions.

4.5 Summary

Reliability, validity, correlation, and regression analyses confirmed that the questionnaire demonstrated high reliability and construct validity, and that the Theory of Planned Behavior (TPB) effectively predicts university students' voluntary blood donation intentions. Attitude, subjective norms, and perceived behavioral control all positively influenced donation intention, with attitude exerting the strongest effect.

Overall, students' donation intentions were moderate to high, with individual differences related to prior donation experience and medical background, which were associated with higher attitudes and stronger intentions.

Structural equation modeling highlighted the mechanisms underlying TPB constructs. Attitude, reflecting recognition of altruistic value, health understanding, and positive emotional experience, strongly predicts intention. Subjective norms, representing social influence and approval, and perceived behavioral control, reflecting self-efficacy and perceived feasibility, also contribute significantly. Pre-, during-, and post-donation nursing interventions should systematically reinforce these factors to translate psychological mechanisms into actual donation behavior.

In conclusion, the TPB model demonstrates robust explanatory power and acceptable fit in this context. Guiding nursing practice according to the logic of "attitude as core, subjective norms as support, perceived behavioral control as assurance" provides a practical framework to promote sustainable voluntary blood donation among university students.

V. Planning & Improvement

5.1 Explanation of Main Findings

The findings of this study indicate that among the three core constructs of the Theory of Planned Behavior (TPB), Perceived Behavioral Control (PBC) exerts the strongest predictive effect on university students' blood donation intention, followed by Attitude, while Subjective Norm shows a relatively weaker influence. This suggests that, when weighing whether to donate blood, university students place greater emphasis on the convenience, feasibility, and controllability of the donation process, rather than relying solely on cognitive evaluations or perceived social expectations.

Based on this result, universities should focus on optimizing donation procedures, increasing the number of on-campus donation sites, providing flexible appointment systems, and ensuring sufficient health and safety measures—all of which can strengthen students' perception of control over the donation process.

The current findings are consistent with the majority of previous TPB-based studies conducted both domestically and internationally, further supporting the applicability of the TPB model among Chinese university populations. The observed differences in specific coefficients may stem from variations in cultural background, sample characteristics, or measurement tools, thereby providing new empirical insights for the localization of TPB and offering a valuable supplement to existing research.

5.2 Theoretical Contributions and Practical Implications

This study provides additional empirical evidence supporting the universality of TPB in explaining prosocial and health-related behaviors among university students, and it clearly identifies the relative influence of each core construct in shaping blood donation intention.

From a practical perspective, universities and blood centers can improve their recruitment strategies in three key directions:

Enhancing convenience: Simplify donation procedures, optimize service efficiency, and increase accessible collection points to reduce behavioral barriers and strengthen perceived control.

Strengthening attitude formation: Use scientific education, health communication, and real donor stories to foster positive cognition and emotional identification with blood donation.

Activating social influence: Leverage campus organizations, peer networks, and new media to build a supportive social environment that enhances subjective norms and encourages participation.

5.3 Research Limitations

This study employs a cross-sectional research design, which limits causal inference. The data rely primarily on self-reported responses and may be affected by social desirability bias. Moreover, the sample is drawn from a single university, constraining the external generalizability of the results. Future research should consider longitudinal tracking and integrate real behavioral data to enhance the robustness and generalizability of the findings.

5.4 Future Research Directions

Future studies could extend the present research in several directions. Conduct intervention-based experiments to verify the actual effects of different variable manipulations. Explore potential mediation and moderation effects among TPB constructs. Shift the research focus from behavioral intention to actual donation behavior, especially the conversion mechanisms between first-time and repeat donors

VI. Conclusion

This study adopts a cross-sectional design, which entails certain limitations in causal inference; the reliance on self-reported data may be influenced by social desirability; and the sampling scope—restricted to a single university—limits external validity. Future research should adopt longitudinal approaches and incorporate actual blood donation behavior data to strengthen the credibility and applicability of conclusions.

Grounded in the Theory of Planned Behavior, this study systematically examines the key determinants of university students' blood donation intentions. The results reveal that the TPB model effectively explains the formation pathways of donation intention, with Perceived Behavioral Control being the strongest predictor, followed by Attitude and Subjective Norm.

The findings highlight that enhancing the convenience of blood donation and students' self-efficacy constitutes the core mechanism for translating intention into actual behavior. This research not only enriches the understanding of the psychological mechanisms underlying blood donation among university students but also provides a theoretical and practical foundation for universities and blood collection institutions to design more targeted and effective recruitment strategies—thereby promoting the sustainable development of voluntary blood donation.

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