Usability and User Experience, Vol. 194, 2025, 204–211
https://doi.org/10.54941/ahfe1006682

Understanding Family-Oriented Vehicle Needs: Insights From Two-Child Families With Older Adults in China

Yancong Zhu[1], Mengxin Hao[1], Zhongkai He[1], Yihan Hu[1], Caoxi Peng[1], Keyi Yan[1], Xiaonan Zhang[2], Lu Wang[2], and Wei Liu[1,3]

[1]Faculty of Psychology, Beijing Normal University, Beijing, 100875, China
[2]Sekurit R&D, Saint-GoBain Research, Shanghai, 200245, China
[3]School of Design, Southern University of Science and Technology, Shenzhen, 518055, China

ABSTRACT

With China's shift from the one-child policy to the two-child policy, multigenerational families—comprising two children and older adults—have become increasingly prevalent, introducing unique challenges to daily travel. This study explores the specific travel needs of such families, identifies key pain points, and provides actionable insights to enhance their shared travel experiences. By analyzing factors influencing vehicle purchase decisions and conducting in-depth user interviews, the research highlights three primary needs: supporting children's education and entertainment, fostering family interaction and communication, and ensuring the health and safety of older adults. These findings inform the conceptualization of intelligent vehicle features such as interactive entertainment modules, real-time health monitoring, and comprehensive information systems. These solutions aim to enhance vehicle cabin functionality and adaptability, addressing the diverse requirements of multigenerational families. The study offers valuable guidance for automakers and designers, contributing to the development of user-centric, family-oriented automotive solutions that align with evolving family dynamics.

Keywords: Multigenerational families, Family vehicle needs, Older adults, User experience, Intelligent automotive design

INTRODUCTION

With the relaxation of China's two-child policy, the birth rate has gradually increased, leading to significant changes in family structures, notably an increase in family size (Chen & Zhou, 2021; Zeng & Hesketh, 2016). These changes have influenced family entertainment and consumption habits, with family outings becoming a top choice for leisure activities (Theopilus et al., 2024; Tseng et al., 2023; Fu et al., 2022). Parents increasingly prefer outdoor trips with their children, enjoying natural scenery or cultural landmarks, over staying at home. This shift in entertainment consumption habits has further impacted family vehicle purchase decisions.

Compared to sedans, larger SUVs and MPVs are favored for their ability to accommodate more family members, spacious interiors, comfortable riding experiences, and high safety standards (Samavati et al., 2024). As demand grows, an increasing number of automakers are focusing on the family travel market, introducing vehicles designed specifically for family outings (Tan et al., 2022). These vehicles often meet fundamental family needs, such as offering ample storage space and compatibility with child safety seats.

However, family needs are diverse, and factors such as budget constraints and travel distance preferences significantly influence vehicle choices. To better address the diverse needs of various families, it is essential to conduct user research to understand their fundamental requirements regarding cabin space, comfort, safety, and entertainment (Zhu et al., 2024). Such insights provide valuable guidance for automakers in designing family-friendly vehicles.

This study focuses on families with two children, employing interviews and surveys to explore the interaction between vehicles and users. It aims to uncover the underlying needs of these families, identify challenges they face when choosing a vehicle, and determine their expectations for future automobiles. The findings provide actionable insights for the design of intelligent vehicle cabins, ensuring that the resulting products better cater to users' needs.

FIELD STUDY

In China, families with two children demonstrate significant purchasing power, with stable incomes enabling them to prioritize quality and functionality in their purchases. These families invest heavily in their children's living needs, education, and entertainment, which influences their vehicle choices to meet specific family requirements.

To gain a deeper understanding of the needs of two-child families, we conducted a comprehensive field study, combining interviews and on-site observations at 4S dealerships, electric vehicle showrooms, and test drive sessions. This approach provided valuable insights into the interaction between vehicles and users. Many families see private cars not only as a convenient mode of transportation but also as a space for fostering family bonding and communication. One parent explained, "Our car is like a mobile living room where we can spend quality time together during trips."

Interviews with vehicle owners and prospective buyers highlighted the importance of advanced features (Liu et al., 2020). Participants frequently emphasized the need for a family-friendly car to balance practicality, comfort, and entertainment, particularly for weekend and holiday road trips. For working parents, commuting efficiency was also a critical consideration, as private cars offer flexibility and reduce time spent on crowded public transportation. A respondent noted, "Driving my own car saves me time and energy. It is essential for balancing work and family responsibilities."

During on-site observations, we focused on electric vehicles featuring advanced intelligent driving systems. Four models emerged as noteworthy: AITO M7, NIO ES8, Li L9, and ArcFox Koala. These vehicles were assessed

for their exterior designs, interior layouts, and intelligent driving capabilities. The cockpits of all four models were spacious and comfortable, catering to the needs of multigenerational families. Advanced driver-assistance systems (ADAS) like autonomous driving and lane-keeping further enhanced their appeal, as these features reduce driver fatigue during long trips.

The intelligent cockpit features of these models provided diverse advantages. For example, the AITO M7 offered a nap mode controlled by voice commands, which dims lighting and plays white noise for relaxation. Similarly, the Li L9 included a rear entertainment screen with gesture-based controls for video playback, enabling interaction through open-hand recognition and fist-based confirmation. One interviewee commented, "The entertainment options are fantastic—they keep the kids busy while we focus on driving." These observations, combined with user feedback, revealed that such advanced technological features effectively meet the varied needs of families, enhancing both convenience and travel experiences.

The insights gained from this combination of interviews and observations shed light on the challenges and expectations of two-child families when choosing vehicles. These findings offer valuable guidance for designing family-oriented automotive solutions that align with modern families' evolving needs and lifestyles.

FINDINGS

Through a combination of field and desktop research, we identified that changes in family structures and population growth are driving increased demand for large family-oriented vehicles in China (Zhu et al., 2022). Automobiles are playing an increasingly vital role in family life. While families may have different motivations for purchasing vehicles, the ultimate goal is to achieve a high-quality, convenient lifestyle. Consequently, the demand for family vehicles is shifting toward larger, more comfortable, and feature-rich options. For automakers, offering personalized and user-centered intelligent cockpit experiences can help differentiate their products in the highly competitive market.

To better understand user needs and refine the dimensions of our interview framework, we conducted observations and preliminary interviews, including one expert interview and three pilot interviews.

Key Observations

Our observations revealed that users focus heavily on factors such as price, mileage, interior space, and exterior design when purchasing vehicles (Liu et al., 2012). Families with more than two children are particularly attracted to large SUVs and family MPVs. Children often show a strong interest in electronic devices and interactive features within the vehicle. After the observational phase, we conducted an expert interview with a car salesperson.

Expert Insights

From the expert interview, we learned that parents prioritize price, space, battery life, and driving experience, similar to other customers. However, families with multiple children have additional concerns, ranked in the order of safety > comfort > entertainment. Common questions from parents include how many child safety seats can be installed and whether the interior space allows for children to move comfortably. Children accompanying parents during vehicle selection often express enthusiasm for electronic devices or novel features, such as NIO's NOMI system.

Core Scenarios

Informed by expert advice, we conducted three additional interviews to identify core family-use scenarios (Liu et al., 2023). These interviews covered participants' basic information, key considerations when purchasing vehicles, and usage scenarios. The five most commonly mentioned scenarios were school drop-offs, medical visits, nighttime driving, long-distance travel, and short-distance outings.

Data Analysis

We interviewed 16 participants (5 women and 11 men). The interview data analysis was conducted in four stages:

1. Familiarizing with Data: Recording and transcribing audio data into text.
2. Coding the Data: Using fact-based and theory-based coding to analyze text data.
3. Problem Analysis: Identifying specific challenges participants face through aspects like scenarios, emotions, and journeys, and grouping these challenges.
4. Needs Analysis: Summarizing and clustering these challenges into broader needs.

The analysis revealed three main scenarios: commuting, medical visits, and nighttime driving. These scenarios were analyzed through a systematic approach using cognitive, emotional, and behavioral dimensions. Interview data within each scenario was coded sequentially across these dimensions.

User Needs

Across the three scenarios, we identified 37 user needs, such as the desire for increased vehicle autonomy and enhanced passenger immersion. Using affinity diagramming, we clustered these needs into eight core requirements:

1. Effortless learning and entertainment for passengers.
2. Real-time safety updates for parents about their children.
3. Comprehensive external safety information within the vehicle.
4. Support for diverse communication between drivers and passengers.
5. Reduced environmental distractions for the driver.

6. Minimized external noise and improved vehicle stability for passenger comfort.
7. Parking assistance and information for the driver.
8. Tools to help drivers manage children's emotions inside the vehicle.

These findings underscore that families with two children in China place a higher priority on supporting children's education and entertainment, fostering family interaction and communication, and ensuring the health and safety of older adults when choosing vehicles.

DISCUSSION

The interview results reveal that the frequency and nature of family outings are closely tied to children's school schedules, influenced by academic pressure and their developmental stages. As children enter primary school, academic demands increase sharply. Under the structure of China's education system, this often results in extended study hours and preparation for exams, leaving little room for leisure activities. As a result, family outings are mainly reserved for weekends, holidays, or special occasions when academic commitments are lighter.

In earlier stages of development, parents emphasize activities that foster emotional, linguistic, and creative growth (Liu et al., 2024). Outings to museums, parks, and parent-child entertainment centers are often chosen for their dual benefits: providing enjoyable experiences while supporting developmental goals. These activities help strengthen family bonds and offer opportunities for shared learning and interaction (Liu et al., 2021). However, when children transition to primary school, family priorities shift, with more time and attention dedicated to academic tasks such as homework and test preparation.

Multigenerational outings, involving children, parents, and grandparents, occur far less frequently, typically only two or three times a year. This infrequency can be attributed to several factors. Older adults today are more independent and less reliant on their children for routine needs, reducing the necessity for shared outings (Zhu et al., 2024). Moreover, differences in preferences for food, entertainment, and lifestyle between generations add complexity to planning these trips, making them less appealing to organize.

The findings also highlight the presence of "pseudo-needs"—features or requirements that appear significant but are misaligned with actual family behaviors and priorities. Examples include studying in the car, frequent multigenerational outings, and regular trips to the hospital with older adults. While the idea of studying in the car might seem practical at first glance, the distractions and lack of focus in a moving vehicle make it an unrealistic solution for most families. Similarly, the assumption that older adults frequently require transportation for medical needs is inconsistent with the growing independence of this demographic.

Identifying pseudo-needs is critical in refining design priorities. By understanding the gap between perceived and actual needs, automakers can focus on features that truly address core family requirements rather than

investing in less relevant functionalities. Practical features like enhanced comfort for daily family outings or safety improvements for commutes hold more value for users than hypothetical, less-utilized options.

The role of vehicles in family life has evolved, with cars increasingly serving as multifunctional spaces for communication, relaxation, and shared experiences. Families are seeking vehicles that go beyond transportation to create opportunities for interaction and entertainment during trips. For example, parents expressed interest in technologies that support passive learning or entertainment for children, provided they are seamlessly integrated and do not distract the driver (Du et al., 2024). Autonomous driving features, in particular, were appreciated for their potential to reduce driver fatigue and enable parents to engage more actively with their children.

Designing vehicles for multigenerational families adds another layer of complexity. Meeting the playful and exploratory needs of children while ensuring the comfort and mobility of older adults requires a careful balance (Zhu et al., 2023). Flexible seating configurations, noise reduction systems, and personalized climate controls can help bridge generational differences and enhance the travel experience for all family members. Advanced features like adaptive lighting, voice controls, or integrated health monitoring systems address specific concerns while promoting inclusivity and usability for diverse users.

Understanding family dynamics—shaped by academic demands, developmental priorities, and multigenerational preferences—underscores the importance of designing features that align with real-world behaviors and needs. This approach enables the development of family-oriented vehicles that genuinely improve convenience, safety, and interaction.

CONCLUSION

This study examined the needs of families with children regarding vehicle use, focusing on the dynamics of two-child families in contemporary China. Through field research, interviews, and data analysis, we identified key priorities that shape family vehicle preferences. Families seek features that support children's learning and entertainment, enable parents to monitor safety, and provide external safety information. Practical aspects, such as minimizing driver distractions, enhancing passenger comfort through noise reduction and vehicle stability, and tools for managing children's emotions, also emerged as significant considerations.

The research emphasizes the impact of evolving family structures on vehicle design needs (Zhu et al., 2024). Two-child families prioritize features that enhance both convenience and interaction, aligning with their focus on fostering family bonds and supporting children's development. Although multigenerational outings and in-car study spaces were occasionally mentioned, these were less frequently reflected in real-world usage patterns, highlighting the importance of addressing core rather than peripheral needs.

This study offers grounded insights into family-oriented vehicle design, emphasizing the need for solutions tailored to the practical and emotional dynamics of modern families. While not exhaustive, the findings provide a

solid basis for understanding and addressing the diverse needs of family users in the evolving automotive market.

REFERENCES

Chen, J., & Zhou, X. (2021). Within-family patterns of intergenerational emotional closeness and psychological well-being of older parents in China. Aging & Mental Health, 25(4), 711–719.

Du, X., An, P., Leung, J., Li, A., Chapman, L. E., & Zhao, J. (2024). DeepThink: Designing and probing human-AI co-creation in digital art therapy. International Journal of Human-Computer Studies, 181, 103139.

Fu, X., Liu, X., Li, H., Wang, Y., & Li, Z. (2022). Creating a balanced family travel experience: A perspective from the motivation-activities-transformative learning chain. Tourism Management Perspectives, 41, 100941.

Liu, W., Byler, E., & Leifer, L. (2020). Engineering design entrepreneurship and innovation: Transdisciplinary teaching and learning in a global context. In Proceedings of the HCI International Conference (pp. 451–460).

Liu, W., Huang, R., Wang, J., Chen, Y., Ohashi, T., Li, B.,... & Leifer, L. (2024). Empathy Design Thinking: Cultivating creative minds in primary education. Frontiers in Education, 9, 1376305.

Liu, W., Pasman, G., Stappers, P. J., & Taal-Fokker, J. (2012). Making the office catch up: Comparing generation Y interactions at home and work. In Proceedings of the Designing Interactive Systems Conference (pp. 697–700).

Liu, W., Zhu, Y., Huang, R., Ohashi, T., Auernhammer, J., Zhang, X.,... & Wang, L. (2023). Designing interactive glazing through an engineering psychology approach: Six augmented reality scenarios that envision future car human-machine interface. Virtual Reality & Intelligent Hardware, 5(2), 157–170.

Liu, W., Zhu, Y., Liu, M., & Li, Y. (2021). Exploring maker innovation: A transdisciplinary engineering design perspective. Sustainability, 14(1), 295.

Samavati, S., Desmet, P. M., & Ranjbar, E. (2024). Happy urban public spaces: A systematic review of the key factors affecting citizen happiness in public environments. Cities & Health, 1–17.

Tan, H., Zhao, X., & Yang, J. (2022). Exploring the influence of anxiety, pleasure and subjective knowledge on public acceptance of fully autonomous vehicles. Computers in Human Behavior, 131, 107187.

Theopilus, Y., Al Mahmud, A., Davis, H., & Octavia, J. R. (2024). Preventive interventions for internet addiction in young children: Systematic review. JMIR Mental Health, 11(1), e56896.

Tseng, T. A., Chien, H. W., & Shen, C. C. (2023). Exploring family travel motivation, preference, and decision-making with children of different ages. Tourism & Management Studies, 19(4), 35–45.

Zeng, Y., & Hesketh, T. (2016). The effects of China's universal two-child policy. The Lancet, 388(10054), 1930–1938.

Zhu, D., Al Mahmud, A., & Liu, W. (2024). Digital storytelling intervention for enhancing the social participation of people with mild cognitive impairment: Co-design and usability study. JMIR Aging, 7, e54138.

Zhu, D., Al Mahmud, A., & Liu, W. (2023). Social connections and participation among people with mild cognitive impairment: Barriers and recommendations. Frontiers in Psychiatry, 14, 1188887.

Zhu, Y., Geng, Y., Huang, R., Zhang, X., Wang, L., & Liu, W. (2024). Driving towards the future: Exploring human-centered design and experiment of glazing projection display systems for autonomous vehicles. International Journal of Human–Computer Interaction, 40(15), 4087–4102.

Zhu, Y., Li, C., Qiao, Z., Qu, R., Wang, Y., Xiong, J., & Liu, W. (2024). From distraction to action: Elevating situation awareness with visual assistance in level 3 autonomous driving. International Journal of Human–Computer Interaction, 1–13.

Zhu, Y., Tang, G., Liu, W., & Qi, R. (2022). How post 90's gesture interact with automobile skylight. International Journal of Human–Computer Interaction, 38(5), 395–405.