Gender differences in income-based segregation level varies with family life cycle stage

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Introduction

The gender segregation problem in Japan is quite severe compared with other developed countries. And the gender gap seems to increase with the age increasing. Household structure has a significant impact on gender differences in activity spaces, especially in Japan, where the proportion of full-time housewives is high. Thus, this study tried to combine income level and household structure to explore the possibility of women's exposure across income classes in daily activity spaces.
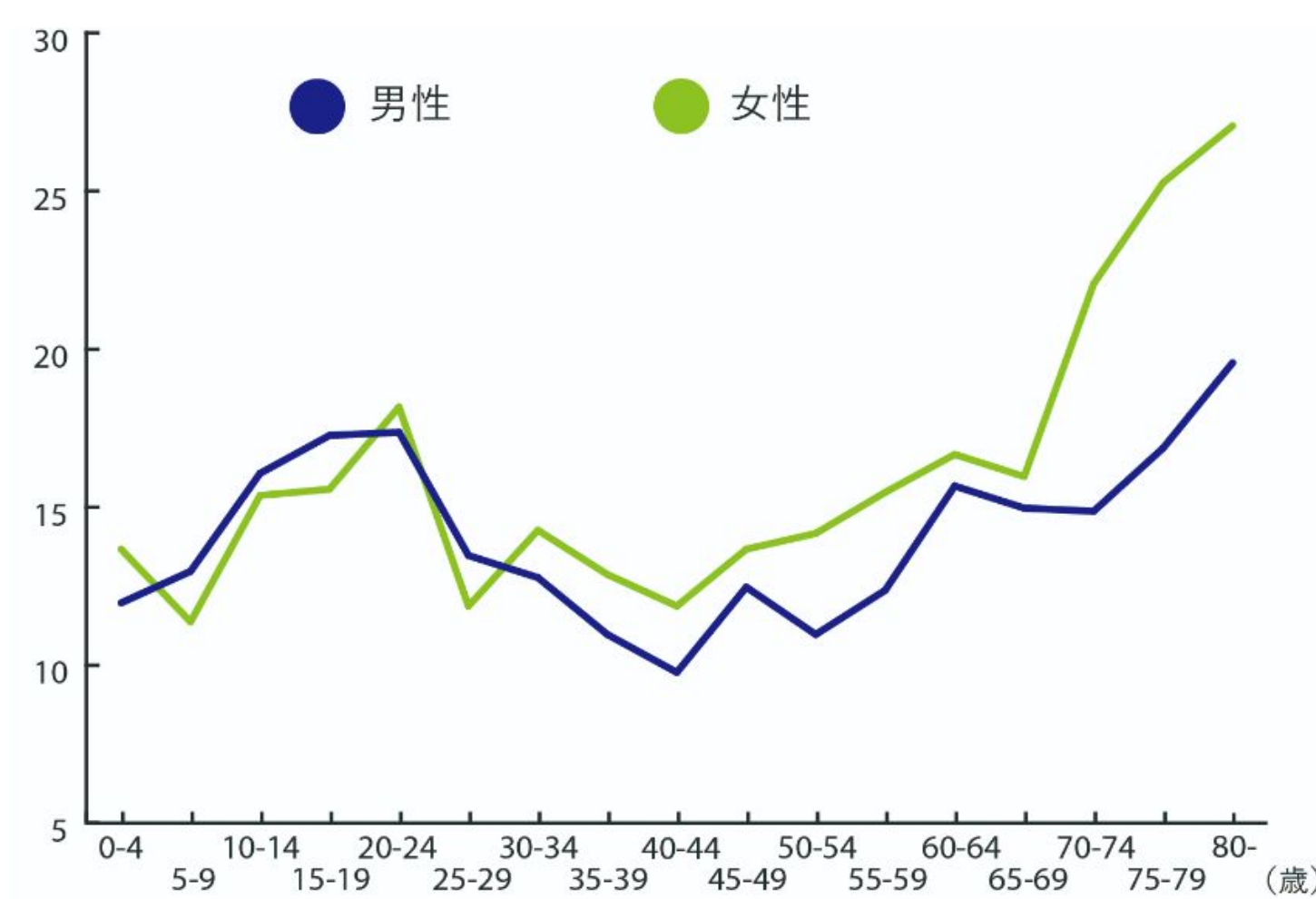

Fig. 1. Relatively poor ratio
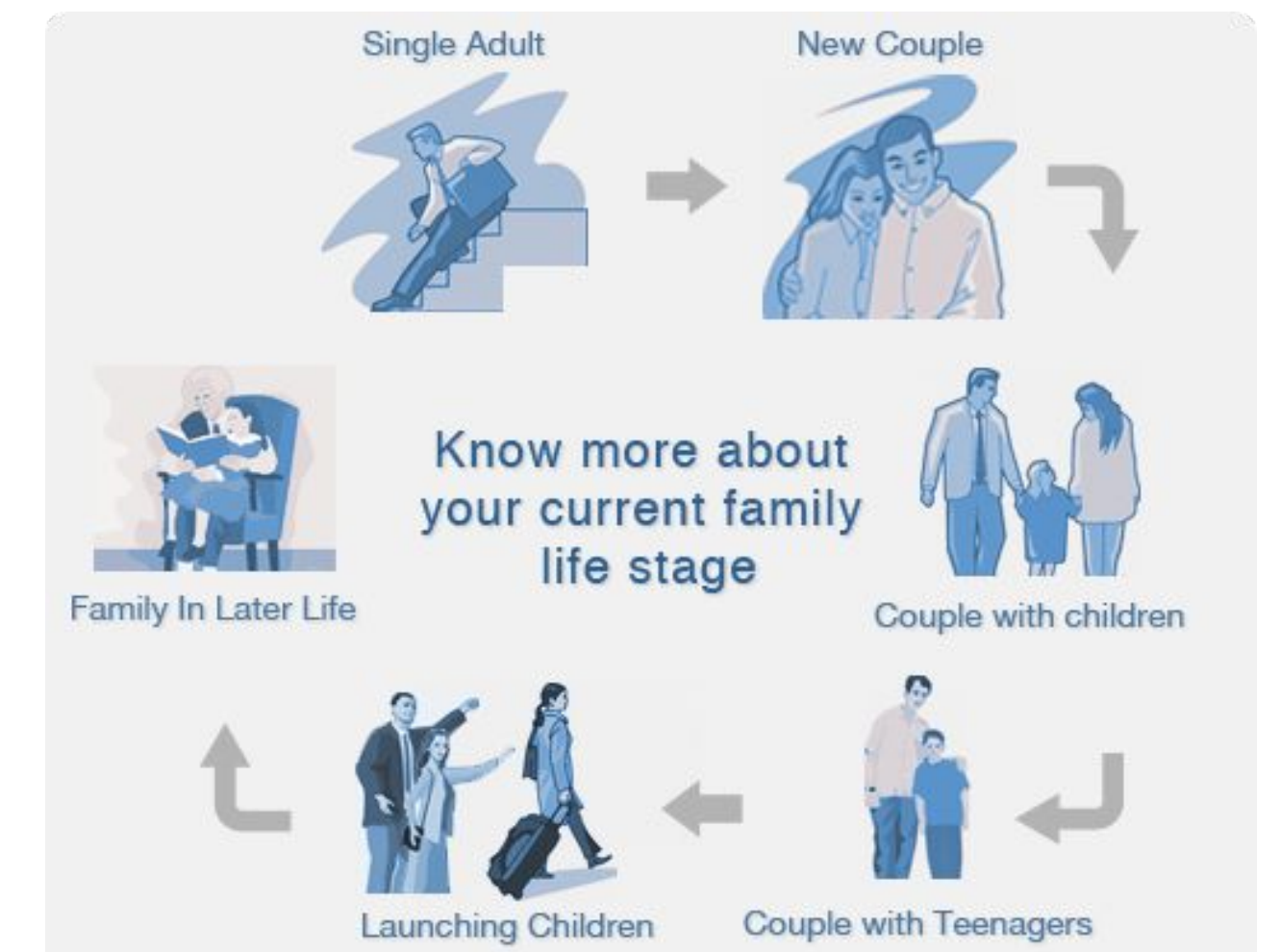
Data source：阿部彩(2018)「日本の相対貧困率の動態:2012から2015年」貧困統計HP

Fig. 2. Family life cycle stage

Data source：This figure is downloaded from this website: https://talkitover.in/

Methodology

We assume that users who live, work or have nonroutine activity (e.g., shopping, going to a park, doing exercise) in the same 1km*1km grid are seen as having social contact with each other. Based on Person trip survey data, we calculate the income-based Nonroutine activity space segregation(NRAS), Routine activity space (including work and residence) segregation(RAS), Workplace segregation(WS) and Residence segregation(RS) to capture the chances of users have contact with people who have different income level in different activity contexts. All the indicators are at the range of [0,1] where 1 indicates highly segregated and 0 is not segregated.

$$RS_i = \frac{5}{8}\sum_g \left| R_{g\alpha} - \frac{1}{5} \right| (1);$$

$$WS_i = \frac{5}{8}\sum_g \left| W_{g\alpha} - \frac{1}{5} \right| (2)$$

$$RAS_i = \frac{5}{8}\sum_g \left| \sum_\alpha RA_{i\alpha} RA_{g\alpha} - \frac{1}{5} \right| (3)$$

$$NRAS_i = \frac{5}{8}\sum_g \left| \sum_\alpha NRA_{i\alpha} NRA_{g\alpha} - \frac{1}{5} \right| (4)$$

Notes:
$R_{g\alpha}$: ratio of residents of income group g living in grid α;
$W_{g\alpha}$: ratio of workers of income group g in grid α;
$NRA_{g\alpha}$: ratio of time spent by visitors of income group g in the grid α to the time spent by all income groups in the grid α.
$NRA_{i\alpha}$: ratio of time spent by individual i in place α to his total time in all activity sites for non-routine activities

Result

In Figure 3, we compared the workplace distribution of female and male groups in different life cycle stage. And job distribution of female groups who need to take care of their child is more dispersed compared with male. But this type of gender difference can be relieved in unmarried male and female groups.

In Figure 4, the average segregation level of female and male in different lifecycle stage were compared. The gender difference is especially severe for female
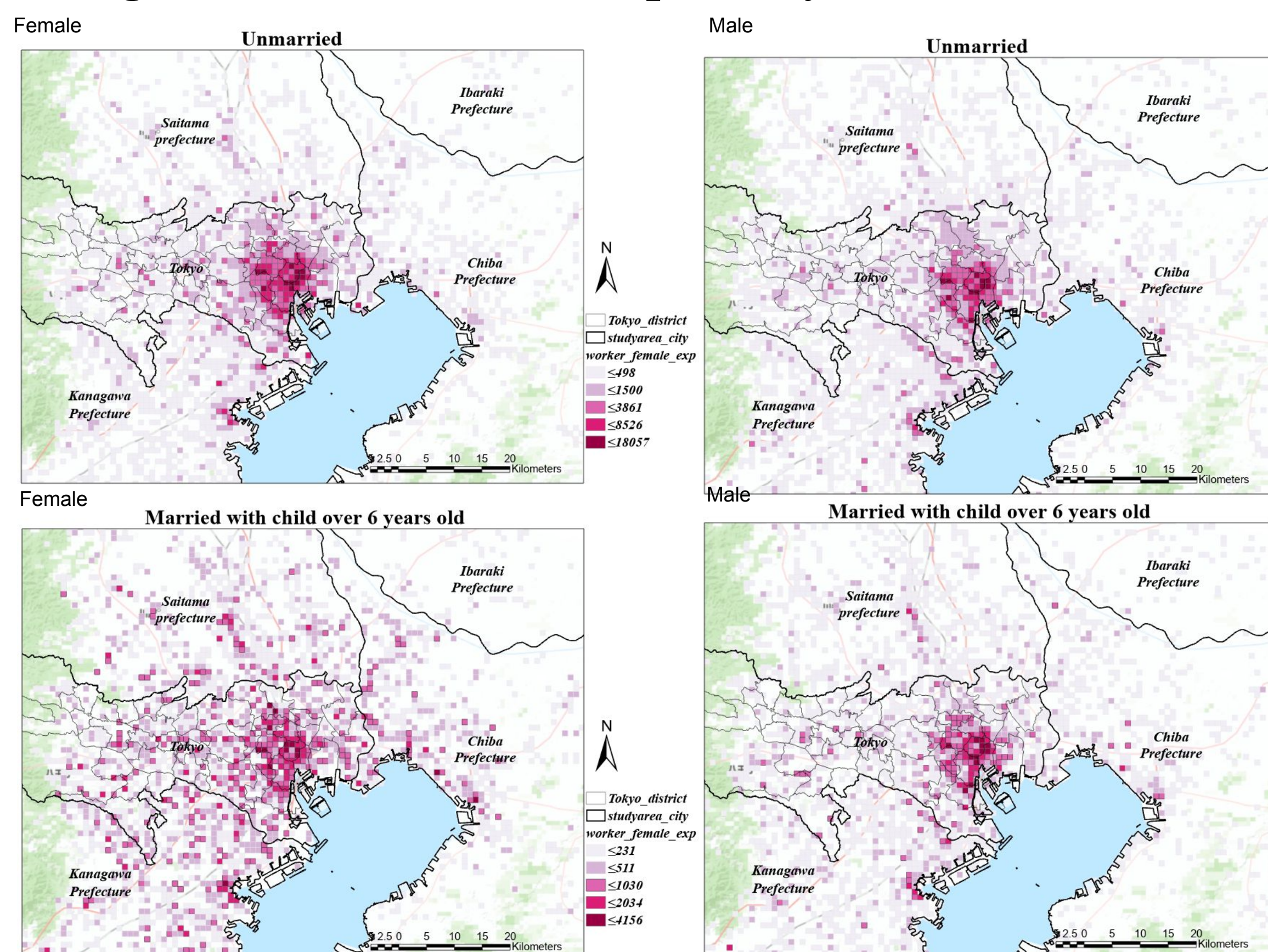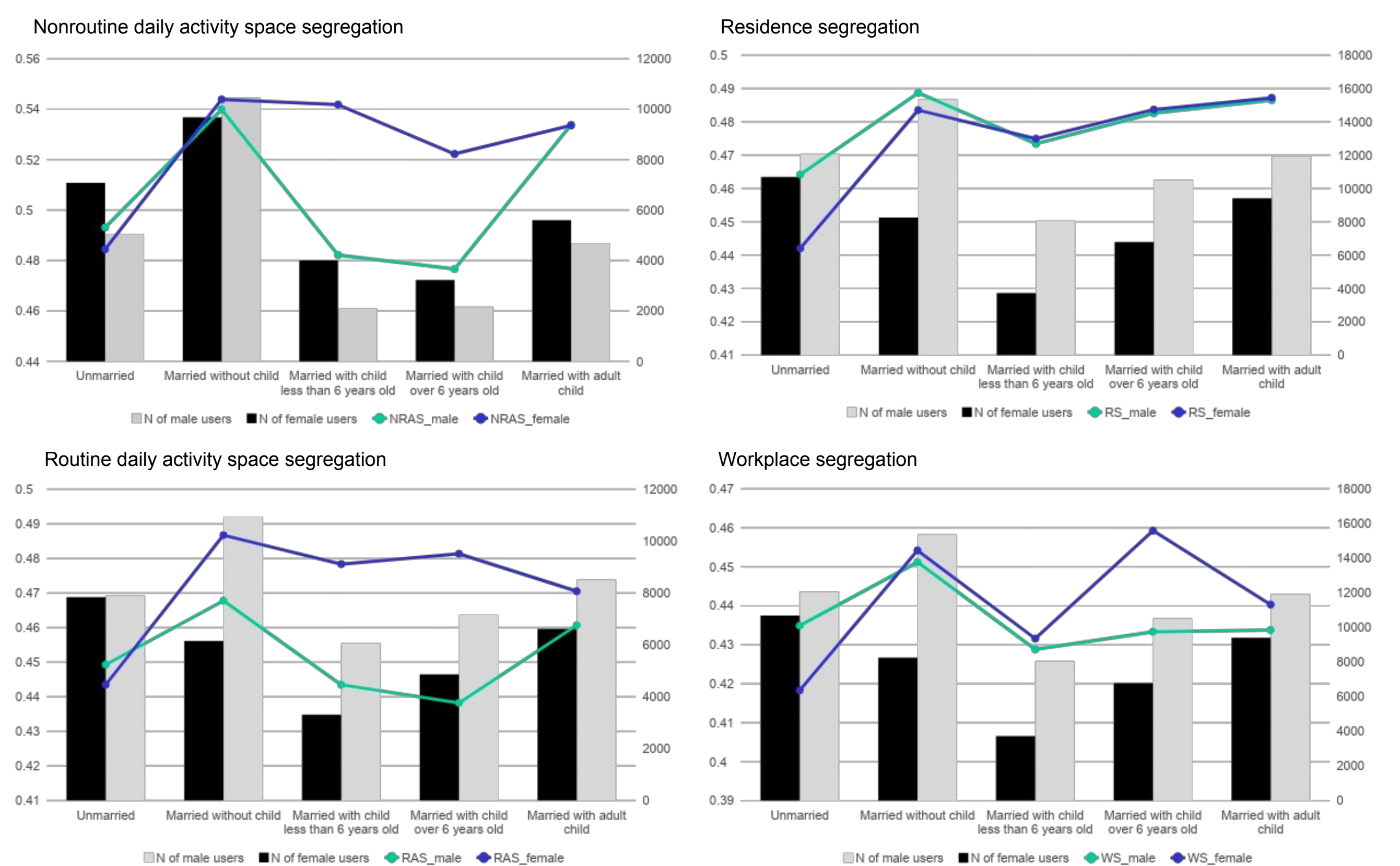

Fig. 4. Segregation results of male and female groups in different lifecycle stages

with child to take care of. And the segregation performance of female is even better than male group when they are not married.

Fig. 3. Workspace distribution of male and female

Conclusion

The gender differences in activity space-based segregation are significantly influenced by family life cycle stage. And the question that what can relieve this type of gender differences need to be further answered.