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A Dose-Response Relationship Between Short-Video Use and Depressive Symptoms Among Pharmacy Intravenous Admixture Services (PIVAS) Staff : A National Multicenter Cross-Sectional Study

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Abstract

Background

Digital health is an emerging public health priority. This study investigated the impact of a prevalent digital behavior—daily short-video use—on mental health among a high-stress occupational group, Pharmacy Intravenous Admixture Services (PIVAS) staff.

Methods

This study employed a large-sample, multicenter cross-sectional design. Data were collected via questionnaire from 4050 PIVAS staff members across China. Depressive symptoms were assessed using the 9-item Patient Health Questionnaire (PHQ-9). Information on demographic characteristics, work-related factors, and lifestyle habits was also gathered. Multinomial logistic regression was used to analyze the association between daily short-video usage duration and depressive symptoms.

Results

In the multivariable-adjusted model, compared to those with daily short-video usage of < 30 minutes, frequent use (1–3 hours) and highly frequent use (> 3 hours) had a significantly higher risk of depressive symptoms. The adjusted odds ratios (aORs) were 1.309 (95% CI: 1.002, 1.711), P = 0.049, and 2.056 (95% CI: 1.424, 2.969), P < 0.001, respectively.

Conclusions

This study is the first to identify prolonged short-video use as an independent risk factor for depressive symptoms among PIVAS staff, demonstrating a clear dose-response relationship. The findings underscore the necessity of incorporating healthy media use education into the occupational health management framework for PIVAS personnel.

Trial Registration

Registration Number: ChiCTR2500114132; Registration Date: December 8, 2025

1. Introduction

With the advancement of mobile internet technology and smart terminals, short videos on mobile platforms have experienced explosive growth worldwide, reshaping contemporary media consumption habits and leisure-entertainment paradigms due to their high accessibility, rich entertainment value, and powerful algorithm-based recommendation mechanisms. A massive user base and staggering usage duration constitute the core of their current landscape. According to the China Online Audiovisual Development Research Report (2025), among various forms of online audiovisual culture, short-video applications rank first in both user scale and time spent. In China, the short-video user base has reached 1.04 billion, with a penetration rate of 93.8%.

When identifying risk factors for depression among occupational groups, research has predominantly focused on traditional workplace variables (e.g., workload, shift schedules). However, workers' digital behaviors during leisure

time, as a potentially significant way of coping with occupational stress and their impact on mental health, have not been sufficiently explored.

Cross-sectional and some longitudinal studies support a significant positive association between prolonged, passive short-video use and higher levels of depressive and anxiety symptoms[1,2]. However, the underlying mechanisms often involve multiple mediating variables, and the relationship can simultaneously be negative or more complex. An individual's initial psychological state, resilience, and usage motives may serve as crucial moderating variables, determining whether the ultimate impact of the usage behavior is more beneficial or harmful.

The Pharmacy Intravenous Admixture Services (PIVAS), a critical department in hospital pharmaceutical care, significantly enhances the safety of clinical intravenous medication through centralized, standardized aseptic operations. Due to the specific nature of their work, the relatively enclosed environment, and professional burnout, PIVAS staff face considerable physical and mental challenges.

Compared to the general population, PIVAS staff may be more prone to developing patterns of excessive short-video use. To test this hypothesis, we conducted a large-scale, multicenter cross-sectional study. Focusing on staff members engaged in long-term intravenous drug admixture work in PIVAS departments across medical institutions at various levels nationwide, this study explores the association between daily short-video usage duration and depressive symptoms among PIVAS staff.

2. Methods

2.1Study Participants and Survey Procedure

This study employed a convenience sampling method. Electronic questionnaires were distributed to PIVAS staff at member institutions through networks associated with the Intravenous Admixture Expert Committee of the National Institute of Hospital Administration, National Health Commission, and the Intravenous Admixture Management Professional Committee of the Chinese Pharmaceutical Association. The questionnaires assessed short-video usage and depressive symptoms among PIVAS staff in participating hospitals. To enhance sample coverage, on-site recruitment was supplemented at some units. All study procedures adhered to ethical principles. All participants read and provided electronic informed consent prior to the survey. Data collection was conducted anonymously to protect participant privacy.

The inclusion and exclusion criteria for study participants were defined as follows:

Inclusion criteria: (1) Currently working full-time in the PIVAS of a participating hospital with a tenure of at least 6 months; (2) Aged 18–65 years; (3) Voluntary participation in this study; (4) No cognitive or language impairments, capable of completing routine survey items and the depression assessment.

Exclusion criteria: (1) Medical record-confirmed history of severe mental illness (e.g., schizophrenia, bipolar disorder) or organic brain disease; (2) Current use of psychotropic medications that may affect sleep patterns or mood regulation, unless the dosage has been stable for ≥ 6 months; (3) Presence of serious physical illness that may independently affect sleep duration or mental health; (4) Questionnaires with a missing information rate > 5%.

Collected questionnaires underwent review for data quality, completeness, and logical consistency. After applying the inclusion and exclusion criteria, a total of 4050 questionnaires were obtained as valid samples for subsequent analysis.

2.2Assessment of Daily Short-Video Usage Duration

In this study, the exposure variable was daily short-video usage duration. Current measurement of short-video usage primarily relies on two methods: subjective self-report and objective data logging. This survey utilized subjective self-report via questionnaire. Participants were asked, "On average, approximately how much time do you spend watching short videos (e.g., on platforms like TikTok, Kuaishou, etc.) per day?" and were instructed to select one of the following four options (see Table 1):

Table 1
Assessment Questionnaire for Daily Short-Video Usage Duration

Daily Short-Video Usage Level	Daily Short-Video Usage Duration
Light Usage	Less than 30 minutes
Moderate Usage	30 minutes to 1 hour
Frequent Usage	1 to 3 hours
Highly Frequent Usage	More than 3 hours or impromptu

2.3Assessment of Depressive Symptoms

Depressive symptoms were assessed using the Chinese version of the 9-item Patient Health Questionnaire (PHQ-9), a scale that corresponds to the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). Participants rated the frequency of depressive symptoms over the past two weeks on a 4-point scale: "Not at all" (0), "Several days" (1), "More than half the days" (2), and "Nearly every day" (3). The total score ranges from 0 to 27, with a higher score indicating greater severity of depressive symptoms. The PHQ-9 has demonstrated excellent psychometric properties for screening depressive symptoms in populations[3,4]. This study adopted the internationally recognized cut-off point, defining the presence of clinically significant depressive symptoms as a PHQ-9 total score of ≥ 10.

2.4Assessment of Covariates

Based on the characteristics of hospital staff and relevant research in occupational health and psychology within the medical field, this study identified a series of demographic, work-related, and lifestyle-related factors as potential confounders for analyzing health-related outcomes among hospital staff. These factors included: (1) Socio-demographic characteristics: sex, age, education level, marital status. (2) Occupational characteristics: work tenure, professional title, job position, shift pattern, average daily working hours within the PIVAS cleanroom, average daily number of intravenous admixture bags prepared. (3) Occupational exposure characteristics: frequency of exposure to hazardous drugs. (4) Lifestyle characteristics: frequency of physical exercise, smoking frequency, alcohol consumption frequency, and coffee intake frequency. The questionnaire was developed by the research team based on the specific context of Pharmacy Intravenous Admixture Services (PIVAS) staff and the study objectives. An English version of the questionnaire is provided as a supplementary file and is cited in the main manuscript.

2.5Statistical Analysis

To investigate the correlation between daily short-video usage duration and depressive symptoms among PIVAS staff using the questionnaire data, comprehensive statistical methods were employed. Analyses were conducted using SPSS 27.0, and all tests were two-sided, with a P-value < 0.05 considered statistically significant.

Descriptive statistics were used to present the baseline characteristics of the study participants. Continuous variables conforming to a normal distribution are presented as mean ± standard deviation, while those not normally distributed are presented as median (interquartile range). Categorical variables are described as frequency (percentage). Participants were grouped and compared based on the presence or absence of depressive symptoms (PHQ-9 ≥ 10). Comparisons of continuous variables between groups were performed using independent samples t-tests or one-way ANOVA for normally distributed data, and the Mann-Whitney U test or Kruskal-Wallis H test for non-normally distributed data. Comparisons of categorical variables were performed using the chi-square test.

Multivariable logistic regression analysis was used to explore the association between daily short-video usage duration and depressive symptoms. Adjusted odds ratios (aORs) and their 95% confidence intervals (95% CIs) were obtained. Four progressively adjusted models were constructed:

Model 1: Unadjusted.

Model 2: Adjusted for age, sex, marital status, and professional title level.

Model 3: Based on Model 2, further adjusted for smoking frequency, alcohol consumption frequency, physical activity, and coffee intake.

Model 4: Based on Model 3, further adjusted for work tenure, daily admixture preparation hours, and shift pattern.

To test for a dose-response relationship, short-video usage duration was treated as a continuous variable (assigned values 1–4) in the multivariable logistic regression model. The significance P-value for this variable represents the P-value for trend (P for trend).

Initial selection of candidate variables associated with the binary outcome (depression) was performed by examining differences in its distribution across strata defined by demographic, occupational, lifestyle, and exposure level factors. To assess multicollinearity, a linear regression model was fitted using all independent variables, and the corresponding variance inflation factors (VIFs) were computed. All VIF values were less than 5, indicating that multicollinearity was within an acceptable range.

3. Results

3.1 Baseline Characteristics

Assessment of Depressive Symptoms

Assessment of Covariates

Results

Baseline Characteristics

This study included a total of 4050 PIVAS staff members. The overall detection rate for depressive symptoms (PHQ-9 ≥ 10) was 14.3% (583/4050). The baseline characteristics of the study participants and comparisons between groups are detailed in Table 2. Overall, the mean age of participants was 35.0 ± 7.28 years, with females comprising 82.4% of the sample. Participants who were married and cohabiting with their spouse accounted for 68.3% (2786/4050), and 76.7% held a bachelor's degree. Regarding professional titles, 50.0% (2038/4050) held junior titles, 42.2% (1720/4050) held intermediate titles, and 7.9% (322/4050) held senior titles. 86.6% of participants reported

frequent exposure to hazardous drugs. Work schedules consisted of day shifts (30.9%) or rotating shifts (68.9%). Most participants were non-smokers (93.3%) and consumed little to no alcohol (76.9%).

Univariate analysis results indicated statistically significant differences in the distribution of several characteristics between the high-depression group and the low-depression group. Specifically, staff in the high-depression group were younger (33.98 ± 6.849 years vs. 35.04 ± 7.33 years, P = 0.001), and a significant association was found with marital status, the married and cohabiting group showed a significantly lower prevalence of depressive symptoms compared to other marital status categories (P < 0.001). In terms of work characteristics, the high-depression group had a longer mean daily admixture preparation time (3.55 ± 1.543 hours vs. 3.31 ± 1.497 hours, P < 0.001). The detection rate of depressive symptoms exhibited a clear dose-response relationship: it increased significantly with rising daily short-video usage duration (Light: 12.0%; Moderate: 12.7%; Frequent: 16.0%; Highly Frequent: 26.3%; P for trend < 0.001), increasing alcohol consumption frequency (P for trend < 0.001), and increasing coffee intake frequency (P for trend < 0.001). However, no statistically significant differences (P > 0.05) were observed between the two groups for variables including education level, work tenure, job position, daily number of admixture bags prepared, and involvement in hazardous drug preparation. Variables with a P-value < 0.10 in the univariate analysis were included in subsequent multivariate analyses.

Table 2: Baseline Characteristics of Study Participants Stratified by Depressive Symptoms (PHQ-9 score of 10 or higher)

Characteristic	Non-Depression group	Depression group	Pvalue	P for trend
N	3497	583		
Age(years)	35.04±7.33	33.98±6.849	0.001	0.019
Sex(%)			0.098	
Male	603(83.8%)	117(16.3%)		
Female	2894(86.1%)	466(13.9%)		
Marital status (%)			< 0.001	
Never married/Living alone	832(83.2%)	168(16.8%)		
Never married/Living with partner	55(79.7%)	14(20.3%)		
Married/Living with partner	2434(87.4%)	352(12.6%)		
Married/Living alone	96(78.7%)	26(21.3%)		
Widowed/Divorced/Separated	80(77.7%)	23(22.3%)		
Education level (%)			0.761	0.945
Junior college or below	511(85.3%)	88(14.7%)		
Bachelor degree	2679(85.6%)	449(14.4%)		
Master’s degree or above	307(87.0%)	46(13.0%)		
Professional title			0.045	0.170
Primary	1739(85.3%)	299(14.7%)		
Medium-grade	1467(85.3%)	253(14.7%)		
Senior	291(90.4%)	31(9.6%)		
Job title			0.124	0.262
Director / Deputy director	108(91.5%)	10(8.5%)		
Department leader / manager	242(88.6%)	31(11.4%)		
Team asset / leader	204(84.6%)	37(15.4%)		
Staff	2943(85.4%)	505(14.6%)		
Work seniority	6.77±4.743	7.01±4.734	0.260	0.037
Average daily duration of medication preparation in the PIVAS	3.31±1.497	3.55±1.543	<0.001	<0.001
Average daily workload of medication preparation in the PIVAS			0.505	0.644
Less than 50 packages	386(86.9%)	58(13.1%)		
50-100 packages	673(86.5%)	105(13.5%)		
100-200 packages	1433(85.9%)	236(14.1%)		

More than 200 packages	1005(84.5%)	184(15.5%)		
Involvement in hazardous drugs preparation			0.243	
Yes	3021(85.5%)	514(14.5%)		
No	476(87.3%)	69(12.7%)		
Work schedule			0.002	
Fixed day shift	1096(86.9%)	165(13.1%)		
Fixed night shift	3(42.9%)	4(57.1%)		
Shift work	2398(85.3%)	414(14.7%)		
Average daily short-video viewing duration			<0.001	<0.001
Light use	826(88.0%)	113(12.0%)		
Moderate use	1539(87.3%)	223(12.7%)		
Frequent use	941(84.0%)	179(16.0%)		
Heavy use	191(73.7%)	68(26.3%)		
Smoking Status			0.001	
No	3282(86.2%)	526(13.8%)		
Yes	215(79.0%)	57(21.0%)		
Drinking Status			<0.001	<0.001
Non-drinker	2727(86.9%)	411(13.1%)		
Light drinker	665(82.7%)	139(17.3%)		
Moderate drinker	98(77.2%)	29(22.8%)		
Heavy drinker	7(63.6%)	4(36.4%)		
Physical Activity Frequency			<0.001	<0.001
Sedentary	350(68.0%)	165(32.0%)		
Low activity	2867(88.1%)	386(11.9%)		
Moderate activity	233(90.3%)	25(9.7%)		
High activity	47(87.0%)	7(13.0%)		
Average coffee consumption (in the past 3 months)			<0.001	<0.001
Never	1338(88.1%)	181(11.9%)		
Occasional	1305(86.1%)	211(13.9%)		
Frequent	821(82.4%)	175(17.6%)		
Heavy	33(67.3%)	16(32.7%)		

3.2 Multivariate Regression Results for Primary Exposure and Depressive Symptoms

Multivariate Regression Results for Primary Exposure and Depressive Symptoms

The results of the multivariate logistic regression analysis showed that, after adjusting for potential confounding factors, higher short-video usage duration was significantly associated with an increased risk of depressive symptoms (Table 3).

Using the "Light Usage" group as the reference, in the unadjusted model (Model 1), the "Frequent Usage" and "Highly Frequent Usage" groups already exhibited a significantly elevated risk of depression (OR = 1.390, 95% CI: 1.079, 1.791; OR = 2.602, 95% CI: 1.853, 3.654, respectively). This positive association remained stable and significant with the sequential adjustment for demographic, lifestyle, and work characteristic variables (Models 2 to 4). In the fully adjusted model (Model 4), compared to the Light Usage group, the aOR for the Frequent Usage group was 1.309 (95% CI: 1.002, 1.711, P = 0.049), and the aOR for the Highly Frequent Usage group was 2.056 (95% CI: 1.424, 2.969, P < 0.001). No significant association was observed for the Moderate Usage group across all models.

The trend test (treating short-video usage duration as a continuous variable in Model 4) further confirmed a significant dose-response relationship (P for trend < 0.001). As shown in Figure 1, the risk of depression exhibited a significant upward trend with increasing short-video usage duration.

Table 3: Association between Depressive Symptoms and Short-Video Usage Duration among PIVAS Pharmacists in China

Characteristic	Model-I		
Average daily short-video viewing duration	OR	95%CI)	Pvalue
Light use	1.00		
Moderate use	1.059	(0.832, 1.349)	0.641
Frequent use	1.390	(1.079, 1.791)	0.011
Heavy use	2.602	(1.853, 3.654)	<0.001
P for trend	<0.001		
Characteristic	Model-II		
Average daily short-video viewing duration	OR	95%CI)	Pvalue
Light use	1.00		
Moderate use	1.050	(0.824, 1.340)	0.691
Frequent use	1.336	(1.033, 1.727)	0.027
Heavy use	2.424	(1.712, 3.433)	<0.001
P for trend	<0.001		
Characteristic	Model-III		
Average daily short-video viewing duration	OR	95%CI)	Pvalue
Light use	1.00		
Moderate use	1.072	(0.835, 1.375)	0.587
Frequent use	1.273	(0.976, 1.660)	0.075
Heavy use	1.958	(1.360, 2.821)	<0.001
P for trend	<0.001		
Characteristic	Model-IV		
Average daily short-video viewing duration	OR	95%CI)	Pvalue
Light use	1.00		
Moderate use	1.093	(0.850, 1.404)	0.489
Frequent use	1.309	(1.002, 1.711)	0.049
Heavy use	2.056	(1.424, 2.969)	<0.001
P for trend	<0.001		

Model 1: Unadjusted.

Model 2: Adjusted for age, sex, marital status, and professional title level.

Model 3: Based on Model 2, further adjusted for smoking frequency, alcohol consumption frequency, physical activity, and coffee intake.

Model 4: Based on Model 3, further adjusted for work tenure, daily admixture preparation hours, and shift pattern.

Trend test: Short-video usage duration was treated as an ordinal categorical variable in the regression model to calculate the P for trend, in order to test for a dose-response relationship.

Figure 1: Association between Short-Video Usage Duration and the Risk of Depression

4. Discussion

This cross-sectional study revealed a significant association between longer daily short-video usage duration and a higher risk of depressive symptoms among PIVAS staff, with evidence of a dose-response relationship. In the multivariate logistic regression analysis, compared to participants who used short videos for less than 30 minutes daily, frequent use (1–3 hours) and Heavy use (> 3 hours or impromptu) showed a significantly elevated risk of depressive symptoms. In the fully adjusted model, the adjusted odds ratios (aORs) were 1.309 (95% CI: 1.002, 1.711, P = 0.049) and 2.056 (95% CI: 1.424, 2.969, P < 0.001), respectively. This positive association was further supported by the trend test results (P for trend < 0.001). The relative differences in prevalence rates across various usage groups remained consistent in direction and magnitude after adjusting for multiple covariates across the three statistical models. This study is the first to reveal an independent association and a dose-response relationship between prolonged short-video use and depressive symptoms specifically within the PIVAS staff population, a group facing unique occupational stressors.

However, it is noteworthy that a statistically significant increase in depression risk was only observed when daily usage exceeded one hour. This suggests the possible existence of a "threshold" for risk accumulation, where shorter durations of use (e.g., 30 minutes to 1 hour) might have a limited impact on depressive symptoms among PIVAS staff. Being the first to identify this association within the uniquely stressed PIVAS workforce, and given that the association persisted after adjusting for significant occupational and demographic confounders, this study implies that prior observations may have underestimated the true risk associated with excessive short-video use.

The dose-response relationship observed in this study warrants exploration of its underlying mechanisms. Drawing on existing theories, we propose several potential explanatory pathways: First, social comparison and upward social comparison: The abundance of curated “idealized lives” in short videos may trigger negative comparisons regarding one’s own work, life, appearance, or achievements, thereby exacerbating depressive mood[5,6]. Second, fear of missing out: The persistent need to stay updated on trending topics and social dynamics may create a pressure to be “always on,”[7] making it difficult to disengage from the digital environment and achieve genuine relaxation—a state potentially in acute conflict with the PIVAS work nature that demands high concentration followed by recovery. Third, time displacement effect: Excessive usage may directly encroach upon time for sleep, physical activity[8], and face-to-face social interaction, all of which are crucial for stress relief and emotional recovery[9]. Future research should aim to delineate the relative contributions of these mechanisms and explore their interactions with the specific occupational stressors inherent to PIVAS work.

This study has several limitations. Firstly, short-video usage duration relied on self-report, which is susceptible to recall bias. Secondly, the cross-sectional design cannot establish a causal relationship between short-video use and depressive symptoms. Reverse causality —— depressive mood leading to more escapist short-video use is equally plausible. Future research should employ prospective cohort designs or experience sampling methods, combined with objective smartphone usage data, to more clearly delineate the causal pathways and temporal dynamics between these variables.

Furthermore, as we observed, "usage duration" is a relatively crude exposure metric. Future research should move beyond the "quantity" perspective to delve deeper into the moderating roles of usage patterns and motives. For instance, distinguishing between active creation and passive consumption, daytime versus nighttime use[10] (particularly concerning its impact on shift workers), and how motives for use (e.g., information seeking, social maintenance, or escapism) influence its relationship with mental health would be valuable. Such nuanced explorations will be instrumental in developing more targeted digital health interventions and mental health promotion strategies for this high-risk occupational group like PIVAS staff.

5. Conclusion

In summary, this cross-sectional study identifies prolonged daily short-video use as an independent risk factor for depressive symptoms among PIVAS staff, exhibiting a clear dose-response relationship.

Notably, our analysis reveals a specific risk threshold, with significant escalation observed at usage levels exceeding one hour per day. These findings offer a concrete scientific basis for developing digital behavior interventions to support the mental well-being of this workforce. Consequently, mental health initiatives for PIVAS personnel should extend beyond traditional focus areas like workload and scheduling. Enhancing digital health literacy and promoting engagement in restorative leisure activities emerge as a novel and equally critical intervention target.

We therefore recommend that healthcare institutions integrate education on healthy media use into routine health management for PIVAS employees. Future studies employing longitudinal designs are needed to confirm causality and to elucidate the distinct effects of different usage patterns—such as active creation versus passive consumption—thereby guiding more precise intervention strategies.

Abbreviations

PIVAS: Pharmacy Intravenous Admixture Services

PHQ-9: Patient Health Questionnaire-9

aOR: Adjusted Odds Ratio

CI: Confidence Interval

DSM-IV: Statistical Manual of Mental Disorders, Fourth Edition

ANOVA: Analysis of Variance

SD: Standard Deviation

VIF: Variance Inflation Factors

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of West China Hospital, Sichuan University (Approval No. 20252053) and registered with the Chinese Clinical Trial Registry (Registration Number: ChiCTR2500114132; Registration Date: December 8, 2025). All participants read and provided electronic informed consent prior to the

survey. Data collection was conducted anonymously to protect participant privacy. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AW and ZJ conceived and designed the study. AW, ZP, and MZ were responsible for data acquisition. AW performed the statistical analysis and created the visualizations. AW drafted the manuscript. All authors (AW, ZP, MZ, YG, and ZJ) contributed to data interpretation, critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Not applicable

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Figures

Figure 1

Association between Short-Video Usage Duration and the Risk of Depression

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- QuestionnaireShortVideoUseandDepressiveSymptomsAmongPIVASStaff.xlsx