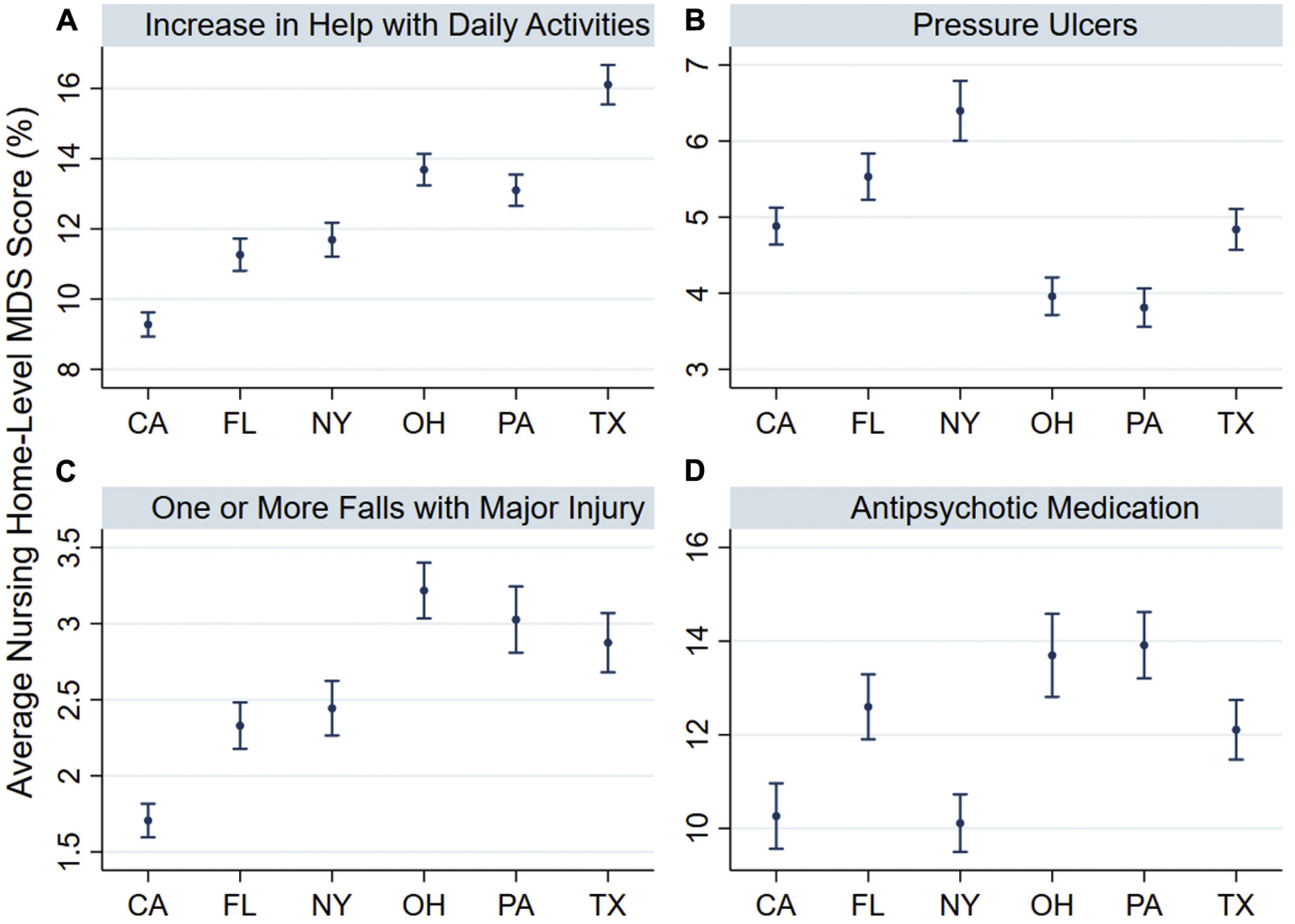

Fig. 1. Average scores for MDS quality measures among nursing homes with a 5-star MDS quality rating in California (CA, n = 873), Florida (FL, n = 407), New York (NY, n = 355), Ohio (OH, n = 510), Pennsylvania (PA, n = 326), and Texas (TX, n = 480). (A) Percentage of long-stay residents whose need for help with daily activities has increased; (B) percentage of high risk long-stay residents with pressure ulcers; (C) percentage of long-stay residents experiencing 1 or more falls with major injury; (D) percentage of long-stay residents who received an antipsychotic medication.

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Effect of Housing Type and Neighborhood Socioeconomic Indicators on Survival After Low Falls in Older Adults

To the Editor:

Falls result in significant morbidity and mortality among older adults and are a concern in ageing populations. There has been evidence that socioeconomic status (SES) predicts postfall outcome; worse postfall survival has been associated with lower education,[1] lower income,[2] and neighborhood deprivation.[2] As a small urbanized country, we were interested to evaluate if SES, at both individual and neighborhood levels, was similarly associated with postfall survival in the older adults of our population. We analyzed a nationally representative retrospective cohort from the

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Table 1
Associations Between Variables and Postfall Mortality

Variables	Frequency	Crude		Adjusted	
		HR (95% CI)	*P* Value	aHR (95% CI)	*P* Value
Housing subsidy index					
<3 (highest subsidy/lowest income)	213/2388 (8.9%)	Referent		Referent	
≥3 to <4	833/2388 (34.9%)	0.84 (0.64-1.11)	.22	0.87 (0.65-1.15)	.33
≥4 (minimal or no subsidy/highest income)	1342/2388 (56.2%)	0.93 (0.72-1.20)	.56	0.93 (0.70-1.23)	.60
Socioeconomic Disadvantage Index					
Lowest quartile	724/2782 (26.0%)	Referent		Referent	
Second quartile	747/2782 (26.9%)	0.90 (0.75-1.09)	.28	0.95 (0.77-1.18)	.64
Third quartile	732/2782 (26.3%)	0.85 (0.70-1.03)	.09	0.90 (0.73-1.13)	.37
Highest quartile	579/2782 (20.8%)	0.99 (0.81-1.20)	.92	1.11 (0.88-1.41)	.38
Age, y					
≥55 to <65	469/2868 (16.4%)	Referent		Referent	
≥65 to <75	590/2868 (20.6%)	1.35 (1.01-1.79)	.04	1.11 (0.81-1.53)	.51
≥75 to <85	1061/2868 (37.0%)	1.85 (1.44-2.39)	<.001	1.54 (1.16-2.04)	.002
≥85	748/2868 (26.1%)	3.67 (2.86-4.70)	<.001	3.08 (2.33-4.08)	<.001
Gender					
Female	1920/2868 (67.0%)	Referent		Referent	
Male	948/2868 (33.1%)	1.35 (1.17-1.55)	<.001	1.38 (1.17-1.63)	<.001
Ethnicity					
Chinese	2413/2868 (84.1%)	Referent		Referent	
Indian	146/2868 (5.1%)	0.90 (0.65-1.25)	.53	0.96 (0.67-1.38)	.81
Malay	270/2868 (9.4%)	1.37 (1.11-1.68)	<.001	1.54 (1.23-1.93)	<.001
Others	39/2868 (1.4%)	1.22 (0.71-2.12)	.47	1.14 (0.54-2.42)	.73
Charlson Comorbidity Index					
0	1538/2868 (53.6%)	Referent		Referent	
1	817/2868 (28.5%)	1.35 (1.15-1.59)	<.001	1.24 (1.02-1.51)	.035
2	335/2868 (11.7%)	2.12 (1.74-2.57)	<.001	1.75 (1.37-2.23)	<.001
≥3	178/2868 (6.2%)	2.98 (2.38-3.73)	<.001	2.84 (2.17-3.72)	<.001
Modified Frailty Index					
0 and 1	1163/2661 (43.7%)	Referent		Referent	
2	887/2661 (33.3%)	1.35 (1.15-1.59)	<.001	1.23 (1.02-1.50)	.031
3 and above	611/2661 (23.0%)	1.70 (1.43-2.02)	<.001	1.17 (0.94-1.46)	.16
Abnormal Revised Trauma Score*	211/2866 (7.4%)	2.13 (1.72-2.56)	<.001	1.82 (1.41-2.33)	<.001
Injury Severity Score ≥16	676/2868 (23.6%)	1.27 (1.09-1.47)	.00	1.03 (0.84-1.27)	.76
Not by emergency ambulance	1642/2868 (57.3%)	0.80 (0.70-0.92)	.002	0.85 (0.72-1.00)	.045
Discharge home	1903/2839 (67.0%)	0.91 (0.79-1.05)	.18	0.93 (0.79-1.10)	.42
Severe injury by region (AIS ≥3)					
Head	1217/2868 (42.4%)	1.39 (1.21-1.59)	<.001	1.26 (0.93-1.71)	.14
Spine	380/2868 (13.2%)	0.79 (0.64-0.98)	.03	1.02 (0.73-1.43)	.91
Lower extremities	1110/2868 (38.7%)	0.85 (0.74-0.98)	.03	1.10 (0.83-1.48)	.50
Thorax	156/2868 (5.4%)	0.62 (0.35-1.09)	.10	—	—
Others†	12/2868 (0.4%)	—	—	—	—
Arrival to hospital at night	1007/2868 (35.1%)	1.08 (0.94-1.24)	.27	—	—

aHR, adjusted hazard ratio; AIS: Abbreviated Injury Scale; CI, confidence interval; HR, hazard ratio.
*Revised Trauma Score (weighted score incorporating Glasgow Coma Scale, systolic blood pressure, and respiratory rate on arrival in hospital).
†Upper extremities, abdomen, neck, face, external region.

Singapore National Trauma Registry (NTR) matched to the death registry.

Methods

Data Source and Study Design

Records for patients aged 55 and above, discharged alive from acute hospitals after suffering residential injurious low falls, were extracted from the NTR (years 2011-2013) and linked to death data (to December 2016). Injurious low falls were defined by moderate or severe injuries (Injury Severity Score ≥9) and fall heights of up to 0.5 m. Low falls have been shown to be at higher risks of adverse outcomes,[3] and the age cut-off is in line with the literature on the effect of age on trauma outcomes.[4] Analysis was restricted to patients who fell in a residential location as they have higher risks of death than patients who fell outdoors.[5] The inclusion criteria and the processes of data collection, data cleaning, and data quality audit of the NTR have been previously described.[4]

Variables and Measures

Housing subsidy based on postal codes was used as the individual-level surrogate for SES. Eligibility for occupancy of public subsidized housing, in which more than 80% of the local population live, are in principle determined by income. Housing subsidy was scored on an index of 1 to 6, where 1 corresponds to the highest subsidy and lowest income and 6 corresponds to no subsidy and highest income.[6] For neighborhood SES, the Socioeconomic Disadvantage Index (SEDI), developed for use in Singapore, was derived from 12 variables pertaining to each area (as delineated by the census development guide plan).[7] A larger SEDI denotes worse socioeconomic disadvantage.

Data on demographic (age, gender, ethnicity), clinical (injury severity based on the Injury Severity Score, Abbreviated Injury Scale by body region, Revised Trauma Score; Charlson Comorbidity Index, discharge destination), health system (transportation mode, time of presentation), and socioeconomic factors (housing subsidy, SEDI) were extracted from the NTR. The Revised Trauma Score is a weighted measure of physiological derangement used in trauma that incorporates the Glasgow Coma Scale, including the systolic

blood pressure and respiratory rate on arrival in hospital, and complements the Abbreviated Injury Scale and Injury Severity Score, which are anatomical scores of injury severity.

Statistical Analysis

Cox proportional hazards regression model was used to examine if housing subsidy and SEDI were associated with postfall survival. Known risk factors and potential confounders were included in the multivariable model. Sensitivity analysis was performed using Cox regression with mixed effects (including a random intercept term for planning area) to examine if there was significant clustering by planning areas, the level at which SEDI was scored. Data analysis was conducted using Stata, version 15.0 (Stata Corp, College Station, TX).

Ethical approval and exemption from consent (as deidentified data was used) was granted by the last author's institutional review board.

Results

There were 2868 patients meeting the inclusion criteria. The median age was 78.9 years (interquartile range 70.1-85.3) and the 3-year mortality was 32.8%. The SES indicators of housing subsidy (subsidy index >4 vs subsidy index ≤ 3, adjusted hazard ratio 0.937, 95% confidence interval 0.707-1.24) and SEDI (highest quartile vs lowest quartile adjusted hazard ratio 1.12, 95% confidence interval 0.889-1.42) did not show a statistically significant association with survival on bivariable and multivariable analysis (Table 1). On sensitivity analysis, no significant clustering by neighborhood was observed (variance $= 1.58 \times 10^{-18}$, $P = .50$), and similar results were obtained.

Discussion

In this Singapore study, housing subsidy type and SEDI, indicators of individual and neighborhood SES respectively, did not show a statistically significant association with survival after a low fall.

One explanation is that frail older adults, whom our subjects likely represent, have limited ability to utilize individual-level socioeconomic advantage to generate health. This may arise from low functional states and declining health, and reduces any disparities in mortality outcomes we may expect.[8] Hence, although development of frailty may be associated with lower SES,[9] our results support that once frail with an injurious fall, SES has limited influence over health outcomes.

Another explanation is that, in a small urban state, the additional safety nets introduced during the acute phase of treatment adequately mitigate SES disparities.

Malays were at slightly higher risk of adjusted mortality in the study. Some studies show worse mortality and morbidity for Malays compared to other ethnicities in Singapore.[10] Hence, this association is not specific to falls. Differences in outcomes due to ethnicity may be due to the complex aspects of SES not captured by the proxies used in this study. Culture-specific health beliefs (eg, choosing quality over longevity) may influence postfall survival outcomes.

One limitation is that the study does not capture patients conveyed by private ambulance to private hospitals—a minor bias as public emergency ambulance use for emergencies is high in Singapore.[11]

Our findings may not be generalizable to larger countries or to countries with greater socioeconomic differences between neighborhoods.

Conclusion

In Singapore, housing-related socioeconomic indicators do not appear to affect postfall survival for low injurious falls. This may be due to the impact of the underlying frailty state that blunts health disparities arising from socioeconomic differences, or a reflection of good access to healthcare locally.

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Cosas de la Edad, a Therapeutic Intergenerational Experience

To the Editor:

"The embrace of a 4-year-old child can work wonders on the health of the older adult." This was one of the most consistent findings of Cosas de la Edad ("A Matter of Age"), a televised social health intervention and one of few attempts to quantify the impact of intergenerational interaction.

For 6 weeks, between March and May 2018, 10 4-year-old children and 10 nursing home residents located in Madrid interacted for 2 hours per day 5 days a week. During their 60 hours together, they followed a predetermined schedule of activities[1] that provided the 2 generations with time and space for socialization and intergenerational interaction through the exchange of knowledge and skills, in accordance with the relevant guidelines for this type of intervention.[2] The schedule of activities included games that sometimes obliged the participants to use their imagination, outdoor walks, dancing and physical activity in the gym coordinated by a physiotherapist (1 day per week), eating together both inside and outside of the residence, as well as music therapy, dog therapy, and group talks about feelings. The final week included 1 day of "intergenerational Olympics," collecting produce from a vegetable garden, and an awards ceremony.

Before starting the program, all older participants underwent a comprehensive geriatric assessment. The following parameters were assessed: cognitive status (Pfeiffer questionnaire); affective state (Geriatric Depression Scale−15); functional capacity (Barthel Index and Functional Ambulation Classification); quality of life (EuroQol-5D health questionnaire); perceived social support (Medical Outcomes Study questionnaire); and frailty (FRAIL questionnaire, Short Physical Performance Battery, manual grip strength, and walking speed). These same parameters were evaluated once again on completion of the program. No changes to pharmacologic treatments or care guidelines were made.

On completion of the 6-week program, significant improvements in the health of older adults were evident. Improvements were observed for most metrics, with 90% of residents showing increases in walking speed and Short Physical Performance Battery score. In total, 3 men and 7 women were evaluated (mean age, 86.9 years). Increases in manual grip strength were observed for all residents, and improvements in Barthel Index score and the Functional Ambulation Classification score were observed for 70% and 60% of residents, respectively.

Prior to beginning the program, 6 of the 10 residents had depressive symptoms, 2 of whom fulfilled the criteria for major depressive disorder. By the end of the program, only 1 resident showed minor depressive symptoms, and none exhibited major depression. Improved control of chronic pain was also observed. Two of the residents who were dependent on a wheelchair transitioned to a walker, and another from a walker to a walking stick. Four of 7 residents who were considered frail at the beginning of the interaction were not classified as such by the end, and all residents showed improvements in overall frailty. No falls or acute adverse health events were recorded. All residents expressed satisfaction with having participated in the program. A significant increase in the level of perceived social support was observed for the resident for whom the lowest score was recorded. Currently, 7 months after the final activity, friendships forged between children and older adults linger on. Intergenerational programs like the one described here are becoming increasingly common. Little by little, we are acquiring greater knowledge about the potential beneficial effects[3,4] of this type of intervention:

- The REPRINTS intergenerational program[5] has demonstrated a positive long-term impact,[6] including protective effects on hippocampal atrophy[7] and physical function.
- Intergenerational Gala[8] improves relationships between medical students and older patients in the context of medical practice.
- Experience Corps,[9] the United States program through which volunteers older than 60 years assist elementary school teachers, has reported positive effects in both age groups. Cofounder Linda Fried has demonstrated improvements in mobility and daily living activities. Secondary improvements included decreases in frailty, falls, and memory loss; delayed loss of strength; and improvements in balance, walking speed, cortical plasticity, and executive function.

Well-planned intergenerational activities with young children can have a positive therapeutic impact on the health and well-being of nursing home residents.[10] However, the employment of intergenerational practices in the sector is still scarce. Using television to present this type of intervention in front of both general and specialized audiences may help to consider its implementation more broadly.

With the help and motivation provided by child participants, older adults can engage in activities they may have never thought possible. These approaches show that there are therapeutic alternatives for sedentary older people with poor adherence to physical activity, or those with depressive disorders or poor social relationships.