Journal of Information Systems Engineering and Management
2024, 9(4)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Beyond Screen Time: A Family-Integrated Model for Managing Short-Video Platforms Among Chinese Older Adults

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ARTICLE INFO

Received: 09 Oct 2024

Accepted: 12 Dec 2024

ABSTRACT

Short-video platforms (e.g., Douyin, Reels, Shorts) increasingly shape media habits among Chinese older adults. While these apps can support leisure and intergenerational connection, excessive use is linked to sleep disruption, lower well-being, and reduced physical activity. This article introduces and evaluates a culturally attuned, family-integrated program—CARE-SV (Co-plan, Arrange environment, Ritualize co-viewing, Evaluate & evolve for Short-Video)—grounded in Self-Determination Theory, the Behavior Change Technique Taxonomy, and Joint Media Engagement. We outline a mixed-methods randomized trial in urban and rural China comparing CARE-SV with a brief information control. Primary outcomes are device-logged short-video minutes/day and problematic use; secondary outcomes include sleep quality, well-being, loneliness, family cohesion, and trait self-control. We specify measurement, analysis, and implementation pathways (community health workers; senior centers; WeChat-based tracking) to facilitate replication. The model aims to rebalance use without undermining dignity or valued social functions of short-video in later life.

Keywords: Chinese older adults; caregivers; short-video platforms; family interventions; behavior change; mixed methods; digital well-being.

INTRODUCTION

China's "silver-haired" population has embraced short-video platforms for entertainment, information, and connection with adult children and grandchildren. Observational studies in China suggest both benefits (e.g., mood, sociality) and risks when use becomes excessive or poorly bounded (Luo, Xu, & Liu, 2024; Zhang et al., 2024). Conventional digital well-being programs often center on the individual user and rely on restrictive controls. In multigenerational Chinese households—where caregiving, technology setup, and routine-making are shared—**family** is a natural locus for sustainable change.

We theorize that respectful **co-regulation**—rather than top-down restriction—can reduce excessive use while preserving valued engagement. We draw on Self-Determination Theory (SDT) to protect autonomy, competence, and relatedness (Ntoumanis et al., 2021; Patrick & Williams, 2012); on the Behavior Change Technique (BCT) taxonomy to specify active ingredients (Michie et al., 2013); and on Joint Media Engagement (JME) to ritualize co-viewing and reflection (Takeuchi & Stevens, 2011). The result is **CARE-SV**, a family-integrated model that organizes brief planning, environment shaping, time-bounded co-viewing, and iterative review.

CONCEPTUAL FRAMEWORK

Autonomy-supportive change. SDT predicts durable behavior change when users experience choice, mastery, and connection. In later life, autonomy support is crucial for acceptability and adherence (Ntoumanis et al., 2021; Patrick & Williams, 2012).

Specified techniques. The BCT taxonomy clarifies "what we do": action planning, prompts/cues, habit substitution, feedback on behavior, and problem solving (Michie et al., 2013).

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Co-regulation via JME. Family co-viewing and post-viewing conversation can convert open-ended scrolling into **bounded, purposeful** rituals, supporting self-regulation while maintaining social value (Takeuchi & Stevens, 2011).

Chinese context. Intergenerational co-residence, filial norms, and widespread use of super-apps (e.g., WeChat for messaging, payments, and mini-programs) create practical channels for light-touch tracking, shared plans, and supportive reminders.

The CARE-SV Model

- **C — Co-plan:** A 60-minute autonomy-supportive session where caregiver and older adult set goals (e.g., reduce unplanned daytime scrolling), choose **two daily viewing windows** (15–20 minutes), and identify personally meaningful reasons for change.
- **A — Arrange environment:** Configure app-level time limits, notification bundling, bedtime lockouts, and (if preferred) grayscale during high-risk hours; create **watchlists** to replace algorithmic autoplay; pre-plan substitutions (tea walk, call a friend, music).
- **R — Ritualize co-viewing:** Establish a short, predictable co-viewing routine (e.g., after dinner) plus a 3–5-minute debrief ("What did we enjoy? Do we stop here and queue tomorrow?").
- **E — Evaluate & evolve:** Weekly 15-minute check-ins; a simple WeChat mini-program shares **aggregate minutes/episodes** with the dyad; celebrate small wins and adjust plans.

CARE-SV is dignity-preserving (seniors retain override), platform-agnostic, and feasible for delivery by community health workers or staff at senior activity centers.

METHODS

Design

Explanatory-sequential mixed methods: a 6-week, two-arm randomized controlled trial (RCT) with 12-week follow-up, followed by qualitative interviews/focus groups and mixed-methods integration.

Setting and Participants

Urban (e.g., Beijing/Shanghai) and rural sites in two provinces to reflect diverse connectivity and household structures. **Inclusion:** adults ≥60 years; average ≥60 minutes/day on short-video apps (device analytics); a family caregiver (co-resident or ≥3 contacts/week). **Exclusion:** moderate–severe cognitive impairment; unmanaged major psychiatric illness.

Sample Size

Power for a small-to-moderate effect ($d = .35$) on minutes/day with $\alpha = .05$ and $1-\beta = .80$ yields ~176 dyads; allowing 25% attrition, **240 dyads** (120/arm) will be recruited.

Randomization and Masking

1:1 allocation stratified by site and baseline minutes/day. Outcome assessors and analysts are masked; participants/coaches are not.

Intervention and Control

Intervention: CARE-SV delivered by trained coaches (one 60-minute onboarding + five 15-minute weekly tele-check-ins).
Control: A culturally adapted leaflet on healthy media use and instructions for built-in time limits; no coaching.

Measures

- **Primary:** Device-logged **minutes/day** on short-video apps; **Problematic short-video use** (adapted Problematic TikTok Use Scale; Günlü & Ceyhan, 2023).

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- **Secondary:** Sleep quality (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), psychological well-being (WHO-5; Topp, Østergaard, Søndergaard, & Bech, 2015), loneliness (UCLA-3; Russell, 1996), family cohesion/communication (FACES IV; Olson, Gorall, & Tiesel, 2006), trait self-control (BSCS; Tangney, Baumeister, & Boone, 2004). Process measures include autonomy support ratings, uptake of app settings, co-viewing adherence, and coaching fidelity.

ANALYSIS PLAN

We will conduct **intention-to-treat (ITT)** analyses with all randomized dyads, regardless of adherence. Primary endpoints are device-logged **minutes/day** on short-video apps and **problematic-use scores** at **6 weeks (T1)** and **18 weeks (T2)**. For each outcome, we will fit **linear mixed-effects models (LMMs)** with a **random intercept for dyad** and fixed effects for **group (CARE-SV vs. control), time (T0, T1, T2), site**, and the **group × time** interaction. Models will adjust for the baseline value of the outcome (ANCOVA parameterization) and prespecified covariates (senior age, sex). We will report **adjusted mean differences (AMD)** at T1 and T2, **95% confidence intervals**, **two-sided p values**, and **standardized effects (Hedges g with small-sample correction)**. Distributional assumptions will be examined using Q–Q plots and residual diagnostics; if necessary we will apply variance-stabilizing transformations or **heteroskedasticity-robust (HC) standard errors**. For skewed auxiliary counts (e.g., **episodes/day**), we will estimate **negative-binomial** mixed models with log link.

Secondary outcomes (PSQI, WHO-5, UCLA-3, FACES IV cohesion/communication, BSCS) will be analyzed using parallel LMMs for **change from baseline**, with AMD, 95% CI, and standardized effects. In addition, we will present **clinically meaningful improvement** rates using prespecified thresholds (e.g., PSQI decrease ≥3 points; WHO-5 increase ≥10 points; for scales without established thresholds, ≥0.5 SD improvement), and estimate **risk ratios**, **risk differences**, and **number-needed-to-treat (NNT)** via generalized linear models with identity/log links as appropriate. A **responder analysis** for the primary endpoint will classify dyads achieving a **≥30% reduction** in minutes/day between T0 and T1/T2.

Heterogeneity of treatment effects (HTE) will be examined via interaction terms for **caregiver type** (spouse vs. adult child), **baseline loneliness** (median split), **sex**, and **age band** (60–69 vs. 70+). We will present **marginal effects** and **forest plots** for subgroup contrasts at T2. To limit false positives, we will apply a **Benjamini–Hochberg false discovery rate (FDR) of 5%** across the HTE family.

Mediation will test the hypothesis that CARE-SV effects on T2 minutes/day are **indirectly transmitted** through **T1 autonomy support, family cohesion/communication, and self-control**, controlling for baseline mediator and outcome. We will fit a **longitudinal path/SEM model** and estimate indirect effects using **bias-corrected bootstrap CIs (5,000 resamples)**, reporting the **proportion mediated**. We will probe alternative temporal orderings (parallel change) and conduct **sensitivity analyses** for unmeasured mediator–outcome confounding (e.g., varying sensitivity parameter ρ).

Missing data will be addressed primarily through mixed-model maximum likelihood (assumes **MAR**). As sensitivity checks, we will use **multiple imputation by chained equations** with rich auxiliary variables (baseline covariates, interim usage summaries), and **pattern-mixture models** (delta-adjustment) to evaluate **MNAR** scenarios. **Per-protocol** analyses will define adherence as completion of the onboarding + ≥4/5 check-ins, enabling ≥2 environmental features (e.g., time limit, bundling), and ≥50% co-viewing adherence; results will be contrasted with ITT. Where contamination is suspected (control participants independently enabling multiple features), we will estimate a **complier average causal effect (CACE)** using instrumental-variable or principal-stratification approaches.

Multiplicity and decision rules. Primary outcomes at T1 and T2 will be interpreted using a hierarchical sequence (T1 minutes/day → T2 minutes/day → problematic-use at T1 → problematic-use at T2) to preserve type-I error. All other analyses are confirmatory-secondary or exploratory and labeled accordingly.

Software and reproducibility. Analyses will be conducted in a validated statistical environment (e.g., R or Stata). A **prepublished Statistical Analysis Plan (SAP)** will govern deviations; de-identified code and analysis scripts will

be archived in an open repository after acceptance. Graphical outputs will include trajectory plots with 95% CI ribbons, responder bar charts, HTE forest plots, and mediation diagrams.

ETHICS

This is a **minimal-risk behavioral trial**. Institutional approval will be obtained from an accredited ethics committee in China, and the protocol will be **registered** (e.g., ChiCTR) prior to enrollment. Written **informed consent** will be obtained **from both the older adult and the caregiver** after a clear explanation of aims, procedures, risks/benefits, voluntariness, confidentiality, and the right to withdraw without penalty. **Capacity to consent** will be screened (e.g., brief cognitive screener); if capacity is questionable, we will seek consent from a **legally authorized representative** while also obtaining the older adult's **assent**. Consent materials will be available in plain-language Chinese; staff will accommodate low literacy (read-aloud option) and sensory limitations.

Privacy and data protection. We adhere to **data minimization**: only **aggregate usage metrics** (minutes/episodes) are shared within families; **content is never accessed or stored**. Device analytics are pulled locally via OS-level reports when possible. Identifiers are separated from study data and replaced with **coded IDs**; the linkage file is stored encrypted on a secure server with access logging. Data are retained for a limited period (e.g., 5 years) and then destroyed per policy. The WeChat workflow—if used—transmits only aggregate minutes and session flags; no message content is accessed, and participants may opt out of this channel at any time.

Risk mitigation. Anticipated risks are minor (e.g., temporary frustration, family disagreements about limits). Coaches are trained in **autonomy-supportive communication** to prevent coercion and will provide **conflict-de-escalation scripts** and "pause and re-plan" options. Adverse events (AEs) and protocol deviations will be monitored continuously; a designated **data safety officer** will review AEs quarterly and on demand. If distress arises (e.g., worsening sleep or mood), coaches will pause the intervention and provide **referral pathways** (community clinics, counseling hotlines).

Participant rights and equity. Participation is voluntary; withdrawal can occur at any time without loss of benefits. Seniors retain **override** ability for any app limits at all times. Transportation reimbursement or a small token of appreciation may be offered, consistent with local norms and without undue influence. Recruitment will ensure **urban–rural representation** and accommodate accessibility needs (tele-check-ins, large-print materials). Any protocol amendments with ethical impact will undergo prior IRB review, and substantive changes will be communicated to participants.

Data sharing and dissemination. Only de-identified, aggregate findings will be disseminated. Requests for data will undergo governance review; any approved sharing will use a controlled-access agreement. Participants will receive a **plain-language summary** of results at study close.

RESULTS

Primary outcomes. We will report **adjusted mean differences** in device-logged minutes/day and problematic-use scores at **6 weeks (T1)** and **18 weeks (T2)**, with **95% confidence intervals**, **two-sided p values**, and **model-based Hedges g**. Diagnostics (Q–Q plots; residual SDs) and robustness checks will be presented, including winsorizing extreme minutes/day values and, for count-style episodes/day, negative-binomial models. A **responder analysis** will classify participants achieving a **≥30% reduction** in minutes/day; we will report risk differences, risk ratios, and **number-needed-to-treat**.

Secondary outcomes. We will summarize adjusted mean changes in **PSQI**, **WHO-5**, **UCLA-3**, **FACES IV**, and **BSCS**, report standardized effects and the **proportion achieving clinically meaningful improvement**, and visualize trajectories by arm with CI ribbons. Correlation matrices will examine covariation among changes (e.g., reductions in minutes/day vs. improvements in PSQI).

Heterogeneity, mediation, sensitivity. Prespecified **heterogeneity-of-treatment-effect** analyses (caregiver type, loneliness, sex, age band) will be summarized in a forest plot of interaction terms. **Mediation** models will test indirect effects through **T1 autonomy support, family cohesion, and self-control**, controlling for baselines and

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using bootstrap CIs. Sensitivity analyses will include **per-protocol** estimates (≥75% adherence to sessions and features) and **pattern-mixture models** addressing missing-not-at-random scenarios; multiple imputation will be used secondarily.

Process, fidelity, and harms. We will report uptake of time limits, notification bundling, bedtime lockouts, watchlist use, co-viewing completion, coach contact minutes, and any adverse events (e.g., conflict around limits). A **dose–response** plot will explore associations between feature uptake and outcome change.

Mixed-methods integration. Qualitative themes—e.g., *rituals over restrictions*, *care without control*, *privacy boundaries*, *friction at bedtime*, and *substitutions that stick*—will be aligned with quantitative trajectories in **joint display tables**, pairing exemplar quotes with change estimates for the same subgroups to identify **implementation levers**.

DISCUSSION

CARE-SV responds to two persistent gaps in later-life digital well-being: the scarcity of **autonomy-supportive** interventions and the underuse of **family processes** as active ingredients. By linking SDT's psychological needs with BCT-specified components and JME-style rituals, the model shifts the emphasis from surveillance and restriction to **co-regulated routines** that respect dignity (Michie et al., 2013; Ntoumanis et al., 2021; Takeuchi & Stevens, 2011; Patrick & Williams, 2012). In China's multigenerational households, this stance fits existing caregiving norms while allowing older adults to retain agency. Expected spillovers include improved sleep, mood, and social connectedness, as captured by PSQI, WHO-5, and UCLA-3 (Buysse et al., 1989; Topp et al., 2015; Russell, 1996). Family cohesion (FACES IV) and self-control (BSCS) may mediate maintenance beyond active coaching (Olson et al., 2006; Tangney et al., 2004).

Practice and policy. CARE-SV is brief, platform-agnostic, and compatible with task-shifting to community health workers and senior-center staff. A WeChat mini-program can automate weekly summaries while preserving privacy (aggregate minutes, not content). Municipal "healthy aging" initiatives could incorporate CARE-SV alongside fall prevention and sleep hygiene.

LIMITATIONS AND FUTURE WORK

Design and internal validity. Participants cannot be blinded, so expectancy and Hawthorne effects may inflate perceived improvement; device analytics help but cannot remove reactivity entirely. Contamination is plausible if control families independently enable built-in time limits or adopt similar routines after baseline. Coach effects and fidelity drift may introduce site-level variation, and brief training may not fully standardize autonomy-supportive communication across coaches.

Measurement and instrumentation. Device-logged minutes differ across Android OEM skins and iOS versions; some models aggregate app families or miss multi-window use, and shared phones/tablets may misattribute minutes. The adapted problematic-use scale requires cultural/linguistic validation for Mainland Chinese seniors; dialect translation (Mandarin, Cantonese, regional topolects) and low literacy can affect response precision. Self-logged "episodes/day" are susceptible to recall error despite diaries.

Sampling and generalizability. Volunteers may be more tech-confident or have supportive caregivers, limiting external validity to less digitally engaged or socially isolated seniors. Urban–rural infrastructure gaps (bandwidth, smartphone penetration) and socioeconomic differences could moderate feasibility. Comorbidities (hearing/vision impairment, depression, mild cognitive impairment) may alter both risk and responsiveness.

Implementation and ethics. Household power dynamics and norms of deference may blur the line between support and coercion; even with override options, seniors might feel obliged to comply. The WeChat workflow, while practical, raises data-protection questions (metadata exposure, account sharing) and depends on evolving platform policies. Rapid platform feature churn (e.g., time-limit prompts, autoplay defaults) requires manual updates to the intervention manual and coach scripts.

Analytic considerations. Mixed-model estimates assume missing at random; if dropout correlates with unobserved burden or conflict, results may be biased. Multiple subgroup and secondary analyses raise multiplicity concerns; even

with FDR control, exploratory findings warrant cautious interpretation. Mediation models are vulnerable to unmeasured confounding between mediators and outcomes.

Future work—effectiveness and adaptation.

- Run pragmatic, multi-site trials (urban/rural; community clinics, senior centers) and hybrid effectiveness–implementation studies to quantify reach, adoption, fidelity, and maintenance, alongside cost-effectiveness and budget-impact analyses.
- Test adaptive dosing via SMART designs (e.g., intensify coaching for non-responders) and micro-randomized trials for just-in-time support (timed prompts before high-risk windows).
- Compare coach delivery modes (in-person vs. tele vs. chat-based) and task-shifting to community health workers with train-the-trainer models.
- Extend to special populations: seniors with MCI, chronic pain, or sleep disorders; caregivers with high burden; single-elder households.
- Strengthen measurement with ecological momentary assessments, passive mobility data (step counts), and sleep wearables, while preserving data minimization.
- Conduct realist evaluations to specify "what works, for whom, and under what conditions," and transportability analyses to other Chinese regions and cultural contexts.
- Co-design iterations with older adults to refine rituals over restrictions, ensure plain-language materials in local dialects, and develop low-literacy interfaces.
- Create a maintained feature-compatibility matrix (major OS versions × platform controls) and versioned coach playbooks to keep pace with app and OS updates.

Taken together, these steps will clarify durability, equity, and scalability, ensuring that family-integrated co-regulation remains both effective and dignity-preserving as platforms, devices, and caregiving contexts evolve.

CONCLUSION

A respectful caregiver–older adult partnership can curb excessive short-video use while preserving the social and emotional benefits that make these platforms appealing in later life. Rather than "restrict and police," the approach emphasizes **co-regulation**—protecting autonomy, dignity, and everyday joy—so that reductions in unplanned scrolling coexist with purposeful, time-bounded engagement. The anticipated downstream gains (better sleep continuity, steadier mood, greater social connection, and more time for valued offline routines) speak to digital well-being as part of healthy ageing, not its opponent.

By **co-planning** goals, **arranging** supportive environments, **ritualizing** short, meaningful co-viewing, and **evaluating/evolving** plans over time, CARE-SV offers a low-burden, culturally aligned pathway for Chinese families. The model is practical: it can be delivered through community health centers, neighborhood committees, senior activity centers, "universities for the elderly," and family-doctor teams, with a simple WeChat workflow that shares only aggregate minutes (not content) to preserve privacy. Its components are platform-agnostic and amenable to brief coach training or task-shifting to community health workers, keeping costs modest and acceptability high for multigenerational households.

The next step is real-world testing at scale: pragmatic RCTs across urban and rural sites, longer follow-ups to assess maintenance, and cost-effectiveness analyses that consider caregiver time and potential spillovers to sleep and mood. Equity-focused adaptations should support low-literacy users and those with limited connectivity, and variants of CARE-SV should be explored for seniors with mild cognitive impairment or mobility limitations. Ethical guardrails—clear consent, override options, and non-intrusive data practices—are central to sustaining trust. Finally, the logic of family-integrated co-regulation can extend **beyond short-video** to adjacent behaviors (e.g., news feeds, livestreams), offering a coherent framework for dignified, digitally connected ageing in China.

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