

Leveraging ChatGPT for Effective Research Design and Data Analysis — An Example with Research on Short Video Addiction

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Abstract: Artificial intelligence, particularly advanced models like ChatGPT, offers significant enhancements in data processing efficiency, decision-making velocity, and precision across various domains. This study explores the transformative potential of ChatGPT within mixed methods research, emphasizing its integration into the exploratory sequential design against a backdrop of increasing reliance on AI in academic settings. Focusing on short video addiction as a research topic, this research employed ChatGPT to develop a qualitative research framework and refine interview outlines before utilizing it to design quantitative research instruments informed by qualitative insights. Results indicate that ChatGPT not only streamlined data collection, analysis, and interpretation but also emphasized the need for human oversight to interpret AI outputs and ensure data privacy. Conclusively, while ChatGPT significantly enhances the efficiency and depth of research methodologies, it also highlights the challenges of maintaining ethical standards and methodological integrity. Continuous refinement and responsible integration of AI tools like ChatGPT are essential to advance methodological sophistication and ensure the reliability of research findings.

Keywords: Mixed Methods Research; Artificial Intelligence; Short Video Addiction

1. Introduction

In recent years, the burgeoning advancement of artificial intelligence (AI) technologies has captured global attention, bringing revolutionary changes to numerous fields, among which ChatGPT stands at the forefront of this transformative wave. AI technology, characterized by the development of computer systems adept at executing tasks traditionally requiring human cognition—such as visual perception, speech recognition, decision-making, and linguistic translation—showcases its disruptive potential primarily through significant enhancements in data processing efficiency, decisional velocity, and precision. By learning and mimicking human cognitive processes, AI can adeptly analyze copious datasets, discern patterns, and formulate accurate forecasts, a capability of paramount importance in

data-intensive industries. Furthermore, AI's capacity for continuous, fatigue-resistant operation ensures consistent and efficient task management, particularly for complex activities. These attributes facilitate unparalleled breakthroughs in various domains, including medical diagnostics, financial analysis, and market prediction, thereby augmenting work efficacy and decisional quality. The self-learning and adaptive competencies of AI introduce novel solutions to intricate challenges, thereby not only optimizing extant processes but also heralding the genesis of innovative services and products, consequently disrupting conventional operational paradigms across diverse industries.

Developed by OpenAI, ChatGPT, a state-of-the-art language model predicated on the Generative Pre-trained Transformer architecture, has showcased remarkable proficiency in natural language understanding, conversation generation, and content creation, thereby catalyzing global discourse upon its inception. The swift incorporation of ChatGPT and analogous AI platforms across various fields underscores their potential to redefine traditional procedures and methodologies. For instance, in education, ChatGPT is revolutionizing pedagogical approaches by facilitating personalized and interactive learning experiences, thereby enriching the educational trajectory for educators and students alike (Adıgüzel et al., 2023). Within data science, ChatGPT automates and streamlines various stages of the data analysis workflow, from preprocessing to result interpretation, significantly bolstering productivity and permitting scientists to dedicate attention to more intricate analytical tasks (Hassani & Silva, 2023). In software development, ChatGPT assists developers in code retrieval and refactoring, optimizing the software development lifecycle and fostering innovation (Purwoko et al., 2023). Additionally, for individuals with neurodevelopmental disorders, ChatGPT offers customized educational tools and assessments, exemplifying AI's potential in providing specialized support and enhancing learning outcomes (Moraiti & Drigas, 2023). These cases underscore the adaptive and transformative essence of AI technologies like ChatGPT, paving the path for novel applications and methodologies across a spectrum of disciplines, thus heralding a new epoch of efficiency and innovation.

2. The Role of ChatGPT in Research Design and Data Analytics

The introduction of ChatGPT and similar AI technologies has kindled fresh perspectives and explorations in academic research, leveraging their capacity for human-like text processing and generation to propose innovative approaches to research design and data analysis, thereby challenging established paradigms and unveiling vast avenues for scholarly innovation and efficiency. As we verge on this AI-driven epoch, the amalgamation of tools like ChatGPT within research methodologies not only epitomizes the symbiosis between human and artificial intelligence but also marks a new chapter in the quest for knowledge and comprehension across disciplines.

Since ChatGPT's inception, scholars have engaged in many discussions and exploratory applications regarding its utility in academic research. An article deliberating on ChatGPT's potential to enhance research and scholarship within academia highlighted its applicability in literature review assistance, text generation, data analysis, linguistic translation, automated summarization, and question-answering (Lund & Wang, 2023). In March 2023, the Journal of Medical Internet Research published an article delineating the use of ChatGPT in generating a complete neurosurgery paper, showcasing a remarkable similarity to authentic medical papers in terms of lexicon, sentence construction, and

structural composition, with the entire article creation process spanning approximately one hour (Májovský et al., 2023). ChatGPT, serving as a virtual brainstorming collaborator, enriches the ideation phase of research projects by offering diverse perspectives and recommendations, thereby potentially leading to innovative discoveries and methodologies (Chatham et al., 2024). Its application in qualitative research data analysis is noteworthy, capable of generating codes, categories, themes, and direct citations from textual data, indicating its potential in elucidating dataset essences and offering a novel approach to qualitative data analysis (Sen et al., 2023). ChatGPT facilitates the drafting, editing, and proofreading of academic manuscripts, rendering the research writing process more efficient and less time-consuming (Lund & Wang, 2023). Its summarization capabilities significantly aid literature review processes by condensing key points from extensive texts and identifying pertinent research gaps, thereby enabling researchers to swiftly comprehend the crux of numerous articles and ensuring a comprehensive and well-informed review of existing literature on their topic of interest (AlZaabi et al., 2023). Investigations into ChatGPT's mathematical proficiency across datasets ranging from elementary to graduate-level mathematics revealed its performance to be substantially inferior to that of a graduate student, particularly in advanced mathematical problem-solving. Here, ChatGPT's efficacy lies primarily as a mathematical assistant for fact queries, functioning more as a search engine and knowledge base interface rather than a tool for high-level mathematical problem-solving (Frieder et al., 2024). This tool's capability to generate coherent and comprehensive text can greatly expedite initial drafting and revision processes, enhancing researchers' productivity (Rahman et al., 2023). For researchers who are non-native speakers of English, ChatGPT emerges as an invaluable resource for translating academic materials and enhancing the clarity and coherence of their writing, thereby facilitating their engagement in global academic discourse and making scientific knowledge more accessible to a broader audience.

Numerous practical examples underscore the advantages of ChatGPT in the academic sphere. Undoubtedly, AI technologies exemplified by ChatGPT can substantially aid the realm of academia. Despite its potential, the application of ChatGPT in academic research introduces ethical dilemmas related to originality, authenticity, data security, and potential legal issues concerning privacy, confidentiality, and plagiarism. To ensure the responsible utilization of AI technologies in research, Ethical standards and citation guidelines need to be maintained (Bhargava et al., 2023; Fatani, 2023; Akbar et al., 2023; AlZaabi et al., 2023). Furthermore, biases and inaccuracies in the content generated by ChatGPT, including references to non-existent sources, present significant obstacles for researchers depending on its output for scholarly pursuits (Sallam, 2023). The growing dependency on AI tools like ChatGPT for academic tasks also raises concerns about the possible erosion of critical thinking and analytical skills among scholars and students. Striking a balance between harnessing AI's capabilities and upholding stringent academic integrity is pivotal (Karakose, 2023).

Despite existing apprehensions, many scholars advocate for the application of AI technologies in academia, suggesting that resistance to AI's integration within scholarly domains is neither possible nor desirable. ChatGPT, serving as potent research and writing aide, can help bridge the gap for researchers in resource-constrained environments, providing them with tools to augment their academic writing and research skills. Such support can lead to a more diverse and inclusive academic community, enriching the discipline with a wider array of perspectives and insights. The exploration of AI technology's application in academia thus continues to call for further investigation.

Mixed methods research design, which amalgamates the strengths of both quantitative and qualitative methodologies, offers a holistic and nuanced comprehension of research queries. Through methodological pluralism, this design bolsters the reliability and validity of results via cross-verification and validation, adeptly mitigating the limitations inherent to singular method research. It fosters adaptability and creativity in tackling intricate research questions, delivering both the depth and scope necessary to elucidate underlying mechanisms and broader patterns. Consequently, mixed methods research is increasingly favored and experimented with by scholars due to its capacity to yield richer insights and more solid conclusions, thereby becoming an invaluable strategy across various academic fields (Bryman, 2006; Hafsa, 2019; Johnson & Onwuegbuzie, 2004; Turner et al., 2017).

Nonetheless, conducting mixed methods research is fraught with challenges due to its complexity. A notable challenge is the integration of qualitative and quantitative data and methodologies (Ivankova et al., 2006). Merging qualitative and quantitative data and methods in mixed methods research is challenging, arising from their distinct epistemological underpinnings, data forms, and analytical techniques. This integration needs meticulous planning to harmonize text-based, contextually rich qualitative data with numerical, generalizable quantitative data, requiring methodological ingenuity in analysis, interpretation, and presentation. Researchers must traverse the philosophical divergences between these methodologies, deciding their sequence, precedence, and theoretical context to ensure a coherent and meaningful amalgamation of findings. Successful integration demands a high degree of ability and a transparent approach to design and implementation, ultimately enhancing the research outcomes with comprehensive insights into the investigated phenomena.

The potential advantages of AI technology, such as ChatGPT, in addressing these challenges and thereby augmenting the breadth and depth of researchers' explorations of knowledge will be examined through a case study employing a mixed methods research design in this paper.

3. Current study

Among different types of mixed methods designs, the exploratory sequential design aims to begin with an exploration of a sample, followed by a subsequent quantitative phase that adapts to the requirements of the subjects being investigated (Creswell & Creswell, 2017). This design encompasses three distinct phases, wherein the researcher begins with qualitative data and analysis, proceeds to develop characteristics, and concludes with the testing of these characteristics. The initial phase is defined as the exploratory phase, followed by the instrument (or quantitative feature) development phase, and finally, the sampling phase to administer and test the instrument features within the population (Creswell & Creswell, 2017).

The integration of ChatGPT into the three phases of the exploratory sequential design offers significant advantages. In the first phase, researchers initiate by proposing a broad research topic. Through continuous interaction with ChatGPT, they can refine the qualitative research topic and framework. Subsequently, ChatGPT can assist in designing qualitative research and refining interview outlines. Researchers then identify suitable subjects for interviews.

In the second phase, researchers upload interview transcripts to ChatGPT, guiding it to utilize qualitative results to inform the design of the quantitative phase. This involves the creation of measurement instruments or identification of new variables worthy of study, leading to the development of a quantitative research design.

During the third phase, researchers collect quantitative data and upload it to ChatGPT for analysis and hypothesis testing. ChatGPT can aid in interpreting results and determining whether the qualitative study findings from earlier phases apply to a broader sample. Additionally, during the research article writing process, ChatGPT can offer suggestions for language refinement and help with graph creation.

4. Results

To illustrate the application of ChatGPT in the exploratory sequential design, this study selected short video addiction as the research topic and followed the aforementioned sequence to conduct mixed-method research.

4.1 Phase I: Exploratory Phase

4.1.1 Conceptualization



At the beginning of the exploratory phase, ChatGPT emerges as an invaluable tool for facilitating conceptualization. Within this realm, ChatGPT serves a multifaceted role, aiding researchers in navigating the complex environment of idea development and study concept formation. ChatGPT's sophisticated natural language processing capabilities facilitate the ideation phase by providing insightful research notions, establishing the groundwork for further investigation. Through interactive dialogue and exploration, ChatGPT stimulates the generation of novel ideas, sparking inspiration and laying the groundwork for further inquiry.

Following the ideation process, ChatGPT facilitates the generation of research concepts by distilling abstract ideas into tangible research frameworks. Drawing upon its analytical capabilities, ChatGPT assists researchers in articulating clear research questions and objectives, refining conceptual frameworks, and delineating the scope and boundaries of the study. By synthesizing complex concepts and disparate strands of information, ChatGPT enables researchers to crystallize their vision and translate conceptual aspirations into actionable research plans.

Lastly, ChatGPT facilitates the iterative refinement of research goals, enabling researchers to change and evolve their research plans in response to emerging insights and feedback. Through iterative dialogue and collaborative refinement, ChatGPT aids researchers in fine-tuning research goals and incorporating new dimensions of inquiry. ChatGPT supports adaptability and flexibility by encouraging a dynamic and iterative approach to conceptualization, ensuring that research aims remain in line with changing scholarly discourse and real-world situations.

In the current study, the researchers provided a broad topic concerning short video addiction, and tasked ChatGPT with generating potential research topics related to this domain. ChatGPT proposed a total of ten possible topics, a selection of which is presented in Figure 1:

Figure 1. Conceptualization of research topics

-  **Anonymous**
If I want to study short video use/addiction, please help design some qualitative research questions.
-  **ChatGPT**
Certainly! If you're interested in studying short video use or addiction, qualitative research questions can help you explore this phenomenon from a more in-depth and nuanced perspective. Here are some qualitative research questions to consider:
1. **Exploring Motivations and Triggers:**
 - What motivates individuals to engage in excessive short video consumption?
 - Can you identify specific triggers that lead to increased short video use or addiction?
 - How do personal factors, such as emotions and stress, contribute to short video addiction?
 2. **Understanding the Experience of Addiction:**
 - What does it feel like to be addicted to short videos? Can you describe the emotional and psychological experiences?
 - How do individuals describe the impact of short video addiction on their daily lives, relationships, and responsibilities?
 3. **Social and Peer Influence:**
 - How does peer pressure or social influence contribute to short video addiction?
 - What role do social networks and communities within short video platforms play in encouraging or discouraging addiction?
 4. **Patterns of Use and Escapism:**
 - How do individuals structure their short video use throughout the day or week?
 - Are there patterns of escapism or avoidance associated with excessive short video consumption?
 5. **Content Preferences and Gratifications:**
 - What types of content are most appealing to individuals who use short videos excessively?
 - How do different content genres fulfill specific gratifications or needs for users?
 6. **Coping Mechanisms and Self-Perception:**
 - How do individuals perceive themselves in relation to their short video addiction?
 - What coping mechanisms do they employ to deal with the negative consequences of addiction?

4.1.2 Qualitative Research Design

In accordance with the conceptual framework, ChatGPT continues to exert its influence by providing indispensable support in methodological guidance and formulation. Drawing upon its

sophisticated understanding of qualitative inquiry methodologies, ChatGPT offers valuable insights and recommendations, empowering researchers to navigate the complexities of qualitative research design with confidence and precision. ChatGPT offers insights into various qualitative approaches such as phenomenology, grounded theory, ethnography, or case study, among others. Through interactive dialogue and contextual analysis, ChatGPT helps researchers identify the most appropriate methodological framework that aligns with the research objectives and context. Moreover, ChatGPT provides guidance on data collection techniques, sampling strategies, and data analysis methods, ensuring methodological rigor and adherence to best practices in qualitative inquiry. By leveraging its expertise in qualitative methodologies, ChatGPT empowers researchers to conduct rigorous and insightful qualitative research studies.

Moreover, ChatGPT collaborates with researchers in the formulation of pertinent interview protocols, leveraging its ability to generate contextually relevant questions and prompts that resonate with the research objectives. Through collaborative dialogue and iterative refinement, ChatGPT assists researchers in designing interview questions that elicit rich and meaningful responses from participants. Drawing upon its understanding of language patterns and communication dynamics, ChatGPT helps researchers strike a balance between open-ended exploration and focused inquiry, ensuring depth and breadth in data collection. Furthermore, ChatGPT offers guidance on establishing rapport with participants, maintaining ethical standards, and mitigating potential biases in the interview process. By leveraging ChatGPT's expertise in interview protocol formulation, researchers can optimize the quality and richness of qualitative data, ultimately enhancing the depth and validity of their research findings. In the context of the short video addiction study, following the conceptualization of potential research topics, the researchers proceeded to identify a more specific inquiry concerning the relationship between emotional needs for intimacy and short video utilization. Subsequently, ChatGPT was enlisted to aid in formulating the qualitative research design and structuring the interview outline. Figure 2 shows the interview outline and sample questions derived from this process:

Figure 2. Qualitative research design**Anonymous**

I would like to study the emotional needs for intimacy (or called romantic relationships) and short video use (e.g., prolonged viewing, large rewards, etc.), please help design an interview outline.

**ChatGPT**

Certainly! To study the emotional needs for intimacy or romantic relationships and their relationship with short video use, you can design an interview outline that explores various aspects of this complex interaction. Here's a structured interview outline to guide your qualitative research:

Introduction and Background:

1. Begin with a brief introduction, explaining the purpose of the interview and assuring confidentiality.
2. Ask the participant to provide some background information, including age, gender, relationship status, and the duration of their short video use.

Understanding Emotional Needs:

3. Explore the emotional needs and desires related to intimacy and romantic relationships:

- What emotional needs or desires do you associate with romantic relationships or intimacy?

Short Video Use Patterns:

4. Investigate the participant's short video use patterns and behaviors:

Emotions and Short Video Use:

5. Explore the emotional experiences associated with short video use:

- How do you feel before, during, and after extended periods of short video consumption?

Relationship between Emotional Needs and Short Video Use:

6. Examine the potential connection between emotional needs for intimacy and short video use:

- Do you find that short video consumption satisfies or complements your emotional needs for intimacy or romantic connection?

Coping Strategies and Alternatives:

7. Discuss the coping strategies or alternatives participants employ to meet their emotional needs:

- Apart from short videos, what other methods or activities do you use to fulfill your emotional needs for intimacy or romantic connection?

Impact on Real-life Relationships:

8. Explore how short video use may influence real-life relationships:

- Has your short video use ever affected your ability to connect with others in a romantic or intimate way?

Reflection and Future Intentions:

9. Encourage reflection on short video use and emotional needs:

- Based on our discussion, how do you feel about the role of short video use in your life and its impact on your emotional needs?

Conclusion:

10. Thank the participant for their time and willingness to share their experiences and insights.


In summary, during Phase I of the exploratory process, researchers initiated a trajectory of ideation, concept development, domain exploration, and iterative refinement of study objectives, facilitated by the symbiotic collaboration with ChatGPT. Throughout the qualitative research design phase, researchers leveraged ChatGPT's methodological guidance and assistance in formulating pertinent interview protocols, thereby ensuring methodological rigor and alignment with the overarching study objectives. These phases highlight the important role of ChatGPT in promoting a systematic and informed approach to study design, laying the groundwork for later phases of inquiry and analysis.


4.2 Phase II: Instrument Development Phase


We conducted interviews with three heavy users of short-form video platforms based on an interview questionnaire provided by ChatGPT. The interviews were transcribed into electronic manuscripts from audio recordings. It is well known that ChatGPT possesses exceptional capabilities in text reading and summarization. Therefore, we intend to utilize ChatGPT for text analysis to assist in the identification and synthesis of key arguments for our study.


In fact, when researchers are faced with an abundance of interview manuscripts, ChatGPT can significantly expedite the material synthesis process by efficiently categorizing and summarizing the content, thereby saving researchers a substantial amount of time. The system's advanced natural language processing capabilities enable it to extract key themes and patterns from extensive textual data, offering valuable insights and streamlined overviews that can be instrumental in the progression and development of scholarly research. Subsequently, we engaged ChatGPT further, soliciting its capabilities to distill the arguments within the manuscripts pertinent to our specific research theme, and we even elicited suggestions for future research directions. Figure 3 shows how the researcher interacted with ChatGPT.

Figure 3. Qualitative data analysis



Anonymous


interview 1.docx
Document


interviewee 2.docx
Document


interviewee3.docx
Document

can you read these docx files, and tell me the main topic of these files


ChatGPT

Certainly! I'll proceed to extract and analyze the text from each of the DOCX files to identify their main topics. Let's go through them one by one.

Based on the initial analysis of the extracted text from each DOCX file, here's a brief overview of their main topics:

- interview 1.docx:**
 - This document appears to be an interview transcript conducted in Chinese.
 - The interview explores young people's addiction to short videos and emotional projection in these videos.
 - The interviewee is a 26-year-old male who has been using short videos for about two to three years.
 - There's a focus on the interviewee's emotional needs and desires related to intimate and romantic relationships.
- interviewee 2.docx:**
 - Another interview transcript in Chinese focusing on the use of short video apps (like Douyin and Kuaishou) and how they meet users' emotional and intimacy needs.
 - The interviewee is a 24-year-old single male who uses short video apps for about 3-4 hours daily.
 - The discussion includes the emotional needs and desires the interviewee hopes to fulfill through romantic relationships.
- interviewee3.docx:**
 - The document is an interview transcript in Chinese, discussing the relationship between short video usage and emotional needs.
 - The interviewee started using short videos around 2021 and found them addictive.
 - The document discusses the interviewee's experience with short videos and their impact on his emotions and life.

Each document seems to revolve around individuals' use of short video platforms and how these platforms relate to or impact their emotional and intimacy needs. The interviews delve into the interviewees' experiences and perspectives on using these platforms and their views on relationships and emotional connections.

Let me know if you need more detailed analysis or translation of specific sections of the text! [\[>-\]](#)

Herein, we present a subset of summaries regarding the interview content as furnished by ChatGPT. Due to the inherent logical structure of natural language, we are able to persistently query the model for more detailed content, thereby obtaining a more granulated understanding of the interviews. However, given ChatGPT's capacity to comprehend colloquial speech, we performed a series of reverse calibration questions aimed at extracting the original textual content. The outcomes demonstrated some interpretive inaccuracies, highlighting the necessity for counterchecking when utilizing ChatGPT. This underscores the prerequisites for utilizing such advanced tools, including the need for reverse-error checking to ensure accuracy and integrity in the data extraction process.

4.3 Phase III: Administering and Testing the Instrument Features within the Population

In mixed methods research, qualitative inquiries are typically inductive, aimed at identifying specific patterns and gaining an in-depth understanding of the textual data. Researchers engage in the thematic synthesis to detect potentially significant patterns and extract variables that might hold causal or correlational relationships. Following this qualitative phase, the research proceeds to the quantitative phase, where statistical analysis is employed to verify the authenticity of these identified patterns on a larger scale.

4.3.1 Quantitative Research Design

Upon distilling key points from interview transcriptions, it is plausible to engage ChatGPT in formulating research questions that would lend themselves to quantitative analysis. ChatGPT can aid in this process by suggesting hypotheses based on the qualitative findings, which can then be operationalized into measurable variables. These variables can be systematically tested using quantitative methods to confirm or refute the presence of the patterns discerned in the qualitative phase. The essence of this approach is the seamless transition from the 'what' and 'why' questions typically addressed by qualitative research to the 'how often' or 'to what extent' questions that can be answered by quantitative research. By employing such a methodology, we enhance the robustness of our findings and ensure a rigorous analytical process that benefits from the rich, contextual insights of qualitative data and the objectivity and generalizability of quantitative data.

This integrated approach not only provides a comprehensive analysis of research phenomena but also expands the scope of inquiry, allowing researchers to explore dimensions of the research questions that would remain inaccessible if only a single methodological stance were adopted. Therefore, consulting ChatGPT for potential quantitative research inquiries could effectively bridge the qualitative understandings with quantitative explorations, thereby enriching the empirical contributions of the study. Figure 4 shows how we asked ChatGPT to summarize possible causal relationships from existing documents.

Figure 4. Exploration of quantitative research**Anonymous**

can you summarize some causal relationship from these files for quantitative research

**ChatGPT**

In qualitative research, establishing causal relationships can be challenging due to the exploratory and interpretative nature of the methodology. However, you can still identify potential associations or patterns within the data that may suggest causal relationships, which can later be tested through quantitative research.

Below, I have outlined some potential relationships that could be further tested:

1. Association Between Emotional Needs and Video Consumption:

- **Hypothesis:** Individuals with higher emotional needs for intimacy may engage more frequently and intensively with short video platforms.
- **Rationale:** Participants appear to use short video platforms to fulfill specific emotional or intimacy needs, suggesting a potential association between their emotional states and video consumption behavior.

2. Link Between Loneliness and Addictive Video Watching:

- **Hypothesis:** Feelings of loneliness may lead to increased and addictive use of short video platforms.
- **Rationale:** If participants express feelings of loneliness and also describe their video watching behavior as compulsive or addictive, there may be a link suggesting that loneliness drives increased platform use.

3. Connection Between Rewarding Behavior and Emotional Satisfaction:

- **Hypothesis:** Individuals who frequently reward content creators may derive higher emotional satisfaction from the platform, possibly feeling more connected or valued.
- **Rationale:** Rewarding behavior might be an expression of appreciation or connection with the content creator, which may fulfill the user's emotional needs.

Guided by the insights offered by ChatGPT, we pinpointed a question of interest to serve as the nucleus for subsequent analytical endeavors. Given this theme, we envisaged ChatGPT to furnish us with scholarly recommendations, for instance, the structuring of a quantitative research design. Notably, ChatGPT provided us with a prototypical research proposal (Figure 5), which stands to furnish those new to the field of academic inquiry with foundational methodological support. Beyond this, our inquiries extended to the provision of pertinent academic scales. Leveraging such scales, we meticulously crafted a standard questionnaire tailored to the rigors of quantitative research. This iterative process highlights the utility of AI in conceptualizing research design and instrumentation, thereby aiding in the operationalization of research constructs and facilitating the empirical testing of theoretical propositions.

Figure 5. Quantitative research proposal**Anonymous**

thank you, and we want to choose the topic "Link Between Loneliness and Addictive Video Watching" to do the further research, can you design a quantitative research for us?

**ChatGPT**

Certainly! Designing a quantitative study involves creating a structured research plan to systematically investigate the proposed hypotheses. Below, you'll find a basic outline for a quantitative study investigating the link between loneliness and addictive video watching.

Title:

"Exploring the Association Between Loneliness and Addictive Behavior in Short Video Platform Usage"

1. Research Objectives:

- To examine the relationship between loneliness and addictive watching of short videos.
- To understand the impact of loneliness levels on the frequency and duration of video watching.

2. Hypotheses:

- **H1:** There is a positive correlation between levels of loneliness and addictive watching of short videos.
- **H2:** Individuals who experience higher levels of loneliness spend more time on short video platforms.

3. Operational Definitions:

- **Loneliness:** Measured using a validated loneliness scale, like the UCLA Loneliness Scale.
- **Addictive Watching:** Operationalized as the number of hours spent on the platform, frequency of use, and self-reported inability to reduce usage.

4. Research Design:

- **Design:** Cross-sectional study using an online survey.
- **Population:** Users of short video platforms (specify the age range, geographic location, etc.).
- **Sampling:** Random sampling or convenience sampling from various online communities, forums, and social media platforms related to short video content.

5. Data Collection Method:

- **Survey Instrument:** Develop an online survey with sections on demographic information, loneliness assessment, and short video watching behavior.
- **Loneliness Measurement:** Include questions from a validated loneliness scale.
- **Video Watching Behavior:** Questions on daily/weekly hours spent, frequency of use, and self-perceived addiction level.

6. Data Analysis Plan:

- Descriptive statistics to summarize the data.
- Correlation analysis to examine the relationship between loneliness and addictive watching.
- Regression analysis to understand the predictive power of loneliness on video watching behavior while controlling for other variables (like age, gender, etc.).

ChatGPT has demonstrated remarkable acuity in understanding the nuances of academic research methodology. It has offered us a detailed quantitative research analysis plan grounded in our selected area of inquiry, providing invaluable guidance for novices in the field. To further refine our tools, we sought ChatGPT's assistance in establishing the scales for our quantitative survey instruments (Figure 6). While ChatGPT was able to present us with a range of professional references, the availability of academically rigorous scales via open-source data proved to be a constraint, reflecting the unique contributions that researchers bring to the investigative process. This emphasizes the irreplaceable nature of scholarly expertise, wherein ChatGPT's role is primarily to augment the intellectual exploration and provide comprehensive elucidation rather than to serve as a substitute for the intricate tasks typically undertaken by human scholars.

Figure 6. Questionnaire design for quantitative research**Anonymous**

can you design a questionnaire for us and use UCLA loneliness scale to measure loneliness

**ChatGPT**

Certainly! Below is a sample questionnaire designed to collect data on participants' loneliness levels and their addictive behavior towards watching short videos. This questionnaire incorporates the UCLA Loneliness Scale (Version 3), a well-validated instrument for assessing loneliness.

Title:

"Understanding the Relationship Between Loneliness and Addictive Video Watching: A Survey"

Instructions:

"Thank you for participating in our survey! Your responses will help us understand the relationship between loneliness and addictive watching of short videos. Please answer all questions honestly and accurately. Your responses will be kept confidential."

Section 1: Demographic Information**1.1 Age:**

- _____ (Please enter your age)

1.2 Gender:

- Male
- Female
- Non-binary
- Prefer not to say
- Other: _____ (please specify)

1.3 Employment Status:

- Employed full-time
- Employed part-time
- Unemployed
- Student
- Retired
- Other: _____ (please specify)

Section 2: UCLA Loneliness Scale

Please indicate how often each of the statements below is descriptive of you.

- **Never**
- **Rarely**
- **Sometimes**
- **Always**

2.1 I feel in tune with the people around me.

2.2 I lack companionship.

2.3 There is no one I can turn to.

2.4 I do not feel alone.

2.5 I feel part of a group of friends.

2.6 I have a lot in common with the people around me.

2.7 I am no longer close to anyone.

2.8 My interests and ideas are not shared by those around me.

2.9 I am an outgoing person.

2.10 There are people I feel close to.

Section 3: Video Watching Behavior

3.1 How many hours per day do you spend on short video platforms (like TikTok, Douyin)?

- Less than 1 hour
- 1-2 hours
- 2-3 hours
- 3-4 hours
- More than 4 hours

3.2 How would you describe your usage of short video platforms?

- Casual viewer
- Frequent viewer
- Addicted viewer

3.3 Do you find it difficult to reduce the time spent on watching short videos even if you want to?

- Yes
- No

3.4 Do you use short video platforms as a way to escape from feelings of loneliness or sadness?

- Yes
- No

Section 4: Rewarding Behavior

4.1 Do you often reward or tip content creators on short video platforms?

- Yes
- No

4.2 If yes, how often do you reward or tip content creators?

- Rarely
- Occasionally
- Frequently

Closing:

"Thank you for completing the survey! Your input is valuable to us. If you have any additional comments or thoughts, please feel free to share them below."

Additional Comments:

- (Open text field for participants to provide additional comments)

End of Survey

Please review and customize the questionnaire as needed to better fit your research objectives and context. Ensure to provide participants with information about the purpose of the study, confidentiality, and how their data will be used. Also, consider pre-testing the questionnaire with a small group of participants to identify and resolve any issues or ambiguities in the questions.

The dialogical interactions with ChatGPT have illustrated its adeptness in developing a well-organized and usable survey framework. This not only encompasses the conception of survey items that are cogent and pertinent to the research question but also ensures that the survey aligns with established methodological standards. Furthermore, ChatGPT's proficiency extends to the domain of data sampling strategies, providing researchers with methodologically sound advice on selecting appropriate sampling techniques that align with the objectives of the study and the nature of the population under investigation. This ability to guide the sampling process is indispensable, as it underpins the reliability and validity of the research findings. Such guidance is particularly valuable in ensuring representativeness and in addressing potential sampling biases, thereby enhancing the overall quality and credibility of the research. Figure 7 shows a description of the specialized sampling methods that ChatGPT provides us with in the role of very limited information.

Figure 7. Sampling methods for quantitative research**Anonymous**

I want study this topic among young adults, can you conduct a detailed sampling plan

**ChatGPT**

Certainly! Below is a sampling plan designed to study the relationship between loneliness and addictive video watching among young adults. This plan outlines the target population, sampling frame, sampling method, and sample size considerations.

1. Target Population:

- **Definition:** Young adults who use short video platforms.
- **Inclusion Criteria:**
 - Aged between 18 and 35 years old.
 - Regular users of short video platforms (at least once per week).

2. Sampling Frame:

- Since it is impractical to obtain a list of all young adults using short video platforms, the sampling frame can be constructed from various online communities, forums, and social media platforms related to short video content.
- Collaborate with universities and colleges to approach students who might fit the criteria.
- Use social media platforms to target groups and communities dedicated to short video content.

3. Sampling Method:

- **Stratified Random Sampling:**
 - Divide the population into subgroups (strata) based on specific characteristics (e.g., age groups, gender, frequency of video platform usage).
 - Randomly select samples from each subgroup.
 - This method ensures representation from various subgroups within the young adult population.

4. Determining Sample Size:

- The sample size depends on the desired level of precision and confidence level.
- For a confidence level of 95% and a margin of error of 5%, you can use the formula for sample size calculation:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{E^2}$$

Where:

- n = sample size
- Z = z-value (1.96 for 95% confidence level)
- p = estimated proportion of the population having the characteristic (0.5 if unknown)
- E = margin of error (0.05 for 5%)
- Adjust the calculated sample size for finite population correction and potential non-response.

5. Recruitment Strategy:

• Online Recruitment:

- Post the survey on social media platforms, online communities, and forums dedicated to short video users.
- Collaborate with educational institutions to distribute the survey among students.

• Incentives:

- Consider providing incentives (like gift cards, discount coupons, or participation in a lucky draw) to encourage participation.

6. Implementation Plan:

1. Pre-testing:

- Conduct a pilot test with a small group of participants to refine and validate the questionnaire.

2. Data Collection:

- Launch the survey and monitor the responses.
- Ensure the diversity of respondents to improve the representativeness of the sample.

3. Data Cleaning:

- Clean and preprocess the collected data for analysis.

7. Ethical Considerations:

- Obtain informed consent from participants.
- Ensure participants' anonymity and confidentiality.
- Clearly communicate the purpose of the study and how the data will be used.

Conclusion:

This sampling plan provides a guideline for collecting data from young adults on the relationship between loneliness and addictive video watching. Adjust and refine the plan as necessary to meet the specific needs and constraints of your research project. Conducting a pilot test of the survey and sampling plan is recommended to identify and address potential issues before full-scale data collection.

ChatGPT has constructed an intricately detailed sampling method based on our stipulated needs. It is important to note that while the current research design is hypothetical, in the context of genuine academic inquiry, the provision of additional details to ChatGPT—such as the specific urban setting, demographic particulars, and an approximation of the intended sample size—would enable a more finely tuned sampling strategy. With these enhanced details, ChatGPT could better align the sampling methodology with the study's objectives. Moreover, ChatGPT's ability to provide a detailed account of the statistical logic that informs the sampling method is invaluable, as it facilitates a deeper

understanding of the principles and procedures that guide the sampling process, thereby contributing to the rigor and validity of the empirical research.

4.3.2 Quantitative Data Analysis

Given that our study has not proceeded to the stage of actual data collection through survey administration, we are unable to engage ChatGPT in the subsequent phase of data analysis with real datasets. Nonetheless, ChatGPT's data analysis functionalities are impressively comprehensive. It is well-equipped not only to provide instruction for programming-related aspects of data analysis but also to conduct a variety of analyses upon receipt of a data sample. We can solicit ChatGPT to review preliminary data characteristics to ascertain the most suitable analytical techniques, such as opting between linear and logistic regression models or considering other, more sophisticated methods of analysis.

Figure 8 displayed our aspiration for ChatGPT to assist us in the process of constructing a Structural Equation Modeling (SEM) framework. With the utilization of straightforward language, ChatGPT can provide us with a comprehensive suite of coding tasks. This facilitates the operationalization of our theoretical constructs into a quantifiable model, thereby enabling the empirical examination of the hypothesized relationships within our research domain.

Figure 8. Quantitative data analysis

Anonymous
we want to conduct a sem model to study the relationship between loneliness and addictive video watching, we have two mediator, m1 and m2, all variables are observed variables, can you write the stata code

ChatGPT
Certainly! If you are planning to conduct a Structural Equation Modeling (SEM) analysis in Stata using observed variables, you would typically use the ``sem'` command to specify your model.

Below is an example of how you might structure the Stata code for your SEM model, based on the information you provided. In this example:

- ``loneliness'` is the independent variable.
- ``addictive_video_watching'` is the dependent variable.
- ``m1'` and ``m2'` are mediator variables.

```
stata
Copy code

* Load your dataset
use "your_dataset.dta", clear

* Specify the SEM model
sem (m1 <- loneliness) (m2 <- m1) (addictive_video_watching <- m2 loneliness), cov(e.m1*e.m2)

* Fit the SEM model
estat mindices, all
```

Explanation of the Code:

1. ``use "your_dataset.dta", clear'`: This line loads your dataset. Replace `"your_dataset.dta"` with the path to your actual data file.
2. The ``sem'` command is used to specify and fit the SEM model:
 - ``(m1 <- loneliness)'`: This specifies that ``m1'` is regressed on ``loneliness'`.
 - ``(m2 <- m1)'`: This specifies that ``m2'` is regressed on ``m1'`.
 - ``(addictive_video_watching <- m2 loneliness)'`: This specifies that ``addictive_video_watching'` is regressed on both ``m2'` and ``loneliness'`.
 - ``cov(e.m1*e.m2)'`: This specifies the covariance between the error terms of ``m1'` and ``m2'`.
3. ``estat mindices, all'`: This command is used to assess the model fit.

The iterative process of refining our analysis requirements can be facilitated by the continuous interaction with ChatGPT. This includes addressing common data analytical challenges, such as the treatment of missing data and outlier values. ChatGPT stands ready to dispense expert advice and offer methodological solutions through an interactive, natural language-based dialogue, thereby enhancing the methodological rigor of the research process.

4.3.3 Writing and Visualization

ChatGPT can significantly contribute to the proofreading process, representing a valuable tool for academicians for whom English is a second language. The task of academic writing, inherently complex, is alleviated by ChatGPT's advanced linguistic processing abilities, which not only comprehend but adapt to diverse literary styles. Scholars may submit their manuscripts to ChatGPT, which can be commanded to execute an array of linguistic refinements, from grammatical corrections to the substitution with more erudite lexicon, thus augmenting the text's academic rigor and legibility. In addition to its linguistic prowess, ChatGPT's capabilities extend to graphical representation. It can offer programming guidance for the generation of visualizations via statistical software suites, or autonomously produce an array of descriptive statistical visuals based on data samples provided, including but not limited to bar graphs, pie charts, and even intricate thermal analysis plots. This invariably renders ChatGPT an invaluable asset in enhancing the visual exposition of research findings.

5. Discussion

The integration of ChatGPT into mixed-methods design presents a promising avenue for enhancing the research process and advancing methodological sophistication. As demonstrated in this study, ChatGPT offers invaluable support across various stages of the exploratory sequential mixed methods design, encompassing the exploratory phase, instrument development phase, and subsequent administration and testing of the instrument features within a population sample. By leveraging its advanced natural language processing capabilities, ChatGPT facilitates dynamic interaction and collaboration between researchers and artificial intelligence, resulting in a synergistic approach to knowledge generation.

In employing a mixed methods design involving ChatGPT, it is essential to recognize and navigate several inherent limitations. Firstly, the importance of human judgment and domain expertise cannot be overstated. While ChatGPT can generate responses based on vast datasets, it lacks the nuanced understanding and contextual sensitivity that human experts bring to the table. Human judgment is crucial in interpreting the output of ChatGPT, identifying errors or biases, and contextualizing responses within the research domain. Without this human oversight, the validity and reliability of the findings may be compromised. Secondly, ensuring ethical considerations and data privacy is a significant concern when utilizing ChatGPT. Given its ability to generate text based on input prompts, there is a risk of inadvertently disclosing sensitive information or perpetuating biases present in the training data. Researchers must implement robust protocols to safeguard participant privacy and mitigate potential ethical concerns arising from the use of AI in data generation and analysis. Moreover, cross-checking and validating ChatGPT's suggestions are imperative to enhance the rigor of the research process. While ChatGPT can provide valuable insights and generate hypotheses, these outputs must be corroborated through alternative methods or by consulting domain experts. Failure to cross-check responses from ChatGPT may lead to erroneous conclusions or overlook crucial nuances present in the data. Lastly, the accuracy of interpreting qualitative data, such as interview transcripts, poses a significant challenge when employing ChatGPT. While ChatGPT can assist in transcribing and summarizing qualitative data, its interpretation of nuanced or ambiguous language may be limited. Researchers must exercise caution in relying solely on ChatGPT's interpretations and should engage in thorough data analysis and interpretation to ensure the integrity of their findings.

In conclusion, the utilization of ChatGPT within a mixed methods framework presents an innovative approach to research methodology, offering a novel approach to data collection, analysis, and interpretation. Through the exploration of its application within the context of this study, we have highlighted the potential benefits and challenges associated with incorporating ChatGPT into the research process. By leveraging its advanced natural language processing capabilities, ChatGPT facilitates dynamic interaction and collaboration between researchers and artificial intelligence, thereby enhancing the efficiency and depth of data exploration across various phases of mixed-methods research. However, it is crucial to recognize and navigate the inherent limitations associated with ChatGPT, including the need for human judgment and expertise, ethical considerations regarding data privacy and biases, and the importance of cross-checking and validating AI-generated outputs. Despite these challenges, the integration of ChatGPT holds promise for advancing methodological sophistication and expanding the horizons of research inquiry. Moving forward, continued exploration and refinement of ChatGPT's capabilities within mixed-methods design will contribute to the ongoing evolution of research methodologies, ultimately enriching our understanding of complex phenomena and advancing knowledge in diverse fields of study.

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Funding Acquisition: None

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*All authors have read and agree to the final version of the manuscript that will be published. Authorship should be limited to those who have contributed substantially to the work of this manuscript.

Funding:

This research received no external funding.

Data Availability and Release Statement:

The dataset generated during the current study is not publicly available but is available from the corresponding author upon reasonable request.

Conflicts of Interest:

The authors declare no conflict of interest.

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