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CORESIDENCE BETWEEN OLDER PARENTS AND ADULT CHILDREN IN SINGAPORE AND CHANGES OVER TIME: THE IMPACT OF HEALTH AND SOCIO-DEMOGRAPHIC FACTORS

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ABSTRACT

This paper examined the impact of health and socio-demographic characteristics on coresidence and changes over time in Singapore. It was hypothesized that older parents in poorer health, with less income and assets, or who are unmarried, would be more likely to transit to shared living with their adult children. The data came from two waves of panel data over a four-year period from 1995-1999 (n=1,898). Coresidence remained high and was relatively stable in the city-state despite a slight decline from 89 percent to 81 percent over the period of study. The multinomial logistic regression results did not provide evidence that health is significantly associated with living arrangement transitions. Household income, home ownership, and marital status of older parents were significant predictors of changes in their living arrangements.

INTRODUCTION

One of the most salient aspects of family life and support pertains to the living arrangements of its members. In particular, coresidence between parents and their children serves as an important setting for intergenerational exchanges and mutual support within the family. Coresidence reflects the extent to which individuals and family members achieve some degree of (in)dependence as well as the sharing or pooling of resources within families and in society as a whole (Wolf, 1995). Because of the importance of the household in the daily lives of its members, there has been much research over the recent years focusing on living arrangements in various parts of the world (for example, see Population Bulletin of the United Nations, Special Issue on Living Arrangements, 2001). Of particular interest to this paper is the growing body of literature on the living arrangements of older parents, which perhaps stems, in part, from the growing numbers and proportions of older people, and, in part, from the varying

needs of these individuals as they deal with life events such as widowhood, declining health or poverty as they approach the end of the life course.

While coresidence has beneficial effects for parents, there have also been evidence to suggest that many of these extended households benefit primarily the child (Ward, Logan and Spitze 1992; Hoyert, 1992; Aquilino, 1991; Eggebeen and Hogan, 1990). In Asia, studies on the Philippines, Singapore, Taiwan, and Thailand showed that grandparents provide substantial care for their grandchildren (Chan, 1997; Hermalin, Roan and Perez, 1998). Speare and Avery (1993) also found in their investigation of the relative contributions of parents and adult children who live together in the United States that the marital status of both the parent and child plays an important role – unmarried children tend to benefit more from and contribute less to extended households than married children; similarly unmarried parents benefit more from living with children than married parents. Benefits of coresidence aside, there are also costs involved, and these are discussed in greater detail, together with the opportunities and preferences for shared living, in the following sections accordingly.

Previous research on the living arrangements of the elderly in Asia has, however, primarily examined the determinants of living arrangements from the older parent's perspective using mainly cross sectional data (Eu, 1991; Feng, 1999; Asis et al., 1995; DaVanzo and Chan, 1994; Knodel and Saengtienchai, 1999; Natividad and Cruz, 1997; Knodel and Chayovan, 1997; Anh, Cuong, Goodkind et al., 1997; Freedman et al., 1995). A key determinant influencing the likelihood of older parents coresiding with their adult

children is the health status of the elderly. Health status can be conceptualized in a number of different ways, namely, self-perceived health, functional capacity, mental/cognitive health, and morbidity. In studies conducted where health effects on elderly living arrangements are considered, the focus is mainly on functional status (Worobey and Angel, 1990; Speare, Avery and Lawton, 1991; Mickus and Stommel, 1997). Functional capacity of the elderly affects their coresidence decisions since living alone is usually more physically demanding than living with others where help is assumed to be more readily available when there are other people in the household.

While these studies have considered one of the key determinants of living arrangements, a main limitation is that, using cross-sectional data, they have not been able to make a valid causal interpretation as the temporal ordering of events is unclear. Put more specifically, there is an issue of reverse causality – is it health that affects living arrangement changes, or living arrangement changes that affect health? In the case of the latter, several studies have suggested that the physical environment and social context of a household can affect individual health (Antonucci, 1990; Martin, 1990; Waite and Hughes, 1999, 2002; Hays, 2002). However, the focus of this paper is to first seek to establish the causal effects of health on living arrangements. Other studies that used cross-sectional data have altogether excluded health measures in order to circumvent this issue of endogeneity (Frankenberg, Beard and Saputra, 1999; Ogawa and Retherford, 1997; Martin and Tsuya, 1991).

A longitudinal research design can address the dynamic issue of changes in living arrangements of individuals in later life more effectively, but because of data limitations, only a few studies to date have done so (see for example, Richards, White, and Tsui, 1987; Schwatz, Danziger, and Smolensky, 1984, White and Tsui, 1986; Worobey and Angel, 1990, Mutchler and Burr, 1991). More recently, the availability of longitudinal data on living arrangements allows us the revisit the research question on the casual relationship between health and living arrangements. In particular, newly available longitudinal data for Asia through a multi-country project permit us to address this issue in the Asian context.

In this paper, using panel data from two survey waves over a four-year period from 1995 to 1999 in Singapore with information on the characteristics of parents and their spouse, the impact of health on transitions in living arrangements is investigated for married and unmarried parents separately. The analysis of how baseline characteristics affect subsequent transitions in coresidence can better disentangle cause and effect than do cross-sectional data. While previous research has shed some light on the determinants of living arrangements among the elderly, little is known about the transitions in living arrangements that the seniors or near-elderly can expect to experience as they age. Since shared living arrangements can serve important functions for both the elderly and their adult children as discussed earlier, understanding both the correlates of their living arrangements and documenting changes in them over time are important objectives. In addition, the health status of the elderly will be conceptualized more broadly than previous studies, with measures of health including not only physical health in terms of

functional limitations, but also mental health as indicated by cognitive status (using standard Mini-Mental Self-Examinations), given the increasing prevalence of mental illnesses such as dementia and Alzheimer's disease among older persons.

Another contribution of this paper to the literature on living arrangements is its attempt to distinguish between living with married and unmarried children. To date, few, if any, studies have attempted to make this distinction in their analyses. As noted by Speare and Avery (1993), because the levels of resources, availability of assistance, and preferences about coresidence are likely to vary by the marital status of the child, it is important to draw attention to these differences.

The structure of this paper is as follows: I first provide a brief background of the Singaporean context, followed by two theoretical frameworks: 1) Lawton's person-environment model (1982); and 2) a rational choice model comprising preferences, opportunities, and constraints involved in living arrangements decisions. The literature is reviewed simultaneously and the hypotheses for this study are stated. I then describe the data and methods used, the measurement of the variables, and present the results of the analyses.

THE SINGAPOREAN CONTEXT

Over nearly four decades since independence in 1965, Singapore has been experiencing rapid economic and demographic change. From 1970 to 1995, the growth rate in Gross National Product (GNP) averaged about five percent annually. In 1999,

GNP per head totaled almost US$30,000 in Singapore (World Bank Development Report, 2000). Other demographic indicators were also shifting rapidly. Fertility was high in the 1950s but by 1998, the total fertility rate was only 1.5 children per woman. Simultaneously, life expectancies have also improved. A Singaporean born today can expect to live to around age 78. A consequence of these demographic changes is that the population of Singapore is aging. In 1996, the proportion of the population over age 60 is 9.4 percent in Singapore. Between 1996 and 2025, this proportion will increase rapidly by an estimated 272 percent in the city-state.

Singapore claims to have strong normative traditions governing familial responsibility for aging family members. Among the Chinese majority which comprise slightly over three-quarters of the population, Confucian culture heavily emphasizes filial piety. For the Malays who are the next largest ethnic group in Singapore at about 17 percent of the population, an important tenet of Islam is safeguarding parents' welfare in old age. Survey data in Singapore further confirm the importance of the family for old-age support. In a nationally representative survey in 1995, almost two-thirds of the respondents aged 55 and over reported that their children are their main source of support in old age.

In terms of formal institutions for old age-support, Singapore has a savings scheme known as the Central Provident Fund (CPF), created in 1955. Although it is a mandatory savings plan for old age, many of the current cohort of elderly either do not have a CPF account or have insufficient amounts in the account. Other formal systems

include tax incentives and priority housing to encourage children to live with or near an older parent and to contribute to parents' CPF retirement accounts (Mehta, 2000). In a country where the cost of living is high and 80 percent of the population live in public housing, policies promoting coresidence might have some effects.[1] The Singaporean government further strongly upholds the ideal of familial support of the elderly. Under the Maintenance of Parent's Act in Singapore, the older parent may sue their children for failure to provide proper support.

THEORETICAL FRAMEWORK, LITERATURE, AND HYPOTHESES

One of the ways in which living arrangements transitions in later life can be explained is by using Lawton's person-environment model (Lawton, 1982; Speare, Avery, and Lawton, 1991; Wilmoth, 2000). From this perspective, the aging process includes various events such as retirement, income loss, heath decline, and death of a spouse. These events increase what Lawton termed as "environmental press", that is, physical and social demands that encourage change and adaptation. Some of these events, such as the death of a spouse, might cause an immediate change in living arrangements, whereas others, such as health declines, may cause an older individual to reconsider the appropriateness of his or her living arrangement. In either case, adaptations allow the older person to alter the physical and social environment, such that effective functioning is enhanced. These adaptations can take various forms including altering the physical structure of the living environment, changing household

[1] Housing conditions and related policies in Singapore will be elaborated in detail when this paper is revised.

composition, or moving to a new environment (Lawton, 1982). In this paper, I am only concerned with the second type of adaptation, changing household composition.

A second theoretical framework that I use in this paper is the rational choice model which focuses on the preferences, cost and benefits to individual family members, as well as the opportunities and constraints for coresidence. Using this model, the decision to have or transit to shared living is viewed as one in which the preferences, needs and resources of an older parent are weighed against those of, and the competing demands made on, each individual in his or her own available network of kin. The preferences, needs and resources are, in turn, influenced by the different demographic and socioeconomic characteristics of the individuals involved. Many of the studies on living arrangements have adopted this organizing framework (Freedman, 1995; Goldscheider and Goldscheider, 1989; Crimmins and Ingegneri, 1990; DaVanzo and Chan, 1994) and the following discusses each of the framework components in greater detail.

Preferences

The preferences of older parents and their children are important considerations in decisions concerning family living arrangements transitions. Members of both generations may have strong ideas about what types of household arrangements they consider to be appropriate or desirable to transit to, and these attitudes may or may not be in agreement. For instance, older Asian parents might prefer to transit to living with a child, upon the death of a spouse, although this living arrangement might not be desirable

to the child. Furthermore, preferences may also depend upon the type of children in question. For example, premised on the patrilineal family system ideal in many Asian countries, the strong preference has been and continues to favor coresidence with a married son, as opposed to married daughter, often the eldest son. While the elderly in Western countries are commonly viewed as preferring to live independently, it seems that at least for the current elderly in some Asian countries, the preference is to live with children. As Mehta (1995) found in her focus-group study of different ethnic groups in Singapore, the preference to live with children, particularly with a son (usually the eldest), was still strong in a society governed by patriarchal traditions.

Preferences regarding living arrangements and transitions in living arrangements are, furthermore, typically embedded in the larger normative system, in particular, norms concerning gender roles, intergenerational kinship relationship, access to property, and the social organization of domestic activities (Casterline et. al, 1991). Personal preferences will also be shaped by individual and family goals, and influenced by the extent to which an individual's activities are organized around familial as opposed to non-familial lines (Thornton et. al., 1994). Of relevance in this regard are activities centering around education and work, as well as place of residence, perhaps especially during childhood and young adulthood, and an older parent's own experiences with respect to intergenerational coresidence as young adults (Goldscheider and Lawton, 1998).

Costs and Benefits

Coresidence may serve a range of functions for both parents and adult children, from providing a means of saving on living expenses to fulfilling physical, emotional, and social needs of family members. In Singapore, the household has provided the setting in which care for the elderly is being provided and services exchanged between generations of family members. The extent to which coresidence is viewed as beneficial or costly (or to which independent living is a feasible option) will depend on the various needs and resources of the individual family members. Of primary concern are the economic, social and health needs and resources of older parents and their adult children.

One advantage that coresidence provides to both children and parents is a means of economizing on living expenses. By living in the same household and sharing meals, children and parents can save on expenses (Goldscheider and Goldscheider 1989; DaVanzo and Chan, 1994). Such savings may be particularly attractive, if not critical, for young adults who are still in school or have not yet married and/or started working. Even children who are working, however, will not necessarily be economically independent from their parent(s) and may not have the resources necessary to support independent living.

The extent to which a child views coresidence as an economic advantage relative to other living arrangements will depend on the amount of independent resources available to the child, which would be a function of the child's education, as well as work

status. Children with lower levels of completed education are likely to have fewer economic resources, and thus, may be more inclined to view coresidence as an advantageous arrangement. On the other hand, the extent that parents are a financial burden on the household, as opposed to an added resource, children who are themselves lacking in economic resources may be less able to support older parents, and/or to afford housing that would accommodate them. From the perspective of an elderly parent, coresidence may be particularly advantageous for those who have low incomes or have experienced a reduction in income due to retirement. The issue of saving on living expenses is especially relevant to parents and children living in Singapore where the cost of urban living is considerably high. On the other hand, for parents and children who are able to afford independent living, it is expected that some may choose to do so because of the greater privacy that independent living provides.

A second advantage of coresidence is that it may also provide a range of domestic services to both adult children and elderly parents that might otherwise have to be purchased. From the perspective of a young married couple with small children, an older coresident family member may serve as a convenient source of child-care, thereby enabling both partners to work. In addition, an elderly mother-in-law can relieve much of the burden of housekeeping and meal preparation for a working daughter-in-law. From the parent's perspective, coresident children can also provide a range of domestic services. For example, depending on the level of impairment, an elderly individual in poor health may need assistance with anything from meal preparation or housekeeping to bathing and dressing. On the other hand, older parents who are in perfect good health but

are who are widowed may need assistance with activities that tend to be defined along gender lines. For example, widowed women may need assistance with house or mechanical repairs, whereas widowed men may require assistance preparing meals or doing laundry. Although for many of these activities provision of assistance does not necessitate coresidence, a coresidential arrangement does make such exchanges more convenient.

Lastly, coresidence can also be a source of social and emotional support for children and elderly parents. Families serve as important resources for children in developing both social and economic ties in the larger society, and provide a source of companionship to children and older parents alike. These types of support may be especially important for children who have not yet established a strong social network apart from the family (for example, through employment, college education or marriage) and for elderly individuals whose social networks may have diminished or declined due to retirement or widowhood.

Opportunities and Constraints

The number and types of alternative living arrangements that parents and adult children choose among and can transit to is a function of kin availability. As Casterline and colleagues (1991) pointed out, this relationship is definitional when living arrangements are identified in terms of specific family members, for example, parent-child coresidence. An older person's opportunities for coresidence are, therefore, represented by the availability of adult children with whom he or she may coreside.

Beyond the mere existence of children, the number of children could have an effect on the likelihood of living with a child. (Casterline et. al., 1991; Chan and DaVanzo, 1994; Aquilino, 1990; Wolf and Soldo, 1988). By the same token, parent availability will also determine adult children's opportunities for coresidence with parents.

Based on the framework of preferences, costs and benefits, and opportunities for coresidence as intermediate considerations, previous research has indicated that individual demographic and socioeconomic characteristics of parents and children are important explanatory factors in analyses of intergenerational coresidence. Most often examined are health, marital status, age, sex, and work status.

It has been found that elderly persons are less likely to live in complex households when they are young, currently married, and have no physical disability (Wolf and Soldo, 1988; Tsuya and Martin, 1992). Studies have shown that older parents' failing health is an important promoter for coresidence (Lee et. al. 1995; Lee and Dwyer, 1996), and so is their marital status (Lee and Dwyer, 1996; Eu, 1991). However the effect of marital status and health status may differ by gender. For example, Eu (1991) reported that among the Korean elderly, being married is more advantageous for men than women, and severe disability of the wife limits the couple's ability for independent living while disability of the husband imposes a less imminent need for coresidence. DaVanzo and Chan (1994) found the unmarried Malaysian seniors are somewhat more likely than married seniors to coreside with at least one adult child, but the difference is not statistically significant. Their results suggest that health effects differ for the married and

the unmarried, and perhaps between males and females: apparently only very serious health problems increase the likelihood of coresidence for husbands, whereas fair health has this effect for wives. The seniors' gender appears to have no significant effect on coresidence in the unmarried sample.

As for the effect of age on coresidence, among the currently married elderly aged 60 and over, those in the age group 65-69 were most likely to live alone (Casterline et. al., 1991). The interpretation is that the age pattern probably reflects at least in part the confluence of the needs of the elderly and the life-course stage of their children – while the needs of the elderly for close kin as coresidents increase with age, the competing demands on their children also grow. The general pattern, however, appears to be that with increasing age, coresidence with children also increases.

In examining the children's characteristics, the age of the youngest child is included in Casterline et. al. (1991) analysis as a proxy for the life-course stage of the elder's children, showing that as the age of the youngest child increases, the likelihood of living only with a spouse increases, and the likelihood of living with a child decreases. The effect of the elderly age is weakened when the age of the youngest child is controlled, and the latter is found to be unrelated to the likelihood of living alone. The gender composition of children also matters with regard to coresidence outcomes. For instance, sons maintain closer ties and are practically more important for their older parents in Taiwan and daughters may be more important for the elderly in the Philippines and in Thailand. In a review of previous research in East Asia, Logan et. al. (1998) point

out a gendered coresidence pattern: a strong preference for coresidence with sons, particularly a married son or eldest son. For example, several studies (Lee et. al. 1994; Weinstein, 1990; Casterline et. al 1991) have found that the number of sons rather than daughters is most important in Taiwan, and coresidence with a daughter is likely in the absence of a son and when the daughter is the eldest child. Eu (1991) found that in Korea, the absence of sons greatly increases the likelihood of living without children even among parents who have daughters.

Based on the theoretical frameworks and literature reviewed, the hypotheses of this paper are as follows: if coresidence reflects, in part, the needs of aging parents, their health status and marital status are relevant factors to consider in their living arrangements transitions. Respondents in poorer health and respondents who are unmarried should be more likely to transit to shared living with their children compared to respondents in good health or are married. In addition, it is expected that older parents who have more assets and resources might be more likely to live on their own. Therefore, it is hypothesized that parents who are home owners might be less likely to coreside with their children. This might particularly be in the case for coresiding with married children and less so for unmarried children who might not have left the family nest yet, since leaving home for marriage is still the primary reason for many young adults in Singapore. Furthermore, coresidence probably increases with the ages of the respondent and spouse, although as children age, however, their needs and possibly their desire for coresidence with their parents may well decrease. Apart from these life-cycle characteristics, other factors may influence transitions in living arrangements because they affect respondent's preferences or opportunities for coresidence. Therefore controls

such as the respondent's and the spouse's other socio-demographic characteristics are included.

DATA AND METHODS

Data

Two waves of panel data over a four year period is used to investigate the impact of health and key socio-demographic variables on transitions in elderly living arrangements in Singapore, separately for married and unmarried parents. The data source for the analysis comes from two surveys: the *1995 National Survey of Senior Citizens* and *Transitions in the Health, Wealth and Welfare of Elderly Singaporeans, 1995-1999*.

The 1995 baseline survey was conducted by the Ministry of Community Development (MCD), the Ministry of Health (MOH) and the Department of Statistics (DOS) in Singapore. The sampling frame used was the National Database of Dwelling maintained by DOS. Only households comprising at least one person aged 55 and above who was a Singapore Citizen or permanent resident were included. The scope of the sample was further confined to elderly residing in the community, and those residing in institutions were excluded from the survey. A customized two-stage stratified design based on house-type was used to select a representative sample of 8,000 dwelling units. Elderly aged 75 and above were oversampled to ensure a sufficient number of respondents in this age group for analysis. This was essential to provide representative information on additional needs of this group of elders who are projected to grow

significantly in the future. For a selected household with more than one elderly, a computer-generated random number was provided in the list to enable the interviewer to select the actual person to be interviewed.

A survey company was commissioned to undertake the fieldwork and data entry. Interviewers for the survey were briefed, trained and provided with instruction manuals to assist them during the fieldwork. They were issued with official authorization letters for verification of their identity. Before the survey was conducted, letters were sent to all selected households informing them of the survey and its objectives, and to seek their cooperation in providing the required information.

The survey was carried out through face-to-face interviews with selected elders at their homes using the structured questionnaire. Up to three visits were made if the respondents could not be contacted at the first and second visits. Prior to the survey proper, a pilot test was conducted by the survey company on approximately two percent of the sample. Findings from the pilot test were reviewed and refinements made to the questionnaire where required.

From the list of 8,000 selected households with seniors, a total of 4,750 seniors were successfully interviewed, resulting in a 60 percent response rate. Of the unsuccessful interviews, 70 percent were due to failure to contact or locate the seniors at the given address and 30 percent were due to refusal to be interviewed.

For the follow-up survey in 1999, a group of researchers at the National University of Singapore in collaboration with MCD attempted to re-interview the respondents, although the initial survey in 1995 was not designed with the intention to be a longitudinal study. Akin to the 1995 survey, a survey company undertook the face-to-face interviews with the same data collection efforts discussed above. Of the 4,750 individuals interviewed in 1995, 11.8 percent had died, 17.9 percent were found but refused to be interviewed, and 28 percent could not be found (personal communication with Angelique Chan, Principal Investigator). A total of 1,981 individuals, constituting 47 percent of those eligible, were re-interviewed. While the data is possibly limited in terms of being representative of the elderly population, the dataset has rich information on the characteristics of the respondents and their kin networks. In addition, as the only longitudinal dataset on the elderly in Singapore to date, it serves to be useful in helping to shed some initial light on the temporal ordering of important life events of the elderly, in this case, their health and transitions in living arrangements.

For the analysis, the sample is separated by the marital status of the older parents at baseline survey. Living arrangements are highly correlated with one's marital status. Because for some arrangements (for example, living with spouse), marriage is a precondition, whereas for some arrangements (for example, living alone) marital dissolution is the chief pathway, it is necessary to disentangle the effects of marital status from living arrangements. This was accomplished by stratifying the empirical analyses by marital status at baseline. In addition, because the substantive focus is on differentiating between independent living and living with children, the relatively small

number of respondents who may have been in a coresident arrangement such as living with siblings, elderly parents, other relatives, or friends (usually termed "living with others" in the literature) were excluded in the analysis.[2] As we are primarily interested in parent-child coresidence, to ensure that all respondents were subject to the risk of living with their children, only respondents who had at least one living child were selected.[3] This was necessary in assessing the probability of making a transition to a particular living arrangement net of the opportunity structure as defined by kin availability. After taking the above into account, the married sample comprises 992 respondents and the unmarried sample comprises 793 respondents.

Methods

The surveys from both waves covered a broad range of topics such as employment and retirement, family support systems, use of community services, health, and finance. Of central relevance for this paper are the details of household structure, the socioeconomic and demographic characteristics of the respondents, and the data on the respondents' spouse and children, including those who live in the household as well as those who live elsewhere. Because the dependent variable, transitions in living arrangements, is categorical and non-ordered, multinomial logistic regression is used to obtain the transition probabilities on the likelihood of changes in living arrangements. Descriptive statistics of the variables in the analysis and bivariate analyses on living

[2] 113 observations (44 and 66 observations for the married and unmarried sample respectively) were deleted because the respondent was living with others at either time 1 or time 2 of the survey.

[3] A total of 83 observations were deleted because the respondent had no living children.

arrangements and changes between the two waves are presented prior to the multivariate results.

Measurement

Living Arrangements. The dependent variable was the living arrangements of older parents at the second wave (time2). This was constructed from the household roster of the questionnaire which provided the age, gender, relationship with respondent (for example, spouse, son, daughter-in-law, etc), and headship status of all household residents. Following previous empirical work on this topic, coresidence was defined as sharing a residence with one or more children at the time of the survey. This is a categorical variable measured in three categories: 1) living alone (and with a spouse only for the married sample); 2) living with at least one married child; and 3) living with unmarried children only. Living with a married child is separated from living with unmarried children to account for the likelihood that levels of resources, availability of home caregiving, and preferences about coresidence vary by whether the child is married or not (Park, Kim, and Kojima, 1999). Because of the very small number of respondents living alone in the married sample, it is combined with the living with spouse only category. For all the models in the multinomial regression analyses, the reference category is living with unmarried children only.

Health. The main independent variable is the older parent's health. Health is a multi-dimensional concept comprising various physical and mental aspects such as functional status, self-assessed health, morbidity, and cognitive status. In the analysis,

because of the collinearity of these variables, only functional status, the key aspect of physical health in determining living arrangements changes, and cognitive status were considered in the analysis.[4]

For functional limitations, difficulties with activities of daily living (ADL) and instrumental activities of daily living (IADL) were considered. Difficulties in ADL include feeding, toileting, and personal grooming; difficulties with IADL include tasks such as cleaning the house, doing the laundry, preparing meals, taking medication, using the telephone, climbing stairs or using the lift, using public transportation, shopping or marketing and doing minor repairs such as changing a light bulb, attending to leaking tap and clearing blocked sink. An index of functional limitations, ranging from 0-12 was obtained by combining the scores of reported difficulties with ADL and IADL. Because close to half of the sample did not have any difficulties with the activities, the variable was categorized into none (reference category), one difficulty, and two or more difficulties.

For cognitive status, respondents were assessed on their memory, memory recall and orientation using standard mini-mental self-examination tests. They were asked to remember a number and to recall it later in the interview. Respondents were also asked their age, birthday, year of birth as well as orientation information such as the day of the week, the date in terms of day, month and year, and which part of the house they were at during the time of the interview. A summary cognitive score was used where 0-4

[4] Measures of self-assessed health and morbidity were included in initial models but did not appear to make a difference in the results and were thus omitted.

indicated a probable case of cognitive impairment, 5-6 indicated a borderline case, and 7 or more indicated normal cognitive status. These were recoded into normal cognitive functioning (reference category) and cognitively impaired.

Socio-Demographic Characteristics. Living arrangements are also influenced by a number of demographic and socioeconomic characteristics. The older parent's age, sex, education, income, home ownership, total number of children, and ethnicity, as well as other spousal characteristics, are considered. The work status of the respondent was omitted as it was highly correlated with income (r=0.899). In addition, it was not possible to consider spouse's health as the variable was not available from the dataset.

Only measures of baseline characteristics were used; characteristics at time2 were not included because they may be partially determined by living arrangements during the interval. For the married sample, also included was the difference of the respondent's age with that of the spouse to take into account the high correlation between the two variables. For the unmarried sample, age was a categorical variable, 55-59 (reference category), 60-69, 70-79, and 80 and over. Sex was coded 0 for male and 1 for female. The educational difference of the respondent and the spouse was used for the married sample. The original variables were coded no education, primary, and secondary. The new educational difference variable had the categories of no difference (reference category), one level difference, and two levels difference. For the unmarried sample, only the respondent's education was used. Income from work has the following categories: no income (reference category) less than S$1000, $1000-1999, and over

$2000. Home ownership was a binary 0 for non-ownership, and 1 for ownership or partial ownership by the respondent.[5] The effects of owning a home was included and controlled for it has been associated with higher levels of functioning, satisfaction with one's living situation, and the availability of privacy in late life (Hermalin, Roan, and Chang, 1997; Waite and Hughes, 1999). In all these dimensions, owning a home reduces the odds of an elderly parent moving in with his or her children.

In addition, family composition matters because nearly all studies incorporate a measure of kin availability (for example, the number or living children by marital status and/or by sex) to define an opportunity structure for living arrangements. The literature consistently shows that the probability of living with a child increases with the number of offsprings (see Soldo et al., 1990). In the analysis of this paper, the variable total number of children was continuous. Other characteristics of the children such as their age, sex, marital status, and geographical proximity (such as living in the same building, living in the same neighborhood, living in another neighborhood, and living overseas) will be considered and included in future analyses.

Finally, ethnicity was coded 0 for Chinese and 1 for all others (Malays, Indians, and persons of mixed descent). In addition to these variables considered, for the married sample, wife's work status was also included and was binary 0 for not working (reference category) and 1 for working. While the health of the spouse is likely to determine any changes in living arrangements, the data is unavailable.

[5] Future revisions and analyses will attempt to make a distinction between joint-ownership and full-ownership, as well as to consider the characteristics, particularly marital status, of the children for joint home ownership.

Baseline living arrangements. The living arrangements of the older parents at time1 was also included and controlled in the model because in addition to the direct effects of the socio-demographic variables, these factors may also influence living arrangements at time2 through prior living arrangements that was measured at baseline. The variable was coded in the same manner as living arrangements at time2 and the reference category was living with only unmarried children.

RESULTS

The results of the analysis of changes in living arrangements are presented in two sections. First, the descriptive analysis of the means of the explanatory variables by baseline living arrangements are presented separately for the married and unmarried sample, followed by the cross-tabulation of the distribution of respondents by their baseline living arrangement with the distribution observed at the follow-up interview. Second, to assess the effects of baseline covariates on the probabilities of changes in living arrangements, multinomial logistic regression was used. To examine the determinants of time2 living arrangements, the variable was regressed prospectively on the baseline health, demographic, and socioeconomic variables. Changes in living arrangements was analyzed by regressing time2 living arrangements on the same set of variables with the additional inclusion of prior living arrangements. The effects of health variables were evaluated by controlling various covariates hierarchically.

Descriptive Statistics

Table 1 shows the means of the explanatory variables by baseline living arrangements for the married and unmarried sample. Across both samples, the majority of the respondents had less than one functional limitation (ADL and IADL measures combined) and cognitive status was generally very high in both of the groups. The married reported lower levels of functioning difficulties than the unmarried respondents. Among the latter, those who live with married children had the most difficulty with functioning activities. These individuals also reported slightly higher levels of cognitive impairments compared to other respondents.

The differences in functional limitations and cognitive status between the married and unmarried parents could be a function of age as the married sample tended to be younger than the unmarried sample. As shown in the same table, the unmarried respondents on average were older than the married respondents. Those who are married and live with unmarried children were the youngest group in the samples. Among the married, only three of the respondents were living alone. The rest were living with either their spouses only and/or with their children. The age difference between them and their spouses is about seven years, regardless of whether they were with spouse, living with married children, or living with unmarried children.

The descriptive statistics showed interesting and known differences by sex across the married and unmarried samples. The married sample was predominately men, while those who were unmarried were mostly women.

In terms of educational levels, those who were married and living with spouse only or living with only unmarried children have the most education compared to the respondents in other groups. Unmarried individuals living with children, whether married or unmarried tended to have lower levels of education. However, across both samples, the majority of the respondents had less than primary schooling.

Income differences are also apparent between the married and unmarried respondents, with the former having higher income levels. Among the married, those living with unmarried children tended to have higher income compared to the other groups.

In terms of home ownership, most of the respondents are homeowners, reflecting in part the success of the public housing scheme in Singapore where most Singaporeans own the apartment or house that they live in.[6] Those who are not home owners tended to live with married children, regardless of their own marital status.

The number of children that each respondent has on average is about four to five children. Those who are married and living with married children as well as those who are unmarried and living with unmarried children tended to have slightly more children.

Finally, there seems to be little difference in living arrangements by ethnicity among the respondents, with non-Chinese only slightly more likely to live with married

[6] More on the housing policies in Singapore will be elaborated in the dissertation proposal.

children among the married respondents. For the married respondents, those with wives working tended to be living with unmarried children only.

Table 2 presents the baseline living arrangements of these parents at time 1 and changes over the four-year period from 1995 to 1999. As shown in both the married and unmarried samples (upper and lower panels of Table 2 respectively), living arrangements remained fairly stable over the study period. Among the married respondents, about three-quarters of those who live with spouse only continued to do so at time 2. Similarly, about three-quarters of those who live with unmarried children continued to do so at time 2. For married respondents living with married children, slightly more than one-half of them remained in the same living arrangement at time 2.

Among the married respondents who lived with spouse only at baseline, about 11 percent and 13 percent of them transited to living with their married children and unmarried children respectively. For those living with married children at time 1, close to one-third moved in with unmarried children only and 13 percent transited to living alone or with spouse only by time 2. Among those who lived with unmarried children at time 1, 11 percent transited to living with spouse only and about 14 percent transited to living with married children.

For the unmarried respondents, the stability in living arrangements continued for the most part. More than three-quarters of the respondents remained in the same living arrangement as they did four years ago. Close to 80 percent of those who lived alone at

time 1 continued to do so. Likewise, among those who live with married children, 77 percent continued to do so at time 2, and among those who live with unmarried children, 78 percent remained in the same living arrangement at the second wave.

For those who lived alone at baseline, about 13 percent and 8 percent transited to living with their married and unmarried children respectively by time 2. Among those who lived with married children at time 1, about 18 percent transited to living with unmarried children, while 5 percent transited to living alone. Lastly, for those living with unmarried children at time 1, about 15 percent transited to live with married children and only 7 percent lived alone by time 2.

Multivariate Analyses

The multinomial logistic regression results for living arrangements at time2 are presented in Table 3 for the married sample and in Table 4 for the unmarried sample. For ease of interpretation, the coefficients are exponentiated to obtain odds ratios which are shown in the tables. The reference category for all the models in both samples is living with unmarried children at follow-up. For each of the models, the first column reports the effects of change in one value of an explanatory variable on the relative odds on living alone (or with spouse only for the married sample) versus living with unmarried children, while the second column of each model presents the odds of living with at least one married child versus living with only unmarried children.

Results concerning the living arrangements of older parents who are married are presented first (Table 3). In Model 1 where only physical health, functional limitations was considered, the probability of living with married children increases with more functional limitations. Older parents with one functional limitation in 1995 were about 48 percent more likely to be living with married children in 1999 relative to parents living with unmarried children. For respondents who had more than one functional limitation, they were about 65 percent more likely to be living with married children. There were no significant results for those who are living alone or with his/her spouse only.

When mental health, cognitive status, was added in Model 2, the effect of functional limitations on living arrangements in time2 continued to remain significant and substantial with very little decrease for those living with married children. For older parents who are cognitively impaired, they were more likely to be living with married children relative to those living with unmarried children, although it was not statistically significant. However, they are less likely to be living alone or with spouse only relative to living with unmarried children. This finding was also not statistically significant which could be in part a result of the small number of cognitively impaired respondents in the sample.

Model 3 takes into account the respondent's baseline demographic and socioeconomic characteristics to predict living arrangements at follow-up. When these factors are controlled for, both functional limitations and cognitive status were not

significant at predicting time2 living arrangements. In this model, both home ownership and the number of children that the respondents had were very strong predictors of living arrangements ($p < 0.001$), while personal income particularly at higher levels was marginally significant. Older parents who are home owners were less likely to be living with married children relative to living with unmarried children than are those who do not own their own homes. Older parents who are home owners were one-half more likely to be living alone or with spouse only than with unmarried children, but this was not significant. The number of children respondents had was also a significant predictor of current living arrangements for those who are living alone or with a spouse only. The number of children the respondent had tend to decrease the likelihood of living alone or with a spouse only.

In terms of income, married parents were only half as likely to live with their married children relative to coresidence with unmarried children if they were earning between $1000-$1999. Among those who are earning more than $2000, they are also less likely to be living alone or with spouse only relative to living with unmarried children. Finally, married male respondents with wives who are working were also less likely to be living with married children compared to living with unmarried children.

In Model 4, an indicator for the interaction of functional limitations with sex is included in the model since studies have found that changes in living arrangements were more responsive to wives' rather than husbands' functional capacity. However, the analysis did not show any significance among this particular sample of respondents.

The last model (Model 5) shows the full model with the inclusion of prior living arrangements at baseline to predict living arrangements changes at time2. Not surprisingly, given the relative stability of living arrangements over the study period, prior living arrangements strongly predicted current living arrangements. Among the married respondents who lived only with a spouse at baseline, they were about 43 times as likely to remain living with only a spouse at time2. Similarly, those who lived with married children at baseline were 8 times as likely to do so at the follow-up interview. In comparison, the likelihood of changing living arrangements is relatively small. Married respondents living with spouse only at baseline were about 4 times as likely to transit to living with married children, and those who lived with married children also had about the same likelihood of transiting to living with spouse only.

Relatively few covariates show a statistically significant effect on changes in living arrangements. Among married respondents, home ownership reduces the odds of transitioning to living with married children relative to living with unmarried children, and increases the odds of living with spouse only. Number of children decreases the likelihood of transitioning to living with spouse only. The health variables, both functional limitations and cognitive status, have no significant effect on changes in living arrangements of older married parents. Changes in health status, however, might have more effect on changes in living arrangements, and would be included in future analyses.

Table 4 shows the models for the unmarried sample. Similar to the married sample, lower functional status increases the likelihood of living with married children relative to living with unmarried children. For those with one functional limitation, the probability of living with married children interestingly decreases compared to those living with unmarried children. The significance holds even when other demographic and socioeconomic characteristics were controlled (Model 3). However, when an interaction term for functional limitation and sex was included (Model 4) and in the full model (Model 5) functional status does not appear to matter. As in previous models, cognitive status was not significant.

Age was also a significant predictor of living arrangements. Those who were aged 70-79 compared to the younger cohort (those in their 50s) were about twice as likely to live with married children relative to living with unmarried children, and those who were aged 80 and above were about three times as likely to do so. This significance was consistent across all models when other variables were controlled for. Educational level has a marginal effect on living arrangements. Unmarried respondents with a secondary education were about three times as likely to live alone relative to living with unmarried children. In contrast, they were about one-third less likely to live with married children. In the full model where prior living arrangements were controlled, unmarried respondents with primary education were about 1.65 times as likely to live with married children compared to those living with unmarried children. The income effects that was found among the married respondents (Table 3) were not significant among the unmarried respondents. However, similar to the married sample, both home ownership and number

of children were strong predictors of current living arrangements. Among those who are unmarried and are home-owners, they were about one-third as likely to be living with married children relative to living with unmarried children. Nevertheless in the final model where prior living arrangements were taken into account, home ownership was no longer significant for those living with married children. Instead, those living alone gained marginal significance – home owners were about 2.5 times more likely to live alone relative to those living with unmarried children.

The number of children, as a measure of kin availability, strongly predicts living arrangements at follow-up. Interestingly, among the unmarried respondents, the probabilities of living alone and with married children decreases with the number of children relative to living with unmarried children. This could be because of the availability of younger and unmarried children who are still living with their parents and these children have not left the family nest yet. Finally, in the full model, prior living arrangements strongly predicts living arrangements at follow-up. The large diagonal values of the odds ratios indicate the stability in living arrangements over time. In this full model, the results showed that relatively few of the other covariates have a highly statistical significant effect on the changes in living arrangements. Both physical and mental health does not appear to have a significant effect on the likelihood of transitions in living arrangements when all the demographic, socioeconomic, and baseline living arrangements were controlled.

DISCUSSION

The preliminary findings showed that living arrangements among older parents in Singapore is relatively stable, with about three-quarters or more remaining in their prior living arrangement by the end of the four-year period for both the married and unmarried respondents. The slight exception were the married respondents who lived with married children at time1. Slightly more than half continued to live with married children, and about 31 percent and 13 percent transited to living with unmarried children and living alone/with spouse only respectively. For those living with unmarried children only at time1, close to 11 percent were living alone or with spouse only at time2, suggesting evidence of an empty nest when children leave home, for the most part, for marriage. About 14 percent transited to living with married children.

The relative popularity of living with children seems to reflect the traditional preference for living with offsprings. With this preference for coresidence with either married or unmarried children, neither physical nor mental health in the analysis had a very significant effect on changes in living arrangements. When demographic, socioeconomic, and prior living arrangements were controlled, functional limitations and cognitive status did not appear to increase the odds of making a transition to other living arrangements.

Of the demographic and socioeconomic characteristics, home ownership and the number of children the respondents have were the strongest predictors of changes in living arrangements for the older parents. Other factors, such as age, education, and income were only marginally significant.

Future analysis would include measures of children's attributes such as their age (particularly for unmarried children) and sex in the models. Indicators of whether the older parent's marital status and health status had changed between the waves of the survey would also be added. These measures would help to isolate the effects on living arrangements from that caused by a change in marital status, functional limitations, or cognitive status. Finally, because the analysis of changes in living arrangements was based only on surviving respondents who completed a personal interview at each wave of the survey, other competing risks including death, nonresponse, or proxy interview need to be explicated (see Brown et al, 2002). This is because the probabilities associated with various competing risks are interdependent. The occurrence of one type of event (for example, death) removes the individual from the risk of all the other types of events (in this case, changes in living arrangements). When a given covariate is significantly associated with a transition in living arrangements as well as death, non-response, or proxy interview, its effects on changes in living arrangements needs to be interpreted by taking the competing risks into account.

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Table 1. Means of Explanatory Variables by Baseline Living Arrangements

	Living Arrangements at Time1							
	married sample				unmarried sample			
Explanatory variables	*Total* (n=992)	*Alone/ spouse* (n=98)	*Married children* (n=253)	*Unmarried children* (n=641)	*Total* (n=793)	*Alone* (n=38)	*Married children* (n=419)	*Unmarried children* (n=336)
Functional Limitations (0=none, 1=one, 2=two or more)	0.49	0.58	0.54	0.46	0.85	0.68	0.94	0.77
Cognitive Status (0=normal, 1=impaired)	0.05	0.04	0.06	0.05	0.12	0.14	0.13	0.10
Age (1=55-59, 2=60-69, 3=70-79, 4=80+)	2.14	2.60	2.38	1.97	2.80	2.97	2.98	2.55
Age difference with spouse (0-29)	6.97	6.98	6.91	6.99	-	-	-	-
sex (0=male, 1=female)	0.38	0.35	0.43	0.36	0.83	0.76	0.83	0.83
Education (0=none, 1=primary, 2=secondary)	0.58	0.65	0.41	0.64	0.23	0.37	0.20	0.25
Education difference with spouse (0=same, 1=one level, 2=two level)	0.36	0.38	0.36	0.35	-	-	-	-
Parent's income (0=none, 3=more than S$2,000)	0.47	0.24	0.25	0.59	0.11	0.13	0.06	0.17
Home ownership (0=no, 1=yes)	0.81	0.86	0.62	0.88	0.53	0.55	0.34	0.75
Number of children (0-15)	4.65	4.11	5.16	4.53	5.08	4.24	4.71	5.63
Parent's ethnicity (0=chinese, 1=others)	0.15	0.12	0.19	0.14	0.12	0.11	0.12	0.13
Wife's work status (0=not working, 1=working)	0.11	0.17	0.15	0.27	-	-	-	-

Table 2. Baseline Living Arrangements of Older Parents and Changes from 1995-1999

married sample (n=992)

	Living Arrangements at Time2 (1999)			
Living Arrangments at Time1 (1995)	*Alone/ spouse*	*Married children*	*Unmarried children*	*Total*
	%	%	%	%
Living alone or with spouse only	75.5	11.2	13.3	100.0
	(74)	(11)	(13)	(98)
Living with married children	13.0	56.1	30.8	100.0
	(33)	(142)	(78)	(253)
Living with unmarried children	10.9	13.6	75.5	100.0
	(70)	(87)	(484)	(641)

unmarried sample (n=793)

	Living Arrangements at Time2 (1999)			
Living Arrangments at Time1 (1995)	*Alone*	*Married children*	*Unmarried children*	*Total*
	%	%	%	%
Living alone	79.0	13.2	7.9	100.0
	(30)	(5)	(3)	(38)
Living with married children	5.0	77.1	17.9	100.0
	(21)	(323)	(75)	(419)
Living with unmarried children	7.1	14.6	78.3	100.0
	(24)	(49)	(263)	(336)

Number of cases are in parentheses

Table 3. Odds Ratios from Multinomial Logistic Regression of Living Arrangements at time2 for married sample (n=992)

	Model 1		Model 2		Model 3		Model 4		Model 5	
Explanatory variables at baseline (time1)	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*
Functional Limitations (ref: none)										
one functional limitation	1.248	1.481 *	1.270	1.434 *	1.158	1.144	1.125	1.283	0.762	1.309
more than one functional limitation	1.122	1.654 *	1.203	1.585 *	1.079	1.249	1.013	1.135	0.977	1.158
Cognitive Status (ref: normal)										
impaired			0.524	1.256	0.550	1.168	0.551	1.172	0.502	1.258
Age Difference with spouse (0-29)					1.019	0.967 *	1.019	0.967 ^	1.028	0.969 ^
Sex (ref: male)										
female					0.931	0.930	0.888	1.069	0.981	0.871
Education Difference with spouse (ref: none)										
one level difference					0.848	1.247	0.847	1.244	0.782	1.274
two levels difference					0.909	1.222	0.902	1.209	0.687	1.233
Income (ref: none)										
< S$1000					0.652	0.685	0.648	0.687	0.793	0.936
$1000-$1999					0.592 ^	0.507 *	0.585 ^	0.504 *	0.998	0.686
> $2000					0.219 *	0.645	0.589 **	0.641	0.472	0.855
Home Ownership (ref: non-owner)										
home owner					1.529	0.299 ***	1.532 *	0.302 ***	2.039 *	0.498 ***
Number of children (1-15)					0.878 ***	1.003	0.877 ***	0.997	0.897 *	0.978
Ethnicity (ref: Chinese)										
others					1.000	1.483 ^	0.999	1.483 ^	0.943	1.409
Wife's Work Status (ref: not working)										
working					0.753	0.549 *	0.752	0.554 ^	0.895	0.656
Functional Limitations*sex (ref: none, male)										
one limitation*female							1.073	0.842	2.044	1.154
two limitaitons*female							1.238	1.314	0.813	1.307
Baseline Living Arrangements (ref: unmarried children)										
alone or with spouse only									42.820 ***	4.007 **
married child									3.499 ***	8.375 ***

***p<0.001, **p<0.01, *p<0.05, ^p<0.1

Table 4. Odds Ratios from Multinomial Logistic Regression of Living Arrangements at time2 for unmarried sample (n=793)

	Model 1		Model 2		Model 3		Model 4		Model 5	
Explanatory variables at baseline (time1)	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*	*Alone/ spouse*	*Married children*
Functional Limitations (ref: none)										
one functional limitation	0.927	0.637 **	0.925	0.626 **	1.167	0.590 **	1.254	1.445	0.793	1.543
more than one functional limitation	0.571	1.192	0.615	1.151	0.574	0.737	0.361	1.006	0.622	0.826
Cognitive Status (ref: normal)										
impaired			0.591	1.062	0.626	0.846	0.616	0.853	0.514	0.910
Age (ref: 55-59)										
60-69					1.408	1.744 ^	1.415	1.783 ^	1.151	1.900 ^
70-79					1.803	2.095 *	1.822	2.127 *	0.906	2.248 *
80+					1.772	3.178 ***	1.710	3.211 ***	0.852	3.402 **
Sex (ref: male)										
female					0.685	1.101	0.612	1.553	0.647	1.769
Education (ref: none)										
primary					1.026	1.301	1.024	1.334	0.839	1.653 ^
secondary					2.925 *	0.335 ^	2.993 *	0.351 ^	2.879 ^	0.458
Income (ref: none)										
< S$1000					0.886	0.522 ^	0.882	0.522 ^	0.832	1.220
$1000-$1999					2.946	4.024	2.790	4.895	4.451	9.324 ^
> $2000					2.146	2.152	2.279	2.346	2.264	0.767
Home Ownership (ref: non-owner)										
home owner					1.191	0.364 ***	1.184	0.369 ***	2.582 *	0.935
Number of children (1-15)					0.786 ***	0.898 ***	0.786 ***	0.898 ***	0.818 **	0.950
Ethnicity (ref: Chinese)										
others					0.941	1.204	0.940	1.250	0.788	1.082
Functional Limitations*sex (ref: none, male)										
one limitation*female							0.976	0.360 ^	1.732	0.357
two limitaitons*female							1.908	0.692	1.426	0.623
Baseline Living Arrangements (ref: unmarried children)										
alone or with spouse only									190.757 ***	7.628 **
married child									4.505 ***	22.473 ***

***p<0.001, **p<0.01, *p<0.05, ^p<0.1

reference category for all the models is living with unmarried children