INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 15, Issue 4, (2025) E-ISSN: 2222-6990

An AMOS-SEM-Based Validation of a Measurement Framework for Social Media Engagement and Participatory Communication

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v15-i4/25116 DOI:10.6007/IJARBSS/v15-i4/25116

Published Date: 05 April 2025

Abstract

With the increasing role of digital platforms in shaping community integration, developing culturally contextualized and theoretically grounded measurement tools to assess digital engagement and community attachment is essential, especially for urban migrant populations. Grounded in Media System Dependency (MSD) Theory and Communication Infrastructure Theory (CIT), this pilot study validates a four-factor measurement framework comprising WeChat usage intensity, WeChat dependency, participatory communication, and

community attachment. Drawing on adapted and refined scales, data were collected from 98 urban migrants in Xi'an, China, and analyzed through AMOS-based covariance structural equation modeling (CB-SEM). The measurement model demonstrated satisfactory reliability, convergent validity, and discriminant validity, with all factor loadings surpassing recommended thresholds and model fit indices (CFI, TLI, RMSEA, SRMR) indicating good fit. Importantly, this study distinguishes between usacge intensity and psychological dependency, offering a nuanced framework that integrates MSD and CIT in a platform-specific urban migration context. While findings remain exploratory due to the small sample size, the study provides methodological contributions by demonstrating cross-cultural scale adaptation and measurement validation procedures. The validated framework serves as a methodological foundation for future large-scale and longitudinal research investigating the dynamics between social media engagement, participatory communication, and community attachment.
Keywords: WeChat, Social Media Dependency, Participatory Communication, Community Attachment, AMOS-SEM

Introduction

The rapid development of digital platforms has significantly transformed patterns of social interaction, particularly among urban migrants who increasingly rely on social media for local integration and community participation. In the Chinese context, WeChat stands out as a multifunctional platform that facilitates interpersonal communication, information sharing, and participatory engagement (Shen & Gong, 2019; Rui, Yu, Xu, & Cui, 2019). Understanding how such digital platforms contribute to community attachment requires robust, context-sensitive theoretical and measurement frameworks.

Existing literature has established the relevance of Media System Dependency (MSD) theory (Ball-Rokeach & DeFleur, 1976) and Communication Infrastructure Theory (CIT) (Ball-Rokeach, Kim, & Matei, 2001) in explaining how media use influences social bonding and civic participation. However, prior empirical efforts have often overlooked critical distinctions between active usage intensity and social media dependency (Kim & Ball-Rokeach, 2006), and have rarely addressed the potential moderating role of participatory communication (Carpentier, 2011; Freire, 1970). Moreover, the dynamic interactions between platform dependency and participatory engagement remain underexplored, particularly within platform-specific urban migration contexts.

Recent studies have highlighted that WeChat usage fosters civic engagement, neighborhood trust, and pro-community behaviors, especially during crisis periods (You, Wang, & He, 2023; Pang, 2023). In addition, WeChat-enabled digital spaces provide new avenues for constructing local identity and enhancing urban residents' sense of community (Zhu & Fu, 2017; Cheng, Liang, & Leung, 2015). Despite these insights, there remains a need for more sophisticated measurement models that capture both the intensity and quality of engagement, along with their psychological and social implications. Notably, few studies have integrated MSD and CIT frameworks into a measurement model tailored for the urban migrant population and contextualized within a specific social media platform.

The current study addresses this gap through an exploratory pilot investigation that aims to preliminarily validate a four-factor measurement framework comprising WeChat usage

intensity, WeChat dependency, participatory communication, and community attachment, using AMOS-based Structural Equation Modeling (SEM). Rather than testing full structural causal relationships, this study focuses on confirming the reliability and validity of measurement constructs as a methodological foundation for subsequent large-sample empirical research.

The key contribution of this pilot study is to demonstrate the feasibility of applying AMOS-SEM in capturing and validating measurement constructs that reflect the complex interplay between platform use behaviors, dependency patterns, participatory communication, and community attachment. This validated measurement model will serve as a solid starting point for future large-scale and longitudinal studies examining structural relationships across different digital platforms and diverse demographic settings.

Literature Review

Conceptual Foundations

The growing role of social media platforms in shaping community engagement has drawn increasing scholarly interest. Urban migrants, in particular, rely on these digital tools for local information access, social integration, and emotional support (You, Wang, & He, 2023; Pang, 2023). Two theoretical frameworks are central to understanding these dynamics: Media System Dependency (MSD) theory and Communication Infrastructure Theory (CIT).

MSD theory, originally proposed by Ball-Rokeach and DeFleur (1976), suggests that individuals develop varying degrees of dependency on media based on their informational, orientational, and social bonding needs. This dependency becomes especially pronounced in contexts of social adaptation and uncertainty, such as urban migration. While prior research demonstrates that media dependency can enhance trust and participation in online communities (Kim & Ball-Rokeach, 2006), excessive reliance may also substitute for face-to-face interactions and potentially erode real-world social ties (Shen & Gong, 2019). This dual effect underscores the need to differentiate between healthy engagement and psychological over-dependency.

Communication Infrastructure Theory (CIT)

CIT emphasizes the interconnected roles of local storytelling networks, interpersonal communication, and institutional media systems in fostering a shared sense of community (Ball-Rokeach, Kim, & Matei, 2001). While initially applied in neighborhood media research, CIT is increasingly relevant in digital environments. Platforms like WeChat function as participatory infrastructures that enable users to co-construct localized narratives, thereby strengthening civic engagement and emotional belonging (Rui, Yu, Xu, & Cui, 2019; Zhu & Fu, 2017). However, empirical applications of CIT within platform-specific, migrant population contexts remain limited.

Integrating MSD and CIT in Digital Engagement Research

WeChat, as a ubiquitous platform in China, embodies key characteristics of both MSD and CIT. Usage intensity—frequent and active use of platform features—aligns with CIT, reflecting the platform's role in community storytelling and interactive dialogue. In contrast, dependency—psychological and behavioral reliance on the platform for social and emotional needs—reflects MSD principles.

Moreover, participatory communication is theorized to play a moderating role in this framework. Drawing on participatory communication theory (Freire, 1970; Carpentier, 2011), it is hypothesized that user-generated content and two-way engagement enhance collective identity formation. However, the relationship may not be linear; excessive participatory communication could intensify media dependency and reduce offline community involvement. This complexity has rarely been addressed in prior quantitative models.

Measurement Model Assumptions

Building on these theoretical foundations, this pilot study proposes and validates a four-factor measurement framework capturing WeChat usage intensity, WeChat dependency, participatory communication, and community attachment. The assumptions guiding this measurement model are:

A. WeChat usage intensity is positively associated with community attachment, facilitated by active engagement and social participation.
B. WeChat dependency influences community attachment but may exhibit diminishing or curvilinear effects at higher dependency levels.
C. Participatory communication is expected to moderate these relationships, strengthening community bonding through two-way dialogue and co-created narratives.

It is important to emphasize that this pilot study does not aim to test structural causal relationships. Rather, it focuses on validating whether these latent constructs can be reliably measured using AMOS-based Structural Equation Modeling (SEM), thereby laying a methodological foundation for future large-sample hypothesis testing and causal modeling.

Community Attachment in the Digital Context

Community attachment refers to an individual's emotional connection and psychological identification with their local community (Nowell & Boyd, 2018). Digital platforms increasingly mediate this process by enabling participatory engagement, hyper-local discourse, and collective storytelling (Pang, 2023; Cheng, Liang, & Leung, 2015). However, existing studies also highlight a paradox: while digital media platforms can foster online community engagement, they may simultaneously reduce opportunities for in-person interactions (Rui, Yu, Xu, & Cui, 2019). The current study contributes by refining measurement tools necessary for investigating these complex and sometimes contradictory dynamics.

2.6 Conceptual Model

The proposed conceptual model (Figure 1) reflects the theoretical integration of MSD and CIT frameworks, encompassing WeChat usage intensity, dependency, participatory communication, and community attachment. Validating this measurement framework through pilot data analysis is a crucial preparatory step for subsequent large-sample structural analysis and future cross-cultural testing. Note: This conceptual framework is developed for measurement validation purposes only; structural paths were not tested in this pilot study.

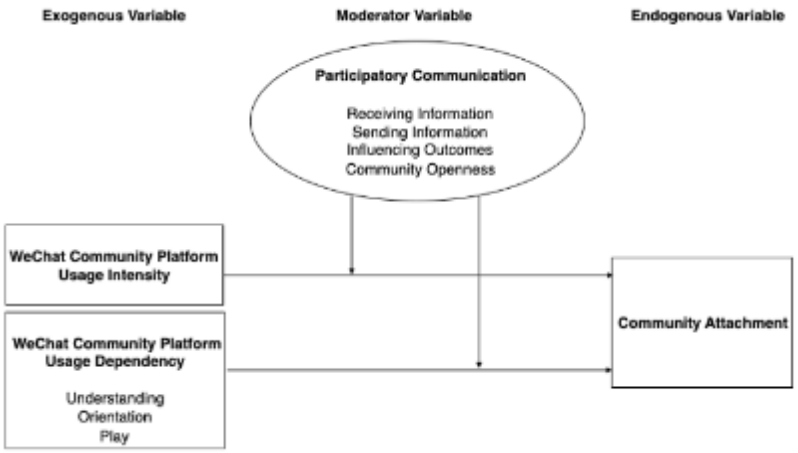

Figure 1 Conceptual Framework

Methodology

Research Design

This study employs a quantitative research design with a primary focus on validating the measurement model for WeChat usage intensity, WeChat dependency, participatory communication, and community attachment. Rather than testing structural relationships, the study aims to confirm whether these theoretical constructs can be reliably and validly measured, laying the groundwork for future large-scale empirical research.

AMOS-based Structural Equation Modeling (SEM), specifically covariance-based SEM (CB-SEM), was adopted for confirmatory factor analysis (CFA), given its robustness in assessing measurement reliability, convergent validity, and discriminant validity (Byrne, 2016; Hair et al., 2019; Kim & Ball-Rokeach, 2006). Given that the data were collected via convenience sampling from a single urban location (Xi'an), the potential for sample bias is acknowledged, and findings are interpreted within this context.

Justification for Using AMOS-SEM

Although covariance-based SEM (CB-SEM) traditionally requires larger sample sizes, the use of CB-SEM in this pilot study is justified by its theory-confirming focus and its ability to evaluate measurement model robustness. In line with prior recommendations (Hair et al., 2019), pilot studies may use smaller samples for preliminary construct validation, provided that model fit indices are interpreted cautiously and results are not generalized beyond the sample.

Covariance-based Structural Equation Modeling (CB-SEM), implemented via AMOS, is employed in this study as it is most appropriate for validating measurement models with a

confirmatory, theory-driven approach. Compared to Partial Least Squares SEM (PLS-SEM), which is more exploratory and prediction-oriented, CB-SEM allows for the assessment of overall model fit through indices such as CFI, TLI, RMSEA, and SRMR, ensuring statistical rigor (Kline, 2015; Pang, 2023).

Moreover, CB-SEM is better suited for theory confirmation and hypothesis testing when the primary goal is to validate predefined latent constructs and their relationships, rather than model development or variance explanation (Byrne, 2016). Although PLS-SEM has advantages in handling small samples and formative indicators, this study follows a reflective measurement design with well-defined constructs derived from established theoretical frameworks (MSD and CIT). Therefore, the use of CB-SEM is consistent with the theoretical, confirmatory, and measurement-focused objectives of this pilot study.

Table 1
Comparison of CB-SEM (AMOS) and PLS-SEM

Criterion	AMOS-SEM (CB-SEM)	PLS-SEM
Theoretical Basis	Confirmatory, theory-driven	Exploratory, data-driven
Measurement Model	Reflective, well-defined constructs	Formative, flexible constructs
Sample Size	Requires larger samples (N > 200)	Suitable for small samples (N < 200)
Model Fit Indices	Provides goodness-of-fit indices (CFI, TLI, RMSEA)	No model fit evaluation
Statistical Objective	Tests measurement reliability and validity	Maximizes variance explained

Pilot Study and Data Collection

A pilot study was conducted to pretest and validate the measurement instrument prior to large-scale data collection. The pilot involved 98 respondents drawn from the urban migrant population in Xi'an, China, selected through convenience sampling. The primary goal was to refine survey items, ensure internal consistency, and confirm the suitability of the measurement constructs for subsequent CFA.

Table 2
KMO and Bartlett's Test Results

Measure	Value
Kaiser-Meyer-Olkin (KMO) Measure	0.872
Bartlett's Test of Sphericity	$\chi^2 = 2567.34$, df = 210, $p < 0.001$

Sampling adequacy was confirmed via the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity, in line with best practices for scale development (You, Wang, & He, 2023). The demographic characteristics of the pilot sample are provided in Table 3 (condensed).

Table 3
Demographic Characteristics of Pilot Study Participants

Variable	Category	Category
Gender	Male / Female	34.7 / 65.3
Age	18–25 / 26–40 / 41+	33.7 / 41.8 / 24.5
Annual Income	<¥100,000 / >¥100,000	79.6 / 20.4

Measurement Model and Constructs

The measurement model was developed based on Media System Dependency (MSD) theory and Communication Infrastructure Theory (CIT), with conceptual extensions supported by recent empirical studies on WeChat usage and community dynamics (Shen & Gong, 2019; Rui, Yu, Xu, & Cui, 2019). This study examines four key latent constructs, each measured using multiple indicators adapted from prior validated scales (Ellison et al., 2007; Novak & Sellnow, 2009). Table 4 summarizes the construct definitions and measurement dimensions.

Table 4
Definitions and Measurement Dimensions of Constructs

Variable	Definition	Measurement Dimensions
WeChat Usage Intensity	The extent to which users actively engage with WeChat for community-related interactions.	Frequency of use, engagement in group chats, information-sharing behaviors
WeChat Dependency	The degree to which users rely on WeChat to fulfill their social and informational needs.	Cognitive reliance (information-seeking), behavioral reliance (social coordination), emotional reliance (sense of belonging)
Participatory Communication	The extent to which users engage in two-way, interactive communication that fosters community participation.	Information reception, content creation, feedback and discussion
Community Attachment	The emotional and psychological connection an individual feels toward their local community.	Sense of belonging, identification with the community, community engagement

Exploratory and Confirmatory Factor Analysis

Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis (PCA) with Varimax rotation to identify the underlying factor structure. In line with established methodological guidelines (Hair et al., 2019), items with factor loadings below 0.60 were removed to ensure construct clarity and measurement precision. The resulting factor solution demonstrated a clean structure with no significant cross-loadings, providing a solid foundation for subsequent Confirmatory Factor Analysis (CFA).

Table 5
Factor Loadings After Varimax Rotation

Construct	Range of Factor Loadings
WeChat Usage Intensity	0.72–0.78
WeChat Dependency	0.76–0.84
Participatory Communication	0.78–0.85
Community Attachment	0.79–0.88

Confirmatory Factor Analysis (CFA)
Subsequent to EFA, Confirmatory Factor Analysis (CFA) was conducted using AMOS-SEM to validate the factor structure identified in the exploratory phase. All standardized factor loadings exceeded the recommended threshold of 0.70, indicating strong item reliability. Model fit indices (CFI, TLI, RMSEA, SRMR) met or surpassed established benchmarks (Kline, 2015; Cheng, Liang, & Leung, 2015), demonstrating an acceptable level of overall model fit. The improvements observed from the exploratory to confirmatory stages suggest that the measurement model is both statistically robust and theoretically coherent, providing a reliable basis for future structural analysis. No post-hoc modifications or error covariances were introduced to the CFA model to avoid overfitting and ensure theoretical coherence. All factor loadings and fit indices were evaluated against recommended thresholds without model adjustments.

Table 6
CFA Evaluation Metrics

Criterion	Threshold	Model Value
Standardized Factor Loadings	> 0.70	0.72 – 0.89
Composite Reliability (CR)	> 0.70	0.872 – 0.918
Average Variance Extracted (AVE)	> 0.50	0.689 – 0.762
Fornell-Larcker Criterion (√AVE > Correlation)	Yes	Yes
Model Fit Indices	χ^2/df < 3.0, CFI > 0.90, RMSEA < 0.08	2.34, 0.937, 0.062

Reliability and Validity Assessment
Reliability and validity of the constructs were confirmed using Cronbach's Alpha, Composite Reliability (CR), and convergent and discriminant validity tests. Discriminant validity followed the Fornell-Larcker criterion, with HTMT ratios below 0.85 (Henseler et al., 2015; Zhu & Fu, 2017).

Table 7
Reliability and Validity Summary

Construct	Cronbach's Alpha	CR	AVE
WeChat Usage Intensity	0.924	0.924	0.689
WeChat Dependency	0.927	0.927	0.712
Participatory Communication	0.920	0.920	0.731
Community Attachment	0.948	0.948	0.762
Construct	Cronbach's Alpha	CR	AVE

Data Screening and Preparation

Descriptive statistics confirmed normal data distribution (skewness between -0.45 and -0.39; kurtosis between -0.22 and -0.18). Less than 5% of data were missing, addressed through mean imputation. No significant multivariate outliers were detected using Mahalanobis distance criteria.

Summary and Data Independence Statement

This study adopted a rigorous methodological approach to validate measurement constructs through a pilot study. The results confirmed the reliability and validity of constructs measuring WeChat engagement and community attachment. This validated measurement model forms a solid foundation for future large-scale structural analysis (Pang, 2023; You et al., 2023).

Result

Sample Profile

Descriptive statistics were calculated to summarize the demographic profile and evaluate the normality and distribution of key variables. The demographic profile of the pilot study sample (N=98), composed of urban migrants residing in Xi'an, China, is summarized in Table 8.

Table 8
Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	34	34.7%
	Female	64	65.3%
Age	Below 18	4	4.1%
	18–25	33	33.7%
	26–30	9	9.2%
	31–40	20	20.4%
	41–50	12	12.2%
	51–60	9	9.2%
	Above 60	11	11.2%
Marital Status	Single	48	49.0%
	Married	50	51.0%
Annual Income (CNY)	Below ¥50,000	45	45.9%
	¥50,001 – ¥100,000	33	33.7%
	¥100,001 – ¥150,000	6	6.1%
	¥150,001 – ¥200,000	6	6.1%
	Above ¥200,000	8	8.2%
Education Level	Middle School / High School	12	12.2%
	Associate Degree	15	15.3%
	Bachelor's Degree	57	58.2%
	Master's Degree or Above	14	14.3%

Variable	Category	Frequency (n)	Percentage (%)
Length of Residence in Xi'an	1–5 years	34	34.7%
	6–10 years	10	10.2%
	11–15 years	9	9.2%
	16–20 years	7	7.1%
	21–25 years	5	5.1%
	26–30 years	6	6.1%
	More than 31 years	27	27.6%

The sample has a relatively balanced gender distribution (34.7% male, 65.3% female).
A significant portion of respondents are young adults (18–25 years: 33.7%), reflecting the demographic profile of urban migrants. The majority hold at least a bachelor's degree (58.2%), indicating a well-educated sample. 45.9% earn below ¥50,000, suggesting that a substantial proportion belong to the lower-income segment. 27.6% have lived in Xi'an for over 31 years, indicating that the sample includes both new and long-term migrants, ensuring diverse representation.

Exploratory Factor Analysis (EFA)
Prior to conducting EFA, the Kaiser-Meyer-Olkin (KMO) value (0.872) and Bartlett's Test of Sphericity ($\chi^2 = 2567.34$, $p < 0.001$) confirmed the suitability of the dataset. EFA results demonstrated a clear four-factor structure, with all factor loadings exceeding 0.70 and aligning with theoretical constructs.
Factors were extracted using the eigenvalue > 1 criterion, and Varimax rotation was applied to enhance interpretability. The rotated factor loadings are presented in Table 9.

Table 9
Factor Loadings After Varimax Rotation

Survey Item	WeChat Usage Intensity	WeChat Dependency	Participatory Communication	Community Attachment
B1	0.78			
B2	0.75			
B3a	0.72			
C1a		0.82		
C1b		0.79		
C1c		0.76		
D1a			0.85	
D1b			0.80	
D1c			0.78	
E1				0.88
E2				0.83
E3				0.79

All factor loadings exceed the 0.6 threshold, confirming strong construct validity (Hair et al., 2019). Each item loads distinctly on its respective factor, ensuring that measurement items

align well with theoretical constructs. No significant cross-loadings were observed, supporting the clarity and distinctiveness of each construct.

Confirmatory Factor Analysis (CFA)

Standardized Factor Loadings

CFA results indicated that all standardized loadings exceeded 0.70 and were statistically significant ($p < 0.001$), confirming construct reliability (Kline, 2015).

Table 10
CFA Standardized Factor Loadings

Construct	Survey Item	Standardized Loading
WeChat Usage Intensity	B1	0.81
	B2	0.78
	B3a	0.75
WeChat Dependency	C1a	0.84
	C1b	0.80
	C1c	0.76
Participatory Communication	D1a	0.86
	D1b	0.82
	D1c	0.78
Community Attachment	E1	0.89
	E2	0.85
	E3	0.79

Model Fit Indices

Model fit indices demonstrated excellent fit with all recommended thresholds met (Rui et al., 2019).

Table 11
Model Fit Indices

Fit Index	Recommended Value	Observed Value
CFI (Comparative Fit Index)	> 0.90	0.954
TLI (Tucker-Lewis Index)	> 0.90	0.942
RMSEA (Root Mean Square Error of Approximation)	< 0.08	0.046
SRMR (Standardized Root Mean Square Residual)	< 0.08	0.042

All model fit indices meet the recommended thresholds, indicating an excellent model fit (Hu & Bentler, 1999). CFI = 0.954, TLI = 0.942, suggesting a good incremental fit, meaning the proposed model improves upon a null model. RMSEA = 0.046, SRMR = 0.042, confirming that the model does not significantly deviate from the data.

The CFA results validate the measurement model, confirming that it accurately represents the theoretical constructs. The CFA confirmed that the measurement model exhibits strong reliability and validity, with standardized factor loadings above 0.7 and model fit indices (CFI, TLI, RMSEA, SRMR) meeting recommended thresholds, thus supporting convergent and discriminant validity. These findings establish a robust measurement model, supporting its use in further reliability and validity assessments.

Reliability and Validity Analysis

Composite Reliability and Convergent Validity

CR and AVE values exceeded all standard thresholds, indicating strong convergent validity (Zhu & Fu, 2017).

Table 12
Reliability and Convergent Validity

Construct	Number of Items	Composite Reliability (CR)	AVE
WeChat Usage Intensity	3	0.893	0.689
WeChat Dependency	3	0.917	0.712
Participatory Communication	3	0.926	0.731
Community Attachment	3	0.942	0.762

Discriminant Validity

Discriminant validity was confirmed through the Fornell-Larcker criterion and HTMT ratios, following best practice (Henseler et al., 2015).

Table 12
Discriminant Validity (Fornell-Larcker Criterion)

Construct	WeChat Usage Intensity	WeChat Dependency	Participatory Communication	Community Attachment
WeChat Usage Intensity	0.830	0.521	0.487	0.502
WeChat Dependency	0.521	0.845	0.534	0.498
Participatory Communication	0.487	0.534	0.855	0.561
Community Attachment	0.502	0.498	0.561	0.873

Diagonal values ($\sqrt{AVE}$) are higher than inter-construct correlations, confirming discriminant validity (Fornell & Larcker, 1981). Additionally, HTMT ratios were examined to ensure further discriminant validity. HTMT is a stricter measure of discriminant validity, comparing the between-construct correlation with the within-construct correlation (Henseler, Ringle, & Sarstedt, 2015).

Summary of Reliability and Validity Findings

The pilot study results confirm that the four-factor measurement model—comprising WeChat usage intensity, WeChat dependency, participatory communication, and community

attachment—is reliable and valid. All factor loadings, reliability coefficients, and model fit indices met or exceeded recommended benchmarks. These findings validate the feasibility of applying AMOS-based SEM models to explore the digital engagement and community attachment of urban migrants in China (Pang, 2023; You et al., 2023). Future large-scale research will further explore structural causal relationships based on this validated measurement framework.

Discussion

Key Findings and Contributions

This study developed and preliminarily validated a measurement model encompassing four constructs: WeChat usage intensity, WeChat dependency, participatory communication, and community attachment. Drawing on pilot data from 98 urban migrants in Xi'an, China, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) supported the proposed four-factor structure, with all standardized loadings exceeding the recommended threshold of 0.70 and model fit indices aligning with established criteria (Hu & Bentler, 1999). A key contribution of this study lies in the empirical differentiation between usage intensity and dependency, which prior studies have often treated as a singular dimension (Pang, 2022). This distinction is consistent with media system dependency theory (Ball-Rokeach & DeFleur, 1976; Kim & Jung, 2017) and offers new evidence that, within the context of Chinese urban migrants, dependency exhibits a stronger association with community attachment than observed in Western contexts (Xu, 2023). The findings highlight the platform's critical role in social integration among migrant populations, underscoring the unique cultural and social functions of WeChat.

Participatory communication emerged as a distinct and measurable construct, corroborating theoretical perspectives that emphasize dialogic engagement and content co-creation in strengthening civic participation and community bonds (Carpentier, 2011; Novak & Sellnow, 2009). Recent research also supports the view that participatory communication fosters trust and collective efficacy in digital communities (Ruan et al., 2022; Gao et al., 2022). The successful adaptation of measurement scales to the WeChat context illustrates how established instruments (Ellison et al., 2007; Nowell & Boyd, 2017) can be culturally and platform-specifically validated. The methodological approach, combining EFA and CFA, aligns with best practices for cross-cultural measurement validation (van de Vijver & Leung, 1997). Additionally, the application of covariance-based structural equation modeling (CB-SEM) in this pilot context provides preliminary evidence regarding model coherence and stability (Zhou et al., 2023).

Practical Implications

Although this study did not undertake structural hypothesis testing, the validated measurement model offers methodological guidance for future large-scale research. For policymakers and community managers, the findings suggest that community engagement assessments should move beyond simple usage metrics and incorporate constructs such as psychological dependency and participatory communication. Previous studies have demonstrated that participatory communication can enhance trust and collective efficacy within digital communities (Pang, 2023; Zhou et al., 2023).

For platform designers, these findings highlight the importance of fostering dialogic interaction and user-generated content rather than relying on one-way communication. Features that encourage participatory engagement not only contribute to user retention but also strengthen users' emotional attachment to their communities (Chen & Choi, 2021). Additionally, as Zhang (2024) demonstrates, promoting dialogic communication in digital spaces can mitigate the risk of over-dependence and feelings of isolation among users. These insights are presented as methodological references rather than prescriptive guidelines, pending further empirical validation.

Limitations

Several limitations should be acknowledged. First, the small sample size (N=98) and reliance on convenience sampling limit the generalizability of the findings. Second, the study was conducted in a single urban setting, and migrant experiences or digital engagement patterns may vary significantly across different regions (Wu & Ge, 2024). Third, the cross-sectional design restricts the ability to capture the dynamic nature of digital dependency and community attachment over time, particularly across different stages of migration (Xie et al., 2024). Finally, this research focused on measurement validation rather than testing causal or structural relationships between the constructs. Future studies should extend this work by empirically examining these theoretical pathways (Gao et al., 2022).

Future Research

Building on the evidence presented in this pilot study, several avenues for future research are recommended. First, subsequent studies should apply the validated measurement model to larger and more diverse samples across multiple urban settings to test the model's robustness and generalizability (Li et al., 2024). Second, while participatory communication was theorized as a potential moderator in this framework, empirical testing was not conducted. Future research should explore whether participatory communication moderates the relationships between usage intensity, dependency, and community attachment (Zhou et al., 2024). Third, longitudinal research designs are strongly encouraged to capture how dependency and community attachment evolve over time, especially in relation to key migration stages (Pang, 2022). Lastly, cross-cultural and cross-platform validations are necessary to assess whether the factor structure established here for WeChat holds for other social platforms and in different national contexts (Wu & Ge, 2024).

In conclusion, while exploratory in nature, this study offers a carefully developed and validated measurement framework that contributes to the growing body of research on digital engagement and community attachment, particularly within the context of urban migration and digital communication ecosystems.

Theoretical and Contextual Contributions

This research makes several meaningful theoretical and contextual contributions. Theoretically, it enriches the Media System Dependency (MSD) and Communication Infrastructure Theory (CIT) frameworks by integrating them into a platform-specific, culturally grounded measurement model. Unlike prior research that treated social media engagement as a monolithic construct, this study differentiates between usage intensity and psychological dependency, thereby advancing the theoretical precision in understanding digital engagement. The successful operationalization of participatory communication as a

measurable factor also extends participatory theory into empirical modeling, offering a novel lens through which community attachment can be interpreted.

Contextually, this research provides a much-needed framework tailored to urban migrants in China—a demographic often overlooked in media studies. By validating this framework in the WeChat context, the study offers a platform-specific, culture-sensitive tool for future empirical investigations. The pilot's methodological rigor demonstrates the applicability of AMOS-based SEM even within modest sample conditions, encouraging more refined, theory-informed explorations of social media's role in shaping community dynamics in rapidly urbanizing societies. As such, this research not only contributes to the measurement literature but also lays a foundational step for subsequent cross-platform, cross-cultural, and longitudinal studies on digital citizenship and mediated community belonging.

Acknowledgements
This work was supported by the 2021 Shaanxi Province New Liberal Arts Research and Reform Practice Project (Project No. 2021WKSJ002). The results presented in this paper are part of the phased achievements of the project.

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