SMU
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Successful Ageing

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*Economic satisfaction, satisfaction with daily activities,
sense of meaning & purpose, & health status:*

KEY DETERMINANTS OF LIFE
SATISFACTION IN OLDER ADULTS

SUMMARY OF KEY FINDINGS AND POLICY RECOMMENDATIONS

Key findings

1. **The Impact of Four Domains on Overall Life Satisfaction**

   Through the application of a collaborative framework utilizing causal discovery and inference, we have identified four domains that are most likely to influence subjective reported life satisfaction. These domains include the sense of meaning and purpose in life, satisfaction with daily activities, economic satisfaction, and health status. Our analysis suggests that these factors can directly or indirectly associate with an individual's overall life satisfaction. Notably, economic satisfaction emerges as the most substantial contributor, closely followed by satisfaction with daily activities. Moreover, having a sense of meaning and purpose may act as a prerequisite, driving both daily activities and health status, which then in turn influence economic and overall life satisfaction.

2. **Combined Effect of Domains on Life Satisfaction**

   Subsequently, we conducted computer simulations to understand the impact of intervening in each domain individually, as well as their combined effects. Among these simulations, enhancing economic satisfaction relates to the highest increase in subsequent life satisfaction. Nevertheless, we also observed that hypothetically increasing all four domains led to higher life satisfaction levels. These findings suggest that implementing interventions that target multiple aspects of an individual's life could be a more effective approach to increasing overall life satisfaction among older adults.

Policy recommendations

1. **Policies need to account for subjective perceptions for life satisfaction**

   The study highlights the importance of considering subjective perceptions of life satisfaction when formulating policies. It emphasizes the distinction between objective and subjective measurements, with particular focus on the discrepancies between subjective views on one's economic situation versus actual income's impact on life satisfaction. The summary concludes that policymakers should consider how subjective perceptions of their policies affect the well-being of older adults.

2. **Collaboration of policies and agencies**

   The study emphasizes the importance of collaboration among agencies and ministries in policy development. The findings reveal that various domains significantly affect life satisfaction. To enhance outcomes, policymakers must integrate policies across economics, health, activities, and meaning, particularly concerning older adults' life satisfaction.

3. **Meaning and purpose is a key driver for life satisfaction**

   Policy formation for older adults should be centred on providing meaning and purpose in their lives, as this can significantly impact their overall satisfaction. When creating policies to improve daily activities for older adults, it is crucial to consider how these policies can contribute to a sense of meaning and purpose. Prioritizing this aspect in policy design and implementation is expected to have a positive and far-reaching effect on the well-being and life satisfaction of older adults.

INTRODUCTION

The World Health Organisation (WHO) estimates that 1 in 6 people will be 60 years or older by 2030 (World Health Organisation, 2022). As life expectancies continue to increase, countries worldwide are bracing for a silver tsunami as population aging occurs. Singapore is no exception, with around 1 in 4 citizens estimated to be 65 and above by 2030 (Fang, 2022). It is thus paramount to understand the numerous factors that affect the well-being of older adults. A greater understanding of the factors that contribute to better well-being will allow Singapore to be better prepared for the various challenges that aging presents and thus provide support to promote both active and successful aging.

Life satisfaction constitutes a fundamental facet of wellbeing, exerting an influence on an individual's mental and emotional state (Zissi & Barry, 2006). Among older adults, elevated levels of life satisfaction are frequently linked to a more optimistic outlook, contributing to improved health and resilience (Khodabakhsh, 2022; Zheng, Huang, & Fu, 2020). This in turn enhances societal involvement, both in the professional and social domains (Khodabakhsh, 2022). It is also vital to acknowledge that life satisfaction is a multifaceted construct, intricately influenced by an array of external and internal determinants. Life satisfaction is essentially a subjective judgement and assessment of one's present life circumstance.

Considering that life satisfaction is a complex phenomenon influenced by several factors (Fox & Kahneman, 1992), there is a need to systematically evaluate potential determinants that positively affect life satisfaction. To achieve this, it is crucial to employ a rigorous data driven methodology while utilising a representative sample. To this end, the Singapore Life Panel presents a valuable opportunity for conducting this research. This nationally representative panel data encompasses a diverse range of lifestyle factors and is specifically focused on older adults in Singapore. This enables an exploration of potential facilitators of life satisfaction, allowing us to narrow down the scope and importance of key contributors to life satisfaction. This in turn can inform policymakers of potentially impactful measures that cater to the well-being of older adults in the country.

Policy and life satisfaction

The Singapore government has implemented various initiatives aimed at enhancing the living standards of older adults. These efforts encompass economic support through schemes such as those from the Central Provident Funds and Silver Support, and measures such as raising the retirement age and promoting employment opportunities for older adults. Supporting older adults financially is vital, as it directly affects their spending power for essential needs, such as food and beverages, which is related to their overall quality of life and satisfaction. Complementary schemes such as Eldercare and Pioneer Generation initiatives have been introduced to ease medical care costs. Moreover, the government has focused policies to improve mobility and road safety (i.e., Silver Zones), and the built environment to support factors like exercise and mobility. Recently, Healthier SG has included older adults with the aim of preventative healthcare. Therefore, focal areas of concern in current policies largely include economics, health, and the physical environment. Such key domains should therefore be important toward enhancing life satisfaction of older adults.

Despite these concerted efforts, there are many other lifestyle and demographic factors that could influence life satisfaction. An understanding of the intricate interrelationships among economic, health, activities, and other factors, and their combined influence on overall life satisfaction is not well understood in Singapore. Gaining insight into these aspects would provide policymakers with a more comprehensive understanding of the current state of older adults' wellbeing and how different facets of life may influence their overall sense of satisfaction. With this more nuanced understanding,

policymakers can identify specific areas that require further attention and refinement, ensuring a more integrated approach to improve the quality of life for older adults in the community.

The present study

In this research brief, we aim to examine potential causes of life satisfaction from. Based on existing policies, we identified economic, and several lifestyle factors as crucial domains to explore regarding life satisfaction. We attempt to estimate their potential causal effects through a collaborative framework utilizing computer science methodology and social science theory. Specifically, we aim to achieve the following:

1. Conduct a data driven process to identify direct and indirect associations of life satisfaction.
2. Using exploratory methods to identify specific areas within the domain of economic and lifestyle factors that likely contributes a significant impact on subjective life satisfaction.
3. Using causal inference to simulate the effect of interventions on life satisfaction to assist evidence-based policy recommendations.

METHODS

Causal Discovery and Inference

Within this context, we utilized a collaborative framework incorporating causal discovery, causal inference, and knowledge from the domain experts (i.e., key persons in ROSA and SLP members). Causal discovery is a process that uses data and input from experts in a specific field to examine how different factors are inter-related. It can estimate the direction and strength of associations, and whether there are indirect relationships between factors. TETRAD is a prominent software that can assist the process, and for our study we utilise the Bayesian optimize search strategy (BOSS) for our causal discovery. Causal inference simulates randomized control trials, which identifies how a change in one variable directly or indirectly leads to a change in another while adjusting for confounds in the model.

We include variables from four well-being dimensions (i.e., physical, economic, mental, and social) to determine which factors significantly impact life satisfaction and how these variables from different well-being dimensions interact. The output is displayed as a causal graph, a visual representation of arrows that indicate the direction of influence between factors, and its relations to life satisfaction as the outcome. This allows us to estimate the potential impact of any variable that is selected based on the results of the causal discovery.

From the causal discovery process, we estimated the contribution of each path as projected in the causal graph to identify variables with the greatest potential impact toward life satisfaction. Based on these estimates, we simulated an intervention where we hypothetically increase or decrease the levels that a person might have on a given factor (e.g., income) and measure the effect of this change on life satisfaction scores. This is done to assist policy makers in identifying potential factors that might be targeted for improving life satisfaction among older adults.

Participants

All participants were derived from the Singapore Life Panel (see Vaithianathan et al., 2018) and a total of 6181 respondents were included. All participants were extracted from Wave 93 (April 2023), with a mean age of 66 years (SD=6.1). The average household income was SGD1740.81 (SD=3427.19). Demographic composition consists of 46.8% males, 89.2% Chinese, 4.5% Malays, 4.5% Indians, and 1.62% other ethnicities. 41.3% reported attaining secondary school education, 36.7% reported having post-secondary education, and 21.8% reported having no formal education.

RESULTS

Multi-Faceted Causes of Life Satisfaction

To identify factors important for improving older adults' well-being, we conducted causal discovery and inference analysis by setting life satisfaction as the outcome variable. In the experiments, we used 54 variables from various well-being dimensions (physical, economic, social, and mental) and four demographic variables (age, gender, race, and education). The results show that 13 out of 54 variables either directly or indirectly relate to life satisfaction (Figure 1).

Impact of contributors to life satisfaction

We use the causal graph as an input to our first causal inference simulation to estimate the contribution of each direct or indirect cause of life satisfaction. Next, we select those variables that made a statistically significant contribution to life satisfaction based on our simulated intervention analyses. Table 1 shows the contribution of each variable to the variance of life satisfaction. Aside from economic satisfaction, daily activity satisfaction and meaning are two of the four highest contributors to life satisfaction. Based on the available data, the top four contributors based on the percentage of variance they account for in life satisfaction are (with means in parentheses), **economic situation satisfaction** (2.71, SD=0.86), **satisfaction with daily activities** (2.21, SD=0.96), **purpose and meaning** (2.97, SD=0.96), and **health conditions** (3.19, SD=0.91) (see Appendix. 1 for details of measurement).

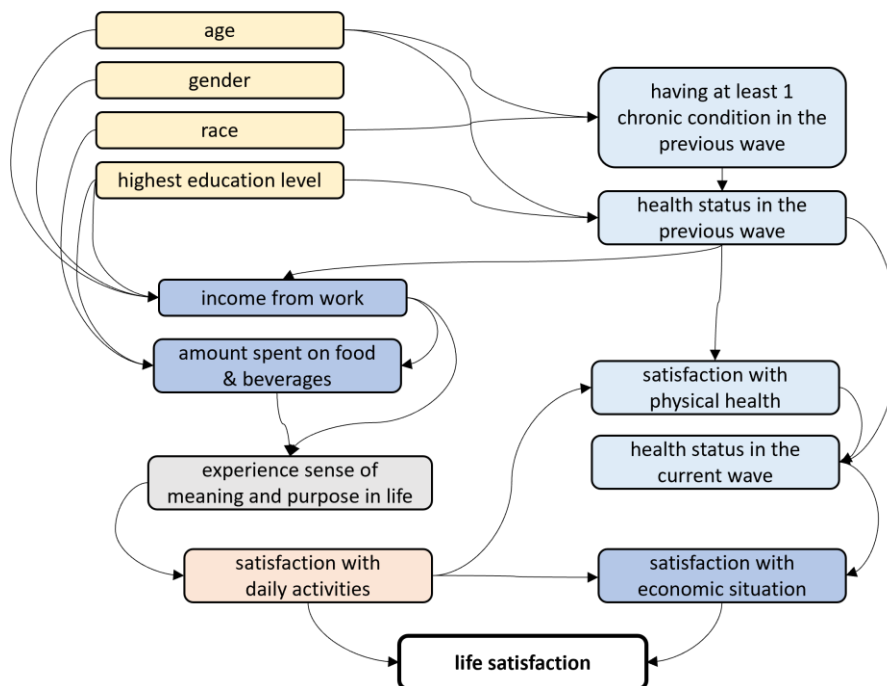Figure 1: Causal graph showing the direct and indirect causes of life satisfaction.

Table 1: Direct and indirect causes' contribution to the variance of life satisfaction.

Variables			Variance[*]
Demographics		Age	~0.005%
		Gender	~0.0%
		Race	~0.0%
		Highest education level	~0.005%
Aspects of well-being	Physical	Having at least 1 chronic condition in the previous wave	~0.016%
		Health status in the previous wave	**~2.225%**
		Health status in the current wave	**~1.282%**
		Satisfaction with physical health	~0.428%
	Economic	Income from work	~0.004%
		Amount spent on food & beverages	~0.002%
		Satisfaction with economic situation	**~29.397%**
	Social	**Satisfaction with daily activities**	**~22.167%**
	Mental	**Experience sense of meaning and purpose in life**	**~7.195%**

↓

Life satisfaction	**~37.272%**

[*]Percentage of the variance of life satisfaction explained by each variable

Intervention Simulation: Intervention's Effect on Life Satisfaction

We conducted another causal inference computer simulation to estimate the effects of intervening on four identified domains on life satisfaction. The intervention simulation is a mathematical framework based on Structural Equation Modelling (SEM) which simulates a randomized controlled trial in social science (Pearl, 2012). The results provide additional considerations for policymakers to prioritize factors that may optimise older adults' well-being on their life satisfaction.

The simulations were conducted in one of two ways. First, we assessed a factor-specific simulation, where we hypothetically increased each of the four factors independently and assess the independent effect of each on changes in life satisfaction scores. Second, a multi-faceted simulation followed where we tested the changes in life satisfaction scores if all four factors were increased simultaneously.

Table 2 shows the effects of the factor-specific interventions and multi-factor interventions on life satisfaction. Specifically, it shows how life satisfaction is expected to increase following an increase in each domain. For example, a one-point increase in satisfaction with economic situation yields a 0.53-point increase in life satisfaction. Life satisfaction here is rated on a 5-point Likert scale (1=very satisfied and 5=very dissatisfied). Additionally, the combined effect of all four domains yields an increase in life satisfaction scores. For instance, life satisfaction scores increase by 1.419 points, for every 1-point

increase in all four domains simultaneously. Therefore, multi-faceted interventions through collaborative and integrative approaches between different domains of satisfaction are required to ensure holistic well-being for our older adults.

Table 2: Effect of factor-specific interventions on life satisfaction.

Soft intervention			Mean of life satisfaction[*]			
Factor	Score	Mean	When factor increase by		When all 4 factors increase by	
			+1	+2	+1	+2
Satisfaction with economic situation	1 to 5	2.706	3.073 (+0.534)	3.554 (+1.015)	3.958 (+1.419)	4.521 (+1.982)
Satisfaction with daily activities	1 to 6	2.210	2.97 (+0.431)	3.402 (+0.863)		
Experience sense of meaning and purpose in life	1 to 6	2.975	2.705 (+0.166)	2.785 (+0.246)		
Health status in the current wave	1 to 5	3.194	2.699 (+0.160)	2.835 (+0.296)		
[*]Mean of life satisfaction before intervention is 2.539, and score ranges from 1 to 5						

DISCUSSION

In this brief report, we utilized exploratory methods on cross sectional data of the SLP to examine plausible causes of life satisfaction. Furthermore, we performed computerized simulations to assess how alterations in factors linked to life satisfactions might affect it.

Our study emphasizes the significance of four fundamental domains, namely economic satisfaction, daily activities satisfaction, meaning, and physical health, as crucial factors influencing life satisfaction among older adults. Notably, a significant portion of the results revolved around subjective perceptions except for health status. In fact, the influence of health status on an individual's life satisfaction is relatively limited compared to the impact of self-reported perceptions. Also, subjective perceptions of economic situation and objective measures of income, food and beverage expenditure were unrelated. This distinction between objective measures and subjective experiences underscores their separate contributions to shaping an individual's overall perception of life satisfaction (Li et al., 1998).

Our results highlight that *satisfaction with the economic situation* emerged as a dominant contributor to overall life satisfaction. We also found associations between *satisfaction with daily activities* and life satisfaction scores, comparable in strength to economic satisfaction. Interestingly, this perceived satisfaction with economic status was independent of income or expenditure. This underscores the importance of psychological processes in shaping financial perceptions, and its consequential effect on life satisfaction.

The role of *meaning and purpose* as an indirect contributor to life satisfaction is also important. The causal model suggests that meaning and purpose may act as a crucial "gateway" toward satisfaction with daily activities. Older adults with a strong sense of meaning are likely to pursue activities with a sense of greater purpose. Therefore, it is evident that while *meaning and purpose* may not be directly related to life satisfaction, or account for a relatively small variance, it plays a pivotal role as a prerequisite for subsequent satisfaction with daily activities.

Policy implications

The differentiation between objective and subjective measures assumes paramount importance in policy formulation concerning older adults. Our study underscores the need for policymakers to consider the underlying financial concerns among this demographic (see Ngu et al., 2023). Implementing targeted interventions that enhance financial literacy can empower older adults with a heightened sense of financial security and confidence. Moreover, health constitutes a significant factor influencing economic satisfaction. Ongoing initiatives like the Pioneer generation scheme and Merdeka packages, as well as the recently announced Majulah package aimed at alleviating medical costs, may impact older adults' perception of financial security in a positive manner. By intervening in these areas, policymakers can contribute to enhancing overall life satisfaction among older adults.

Also, the data further suggests that policies that intervene with their daily activities can also impact life satisfaction. Aligned with this perspective, the local government has undertaken proactive measures aimed at promoting daily activities among the populace. For instance, the implementation of Silver Zones has been a prominent initiative, primarily focused on augmenting pedestrian and road safety for older adults. While boosting mobility may improve physical health (Felberbaum, Lanir, & Weiss, 2023), policies related to this may also want to consider how it impacts their economic perceptions. For instance, increased mobility may ease accessibility to work or employment. It is therefore plausible to anticipate that this boost in mobility may have a comprehensive effect, fostering a heightened sense of life satisfaction among individuals.

The significance of our model highlights the importance of implementing a comprehensive and multi-faceted intervention strategy to address life satisfaction policies effectively. This entails considering various factors such as health status, economic perceptions, meaning, and daily activities collectively. To illustrate, initiatives like Silver Zones can improve access to health facilities, while adopting health packages may alleviate financial burdens, thereby influencing individuals' perceptions of their economic circumstances. Achieving these goals requires enhanced coordination among different ministries to ensure seamless policy integration and implementation. Collaboration among agencies is imperative, as working in isolation may undermine the cumulative impact on life satisfaction.

Our model evidenced the significance of a sense of purpose and its influence on daily activity satisfaction, and subsequently on economic perceptions. Consequently, policy formulation should be grounded in the purpose and meaning it can offer older adults, as this may serve as a fundamental gateway to overall satisfaction. Therefore, when crafting policies aimed at enhancing mobility for older adults, a crucial initial step is to evaluate how these policies can imbue their lives with meaning and purpose. This is expected to yield a cascading effect on their overall well-being. Accordingly, policymakers must prioritize the consideration of purpose and meaning in policy design and implementation, recognizing its far-reaching implications on life satisfaction among older adults.

CONCLUSION

Utilizing the richness of SLP data, we estimated which factors from various well-being dimensions most contribute to life satisfaction (i.e., economic situation satisfaction, satisfied daily activities, meaning, and health condition). Moreover, simulating the causal effects of these factors provides suggestive evidence that applying interventions in these areas may enable us to increase life satisfaction. Understanding the key determinants of life satisfaction constitutes a crucial stride towards promoting comprehensive well-being. The work presented here is a preliminary exploration. Future directions ought to develop a more refined index with reliable and valid indicators of wellbeing This would allow greater interdisciplinary efforts to comprehend key variables that shape holistic wellbeing. Since our data is cross-sectional, it is important to note that causality is implied rather than explicitly established. While the computing methods like causal inferences provides a certain degree of confidence, we strongly encourage future researchers to validate our findings, possibly employing longitudinal or intervention methods.

For policymakers, it is imperative to grasp the intricate interplay between social, health, and economic aspects that influence the older adult population's overall contentment. Specifically, policymakers must address the fundamental significance and purpose behind their policies, comprehending how they contribute to meaning and purpose in the lives of older adults. This understanding will pave the way for more informed and effective policies that enhance life satisfaction among this demographic.

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Appendix 1.

Economic situation satisfaction. This is measured with an item, "How satisfied are you with your overall economic situation?" with a 5-point Likert scale, from 1 *Very dissatisfied* to 5 *Very satisfied*.

Satisfied activities daily. This is measured with an item, "How satisfied are you with each of the following activities? – Your daily activities, "i.e., things you do on a normal day" also with a 5-point Likert scale, from 1 *Very dissatisfied* to 5 *Very satisfied*.

Purpose and meaning. This is measured with a question, "Over the past month, how often did you experience a sense of meaning and purpose in your life?", with a 6-point Likert scale, from 1 *None of the time* to 6 *All of the time*.

Health condition. This measure is on one's own perceived health condition using an item "Would you say your health is excellent, very good, good, fair, or poor?", with a 5-point Likert scale, from 1 *Poor* to 5 *Excellent*.

Life satisfaction. This is measured on a 5-point Likert scale (1=very satisfied and 5= very dissatisfied) with a single item "Taking all things together, how satisfied are you with your life as a whole these day?"

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About the Centre for Research on Successful Ageing (ROSA)

ROSA is a multidisciplinary research centre based in SMU. It was established with an MOE Tier 3 social sciences research grant, as well as the generous support of The Ngee Ann Kongsi. Research at ROSA seeks to define and measure a holistic construct of well-being and to identify the factors that impact Singaporeans' well-being as they progress through the later phases of life. Through close collaboration with government and other partner agencies, ROSA also aims to translate research insights into policy innovations that advance the well-being of older adults holistically and promote successful ageing in Singapore. ROSA brings together a diverse team of leading international and local researchers in ageing and age-related issues from various disciplines. Through empirical evidence derived from a longitudinal methodological approach, the multidisciplinary and multi-institutional research team advances propositions that promote successful ageing in Singapore.