

INFLUENCE OF LIFE CYCLE EVENTS ON THE DYNAMICS OF FACE-TO-FACE SOCIAL INTERACTIONS

- A LONGITUDINAL EVALUATION IN JAPANESE CONTEXT -

ライフサイクルイベントが対面による社会的交流の変化に与える影響 —日本における縦断的評価—

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This study explores how life-cycle transitions affect the dynamics of face-to-face social interaction in Japan, with a particular focus on the frequency of family dinners and shared meals with friends. Despite growing recognition of the importance of social networks in shaping travel behaviour and well-being, most empirical research remains cross-sectional and Western-centric. To address these limitations, the study employs three-wave panel data (2009, 2013, 2019) from the Japanese General Social Survey Life Course Study (JGSS-LCS), applying both ordinal logit and log-linear random effects models to examine how key life events—including marriage, childbirth, employment changes, health deterioration, and shifts in household composition—influence patterns of social engagement over time. The findings reveal that marriage and the transition to parenthood significantly increase the frequency of family dinners, highlighting the institutional role of family life in structuring daily routines. In contrast, meals with friends are less systematically affected by life transitions, with associations generally weaker, inconsistent, and often statistically insignificant. These differences underscore the discretionary nature of extrafamilial ties and their greater vulnerability to time constraints, health status, and life-stage pressures. By integrating sociological theory, transport research, and longitudinal analysis, this research contributes to a more temporally and culturally grounded understanding of personal networks. It offers valuable insights for designing socially inclusive mobility and planning policies, particularly in ageing societies undergoing rapid demographic and technological change.

1. Introduction

Social networks—defined as systems of interpersonal ties that shape decisions, behaviours, and access to resources—have gained increasing attention across disciplines including sociology, public health, and transport studies. In mobility research, social networks are now seen as key to understanding discretionary travel behaviour, particularly for socially motivated trips such as dining with family or friends. However, much of the existing literature offers a static view of social networks, relying on cross-sectional data that fail to capture how networks evolve in response to life-cycle transitions such as marriage, childbirth, employment change, or health decline.

Recent efforts using longitudinal data have begun to address this limitation but remain

largely focused on Western contexts. As a result, there is limited empirical knowledge of how network dynamics unfold in non-Western societies with distinct cultural and demographic structures. Japan offers a compelling case, where networks tend to be smaller, more kin-based, and shaped by collectivist norms, yet are being transformed by rapid ageing, declining fertility, and urbanisation. Despite these shifts, few studies have examined how life events affect face-to-face interaction patterns in the Japanese context over time.

This study addresses this gap by using three-wave panel data (2009, 2013, 2019) from the Japanese General Social Survey Life Course Study to examine how life-cycle transitions influence the frequency of shared meals with family and friends. The research is

guided by three main objectives:

1. To examine patterns of life-cycle transitions among Japanese adults using longitudinal panel data;
2. To identify which transitions are most strongly associated with changes in face-to-face social interaction, particularly meal frequency;
3. To assess how social engagement structures evolve over time in response to personal and household-level changes.

Understanding these dynamics has important implications for urban planning and transportation. Social interaction is a key driver of out-of-home activity and discretionary travel, particularly in later life. Designing mobility systems that support continued access to social networks—especially during life-course transitions—can help mitigate isolation, promote well-being, and enhance the resilience of ageing societies. This dissertation contributes to an emerging interdisciplinary dialogue that integrates social inclusion into transport and planning frameworks, offering a dynamic, context-sensitive perspective on personal networks and their mobility implications.

2. Literature Review

Social networks are dynamic systems of interpersonal ties that provide emotional and instrumental support, shape behavioural norms, and influence individual access to resources (Wasserman and Faust, 1994; McPherson, Smith-Lovin and Cook, 2001). These structures—defined by size, strength, spatial dispersion, and homophily—evolve across the life course in response to personal circumstances, life events, and cultural norms (Byrne, 1971; Bidart and Degenne, 2005). In Japan, social networks are generally smaller and more kin-centred, shaped by hierarchical norms and social restraint (Nakane, 1970; Parady, Takami and Harata, 2020), with declining intermediate structures such as multigenerational households and firm-based communities (Harada, 2012; Ishiguro, 2018).

Transport scholars have increasingly recognised the influence of social networks on mobility behaviour. Rather than treating individuals as isolated decision-makers, recent research highlights the embeddedness of travel in social contexts (Carrasco and Miller, 2006; Frei and Axhausen, 2007). Egocentric network analysis reveals that social attributes—network size, tie type, geographic proximity—significantly shape activity participation, travel frequency, and destination choice (van den Berg, Arentze and Timmermans, 2010; Kim, Rasouli and Timmermans, 2018). ICT tools like messaging or video calls complement or substitute face-to-face interactions, especially over longer distances (Mok, Wellman and Carrasco, 2010; Parady, Takami and Harata, 2020).

A parallel body of work focuses on social influence—the behavioural adaptation to perceived or actual actions of peers (Cialdini and Goldstein, 2004; Manski, 1993). Peer norms and tie strength affect mobility decisions including car and bicycle ownership, travel mode, and shared mobility use (Goetzke and Weinberger, 2012; Maness and Cirillo, 2016). Discrete choice models and hybrid frameworks have integrated social variables into utility functions (Dugundji and Walker, 2005; Kim, Rasouli and Timmermans, 2017), though they often conflate peer influence with homophily and assume static social structures.

Social networks are not fixed but evolve through life-cycle events. Transitions like marriage, parenthood, relocation, and job changes often reconfigure personal networks by altering time availability, spatial proximity, or emotional investment (Bidart and Lavenue, 2005; Sharmeen, Arentze and Timmermans, 2014). Parady, Takami and Harata (2020) found that caregiving responsibilities in Japan are linked to reduced interaction frequency and smaller networks, highlighting the impact of life-stage demands.

Despite theoretical advances, methodological limitations persist. Many studies rely on cross-sectional data, limiting the ability to capture dynamic processes of tie formation, decay, and interaction modality

shifts (Snijders, Van De Bunt and Steglich, 2010). Communication mode is often treated simplistically, overlooking hybrid ICT–physical interactions (Chávez, Carrasco and Tudela, 2018). Furthermore, individual heterogeneity across life stages, gender, and vulnerability is often overlooked.

Additionally, most empirical research has been conducted in Western contexts. Japan’s ageing society, high gendered division of labour, and evolving family norms present a unique cultural setting that remains underexplored (Iwata, 2014; Ishida, 2011). Existing Japanese studies often lack spatial granularity and longitudinal tracking, limiting insights into how social ties adapt to demographic and institutional change.

This study addresses these gaps by employing a rare three-wave panel dataset from Japan to examine how life-cycle transitions influence face-to-face interaction frequency. By adopting a longitudinal and culturally grounded approach, the study contributes to developing dynamic and inclusive models of social network evolution and mobility.

3. Model Formulation & Methodology

This study draws on three waves of longitudinal panel data from the Japanese General Social Survey – Life Course Study (JGSS-LCS), conducted in 2009, 2013, and 2019. The JGSS-LCS is a nationally representative dataset designed to track changes in respondents’ life circumstances and social relationships over time, offering an opportunity to examine within-person dynamics in the Japanese context. After harmonising the data structure across the three waves, the final sample consists of respondents who participated in at least two consecutive waves, yielding a longitudinal sample appropriate for within-person transition analysis.

Two outcome variables—frequency of family dinners and meals with friends—were coded in both ordinal and continuous formats (Table 1). The ordinal scale ranged from 1 (“Never”) to 7 (“Almost every day”), supporting

the use of an ordinal logit model. The continuous version approximated annual interaction counts (e.g., 365 for “Almost every day”, 12 for “Once a month”), enabling interpretation of proportional shifts via log-linear models.

Table 1. Coding of Dependent Variables for Both Meal Frequency.

Original Category	Ordinal Code (_numeric)	Estimated Annual Frequency (_real)
Almost everyday	7	365
About once a week	6	52
Several times a week	5	36
About once a month	4	12
Several times a year	3	4
About once a year	2	1
Never	1	0.00001
No answer / Missing	NA	NA

Key independent variables include life-cycle transitions such as changes in marital status, the number of children, employment status, commuting time, health condition, and household composition. These transitions are operationalised as dummy variables that reflect status change (e.g., “Single to Married”, “Childless to Parenthood”, “Health Improved”). To estimate the effects of these transitions, two complementary statistical models are employed:

- Random Intercept Ordinal Logistic Model (OLM) is used to examine shifts in the ordinal outcomes of meal frequency.
- Log-linear Random Effects (log-RE) Models are applied to log-transformed continuous approximations of the dependent variables, enabling interpretation of effect sizes as percentage changes.

These models allow for both categorical and continuous interpretations of behavioural change, offering a nuanced understanding of how life-course transitions shape social interaction patterns over time.

4. Results

The analysis reveals important asymmetries in how different life-cycle transitions influence the frequency of face-to-face interactions with family and friends.

4.1 Family Dinner Frequency

The ordinal logit model (Figure 1, 2) confirms that transitions such as having a newborn child and getting married significantly increase the likelihood of having

family dinners more frequently. For example, moving into parenthood is associated with an odds ratio of 2.27 ($p < 0.01$), while marriage increases the odds of more frequent family dinners by a factor of 2.02 (although marginally insignificant). In contrast, commuting time increases and downsizing of household members significantly reduce the frequency of family dinners.

Figures 1 illustrate the OLM results. Notably, marriage-related transitions exhibit the strongest associations with increased frequency of family dinners. The transition from being single to married significantly raises the likelihood of having frequent family meals, followed by becoming a parent. These patterns suggest that the formation of a nuclear family structure reinforces routine, home-based social interactions.

Figure 1. Ordinal Logit Model Results for Family Dinner Frequency

Variable	Estimate	Std..Error	z.value	Pr...z...	Signif	Odds.Ratio
1 2	-6.594	0.534	-12.345	0	***	0.001
2 3	-6.500	0.529	-12.288	0	***	0.002
3 4	-5.410	0.480	-11.261	0	***	0.004
4 5	-4.867	0.462	-10.524	0	***	0.008
5 6	-2.174	0.401	-5.422	0	***	0.114
6 7	-1.599	0.393	-4.068	0	***	0.202
single_to_married	0.704	0.572	1.230	0.219		2.021
have_newborn_kids	0.821	0.265	3.102	0.002	**	2.272
income_downgrade	-0.420	0.232	-1.813	0.070	.	0.657
urban_downgrade	-0.503	0.495	-1.018	0.309		0.604
commuting_increased	-0.752	0.240	-3.141	0.002	**	0.471
decreased_family	-0.517	0.261	-1.984	0.047	*	0.596
shift_to_unemployed	0.939	0.627	1.498	0.134		2.557
changed_work_status	1.072	0.614	1.745	0.081	.	2.920
wave	-0.298	0.146	-2.033	0.042	*	0.742

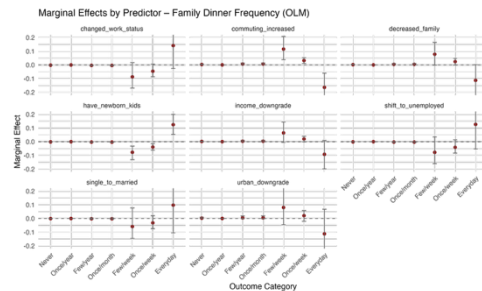
* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$
Log-Likelihood: -1312.65
AIC: 2657.31
BIC: 2739.59
rho²: 0.3448
N Observations: 1265

Other life events also exert meaningful influence. Improved health conditions and residential relocation are associated with more frequent family dinners, possibly reflecting enhanced mobility and household restructuring. On the contrary, increased work hours or changes in work status are linked to a decline in family meal frequency, likely due to time scarcity and scheduling mismatches.

To aid interpretation, marginal effects were simulated across each level of the ordinal outcome (Figure 2), showing how predicted

probabilities shift with specific transitions. The results confirm that transitions into marriage and parenthood notably raise the probability of having meals “almost every day” or “several times a week,” while reducing the probability of rarely dining with family.

Figure 2. Visualisation of the Marginal Effects for Family Dinner Frequency



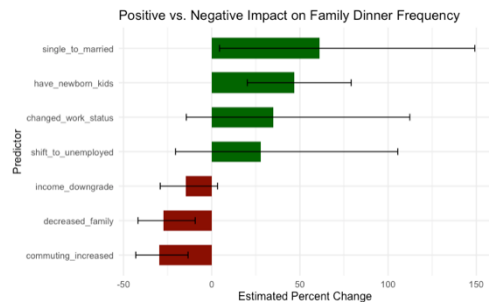
These patterns are supported by the log-linear random effects model (Figure 3), which estimates the percentage change in meal frequency. Marriage and childbirth are associated with a 48% and 38% increase, respectively, in expected family dinner frequency. Conversely, longer commutes reduce expected frequency by 35%, and household contraction (e.g., children leaving home) by 32%.

Figure 3. Log Random Effect Model Results for Family Dinner Frequency

	Dependent variable: log_family_dinner
single_to_married	0.478** (0.222)
have_newborn_kids	0.383*** (0.102)
income_downgrade	-0.156 (0.096)
commuting_increased	-0.354*** (0.107)
decreased_family	-0.320*** (0.113)
shift_to_unemployed	0.245 (0.242)
changed_work_status	0.299 (0.232)
Constant	4.899*** (0.056)
Number of Observations	1265
Number of Respondents	718
Observations	1,265
R ²	0.069
Adjusted R ²	0.064
F Statistic	41.484***

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Figure 4. Virtualisation of the Effect Size of Family Dinner Frequency



The marginal effects visualised in Figure 4 further illustrate that parenthood and marriage positively shift probabilities toward higher-frequency dinner categories, whereas commuting burden and family downsizing reduce the likelihood of regular shared meals.

4.2 Meals with Friends

In contrast, the results for meals with friends reveal weaker and more heterogeneous associations. The ordinal logit model (Figure 5) shows that deterioration in health and a decrease in the number of close friends are both negatively associated with meal frequency with friends, although statistical significance is weaker. Notably, none of the family-related transitions (e.g., marriage, childbirth) exhibited strong or consistent associations, indicating that friend interactions are more discretionary and less embedded in household routines.

Figure 5. Ordinal Logit Model Results for Frequency of Meals with Friends

Variable	Estimate	Std..Error	z.value	Pr...z..	Signif	Odds.Ratio
1 2	-5.877	0.415	-14.156	0	***	0.003
2 3	-4.689	0.385	-12.191	0	***	0.009
3 4	-1.538	0.330	-4.660	0	***	0.215
4 5	1.753	0.334	5.256	0	***	5.774
5 6	2.102	0.339	6.209	0	***	8.184
married_to_single	0.284	0.455	0.624	0.532		1.329
have_newborn_kids	-0.779	0.231	-3.366	0.001	***	0.459
health_deteriorated	-0.212	0.150	-1.410	0.158		0.809
income_upgrade	-0.090	0.148	-0.606	0.544		0.914
increased_family	-0.304	0.296	-1.026	0.305		0.738
changed_work_status	0.271	0.526	0.515	0.606		1.311
wave	-0.699	0.127	-5.488	0	***	0.497

* p<0.1; ** p<0.05; *** p<0.01

Log-Likelihood: -1724.42

AIC: 3474.84

BIC: 3541.7

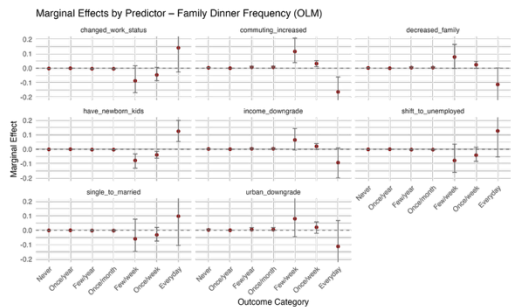
rho²: 0.3562

N Observations: 1265

The marginal effects plot (Figure 6)

reinforces this interpretation, showing only modest probability shifts associated with any single transition. Most respondents remain in lower-frequency categories regardless of life-cycle changes.

Figure 6. Visualisation of the Marginal Effects for Friend Meal Frequency



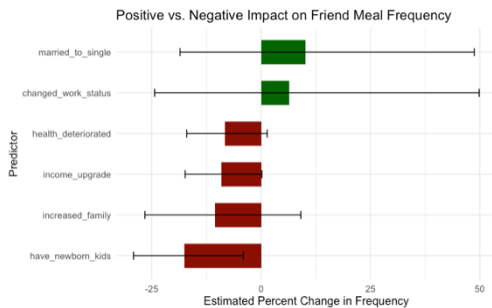
In line with the ordinal model, the log-RE model (Figure 7 and 8) reveals smaller and more inconsistent effects compared to the family dinner model. Health deterioration and loss of close friends lead to statistically significant declines in meal frequency with friends. However, other transitions, such as work-related or residential changes, exhibit limited explanatory power.

Figure 7. Log Random Effect Model Results for Family Dinner Frequency

	Dependent variable:
	log_friend_meal
married_to_single	0.096 (0.154)
have_newborn_kids	-0.193** (0.077)
health_deteriorated	-0.086* (0.051)
income_upgrade	-0.095* (0.049)
increased_family	-0.111 (0.101)
changed_work_status	0.063 (0.174)
Constant	2.066*** (0.047)
Number of Observations	1265
Number of Respondents	717
Observations	1,265
R ²	0.038
Adjusted R ²	0.033
F Statistic	16.385**

Note: * p<0.1; ** p<0.05; *** p<0.01

Figure 8. Virtualisation of the Effect Size of Friend Meal Frequency



This suggests that friend-oriented social contact is shaped more by personal discretion and broader lifestyle factors, rather than structured life-cycle events.

In sum, these two sets of results point to a clear contrast in how family versus friend interactions respond to life-cycle events. While institutionalised household transitions tend to strengthen family-based routines, friend-based social engagement is comparatively fragile and contingent on health and network continuity.

5. Discussion

This study has examined how life-cycle transitions influence the frequency of face-to-face social interactions in Japan, focusing on two distinct relational domains: family dinners and meals with friends. By combining ordinal logit and log-linear random effects models applied to three waves of nationally representative panel data, the research provides a temporally grounded and culturally specific analysis of social behavioural change.

The findings underscore a clear asymmetry in the effects of life events: family-related transitions (e.g., marriage, childbirth) are robustly associated with increased family meal frequency, while their effects on friend-oriented interactions are negligible or negative. This contrast reflects the institutional strength of familial obligations in Japan, where shared meals reinforce co-residence and caregiving roles, particularly after entering marriage or parenthood. On the other hand, friend-based interactions are more discretionary, and thus more vulnerable

to erosion when time and mobility constraints intensify.

These findings contribute to three important scholarly debates. First, they extend life-course theory by demonstrating how role transitions structure daily interaction rhythms. Second, they advance the transportation-social network interface by linking personal network changes to variations in interaction-based mobility demands. Third, the study contributes to regionally contextualised network research, offering empirical evidence from Japan—a setting underrepresented in current literature yet facing profound demographic and social change.

This study has several limitations. First, although the panel structure captures within-individual change, panel attrition may introduce selection bias, particularly if individuals experiencing residential relocation or relationship dissolution are more likely to drop out. Second, the analysis is limited to ego-level data, and lacks tie-specific (alter-level) attributes such as the location or nature of relationships. Third, the operationalisation of “interaction” is limited to meal-sharing, which may not capture the full breadth of social connectivity, especially in increasingly hybrid (physical-virtual) communication landscapes.

Future research would benefit from incorporating alter-level or dyadic data, which would allow exploration of how tie-specific attributes (e.g., proximity, intimacy, relationship type) moderate interaction dynamics. Moreover, the role of digital communication deserves deeper examination—especially post-COVID—as virtual contact may substitute or complement in-person interaction. Finally, expanding this analysis to cross-national comparative contexts would help assess the cultural specificity of the Japanese case, particularly regarding family resilience and social isolation in ageing societies.

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