Mid-career Learners

How do we best support them?

Workshop on Rethinking Age – Opportunities not Obstacles

26 July 2024

Dr Sahara Sadik

With Bryan Ang, Sophia Koo, Ong Yong Liang

IAL Research Division

THE STRAITS TIMES SINGAPORE LOG IN

Budget 2024: $4k SkillsFuture Credit top-up for mid-career workers, subsidies for another diploma

DPM Lawrence Wong said the Government invests heavily in human capital, but learning cannot stop when formal schooling ends. PHOTO:

Syazalena Shafeeq

UPDATED FEB 19, 2024, 12:45 PM

SINGAPORE – All Singaporeans aged 40 and above will be given a $4,000 top-up of SkillsFuture credits in May to encourage mid-career workers to refresh their skills and progress in their careers.

They will also be given subsidies to pursue another full-time diploma at

Source: Straits Times, 19 Feb 24

Context

Government policy

Substantial increase in funding for mid-career workers to undertake job-related training to support their employability

Implications for TAE practitioners

Do mid-career adult learners learn differently?
Should training programmes for mid-career learners be designed/ delivered differently?

>> Insights from Science of Learning

Who is a ‘mid-career’ learner?
No consensus.

There is no consensus in academic literature on the definition of ‘mature’, ‘middle-aged’, ‘mid-career’ or ‘older’ workers.

- Lifespan development researchers and sociologists highlight that there is no specific age at which a person becomes ‘older’; this transition will vary due to a person’s development, job responsibilities, and culture of the organisation, industry and country (Beier et al. 2022; Flauzino et al. 2022)

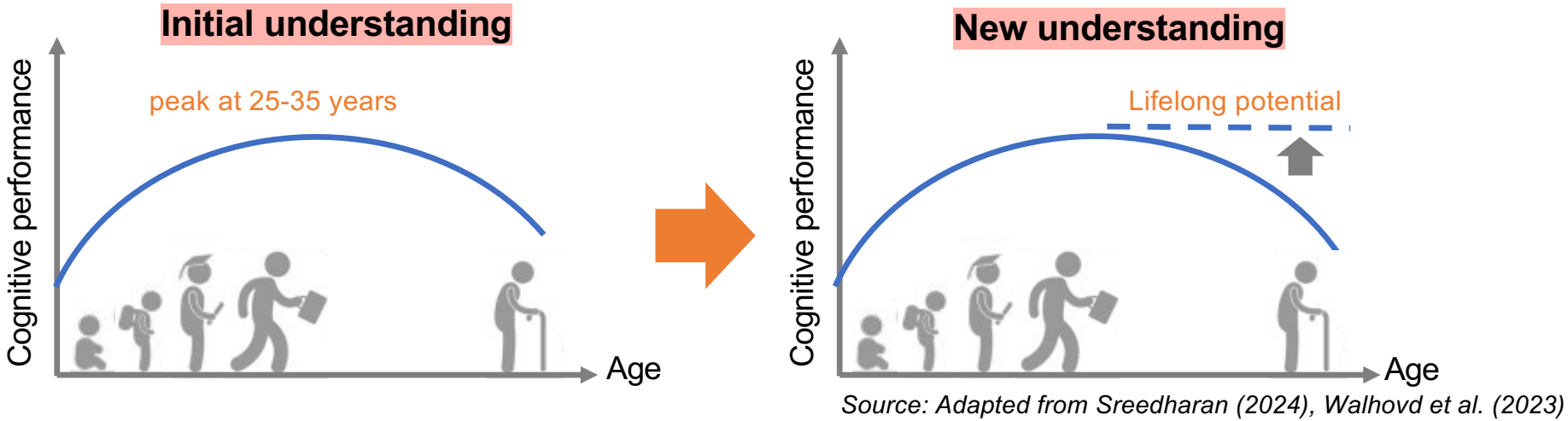
SG Policies	
	• Eligibility for **SkillsFuture Mid-Career** Enhanced Subsidy: 40 years • Eligibility for Senior Citizen Card: 60 years • Minimum Retirement & Re-employment Age: 63 & 68 years respectively

- Cognitive scientists offer varying age bands when describing sub-segments of adult population (Cornelis et al. 2019; Flauzino et al. 2022; Roberts 2021; Ramscar et al. 2014)

  “Middle-aged adults”: Varies between 35-65 years across studies

  “Older adults”: Start age varies between 60-65 years across studies

An ageing brain?
New revolutionary evidence.

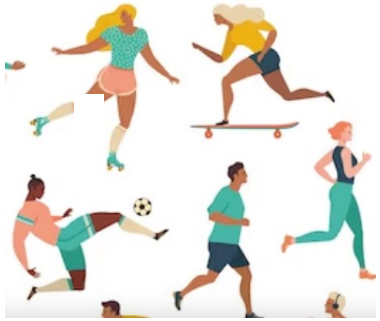


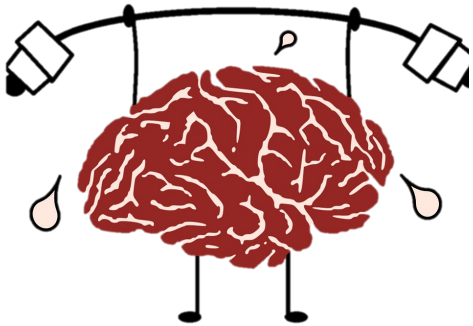
Source: Adapted from Sreedharan (2024), Walhovd et al. (2023)

Growing body of evidence demonstrating the capacity for neurogenesis / neuroplasticity in adulthood AND into later life.

Emerging consensus that cognitive decline with age is not linear nor inevitable (Chen and Goodwill, 2022; Draganski et al., 2006; Lövdén et al., 2013). Specifically, **neurogenesis** has been found to occur in the adult hippocampus, **a brain region implicated in learning and memory**. Importantly, this has been shown to occur **at a rate and magnitude great enough** to have a positive impact on human cognition and behavior (Spalding et al., 2013).

What helps?
Physical + cognitive stimulation + social interaction.



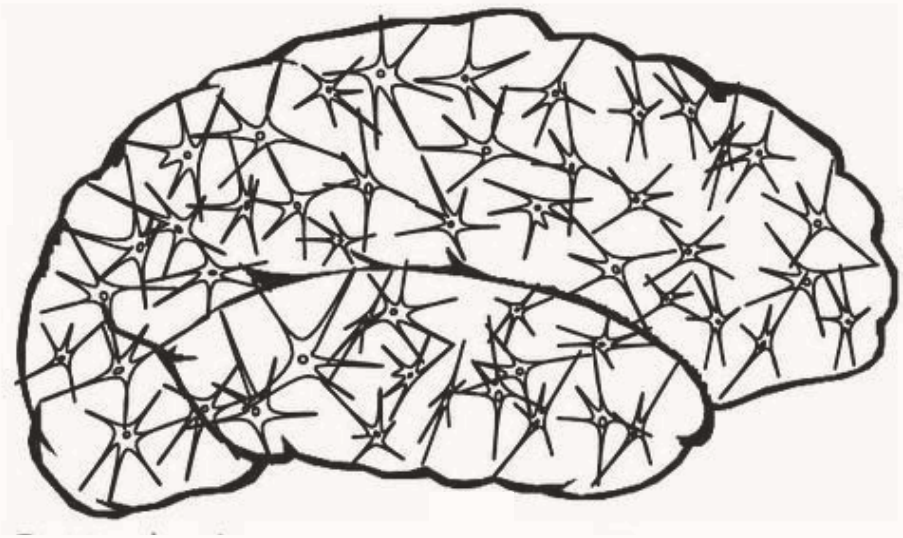


Physical exercise + mental training support neurogenesis. Exercise increases the number new neurons, while challenging mental training increases neuron survival (Curlik & Shors, 2013).

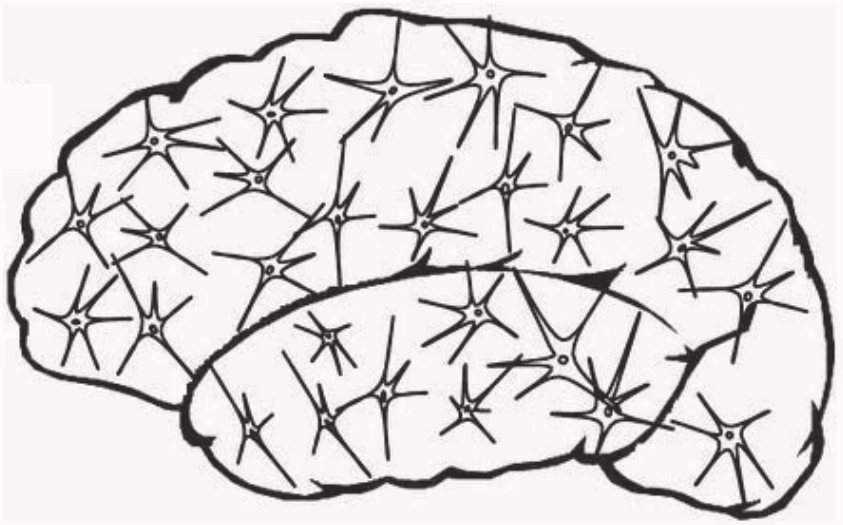
Two types of neuroplasticity. Positive plasticity builds stronger neural connections, promoting restoration. Negative plasticity indicates maladaptation, weakening neural connections. **Cognitive stimulation and social interaction** support positive plasticity, while **stress, non-engaging activities, and social isolation** can lead to negative plasticity. (Chen & Goodwill, 2022).

Two possibilities.
How positive / negative neuroplasticity appear.

Positive neuroplasticity – denser neural connections

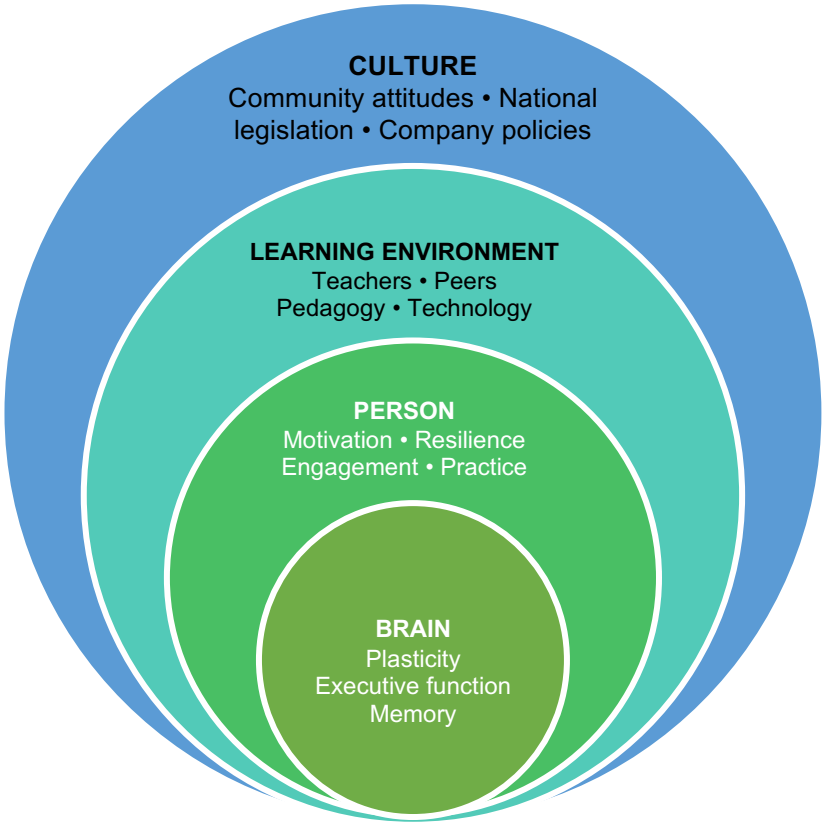


Negative neuroplasticity – sparser neural connections



Source: Vance (2009)

Context matters.
A lot.



Source: *Adapted from Thomas et al. (2020)*

Embedded cognition: Four nested levels

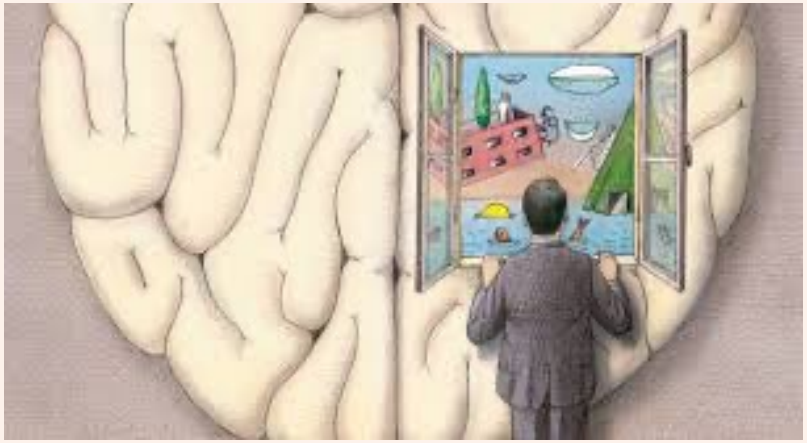
- **The Brain**, where neuroscientific evidence of how learning changes over the lifespan offer insights about processes that limit but also augment adult learning.
- **The Person**, where the roles of motivation, resilience and engagement have a significant impact on learning outcomes.
- **The Learning Environment**, where teaching approach, course structure, technology etc can influence progress; and
- **The Cultural Context**, where societal aspects such as cultural attitudes towards ageing mediate opportunities.

What about the middle-aged brain?

Old is new gold.

Slowly and steady

A study found that middle-aged pilots displayed slower information processing speed for simulated flight tasks. However, using accuracy-based measures, their expertise and sustained skillset correlated with higher performance than their less experienced younger counterparts (Taylor et al., 2007).



Slower information processing speed is not cognitive decline

Poorer adult performance in tests on information processing speed reflects **memory search demands** that understandably escalate as adults accumulate more experience and knowledge (Ramscar et al., 2014).

New evidence of peaking in middle-age.

Old is new gold.

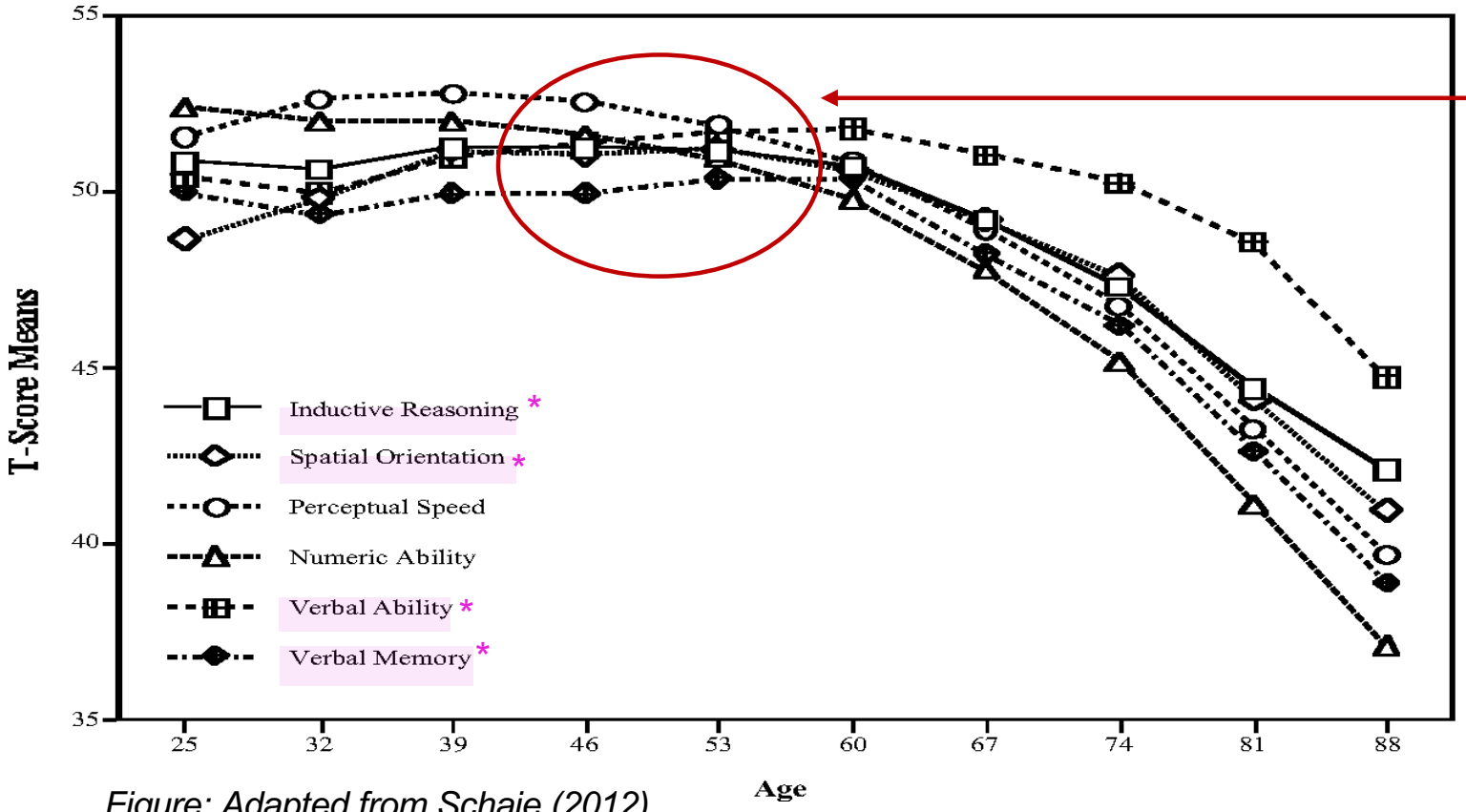


Figure: Adapted from Schaie (2012)

*Seattle Longitudinal Study shows peaking at middle-age for a good number of skills (40-59 yrs)

Prior knowledge.
A double-edged sword.

Adult brain excels at executive function: sustained attention, planning and metacognition (thinking about thinking). We need to draw on adult learners' prior experience strengthen their executive function. Prior experience, however, has to be harnessed appropriately to avoid entrenchment.

Mediators of positive effects of prior knowledge:

1. Use of prior knowledge to guide learners' attention.
2. Use of prior knowledge to promote interpretation and encoding of new information.
3. Associating prior information to support chunking of new information for efficient processing and retrieval.
4. Use of prior knowledge about the effectiveness and efficiency of problem-solving strategies to facilitate exploration, goal-directed behavior, and the construction of more advanced new strategies
5. Use of prior knowledge to help learner evaluate credibility of sources and plausibility of new information

Mediators of negative effects of prior knowledge:

1. Misconceptions, and correct but incomplete knowledge in a subject can contribute to inaccurate conclusions that inhibit continuous learning.
2. Learners with high prior knowledge in a subject tend to pay selective attention to the aspects of a situation perceived as relevant for resolving issues in the past; this selectivity can induce perceptual biases or inhibit the finding of improved solutions.
3. Extended practice necessary to automatize procedural knowledge can bring about inflexible behaviour.
4. Possessing more knowledge elements in a subject increases the possibility of intrusions or interferences involving these elements in the same subject.
5. Through negative transfer, accurate knowledge in one domain can hamper learning in another.

Source: Thomas et al., 2020; Simonsmeier et al., 2022

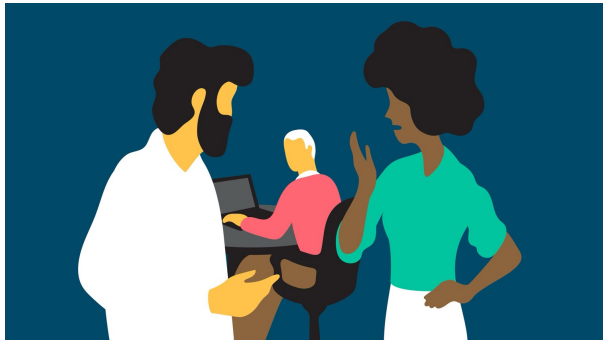
Other mediators.

Higher education helps.

Higher education is associated with less age-related decline in cognitive function.

Cumulative stress hinders.

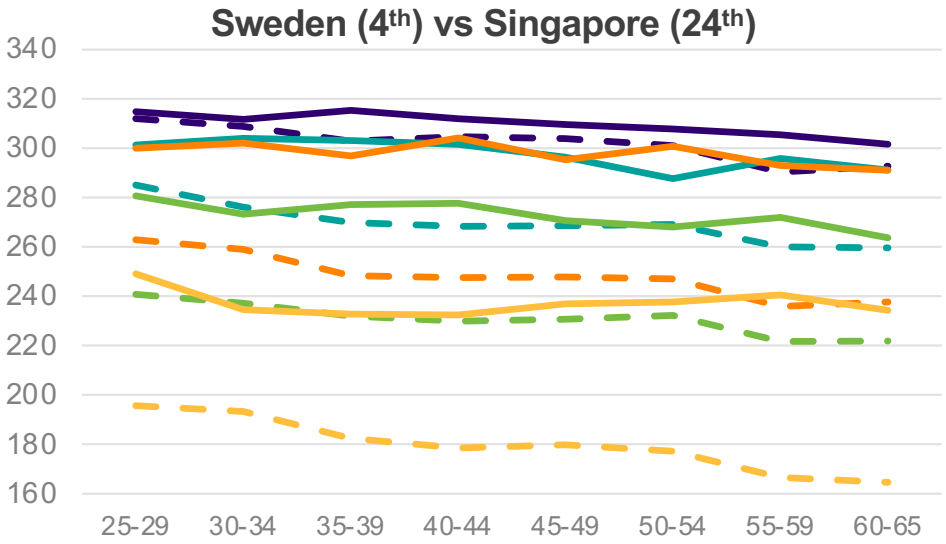
Stress from pressures of work and caring responsibilities extend beyond immediate timescales.

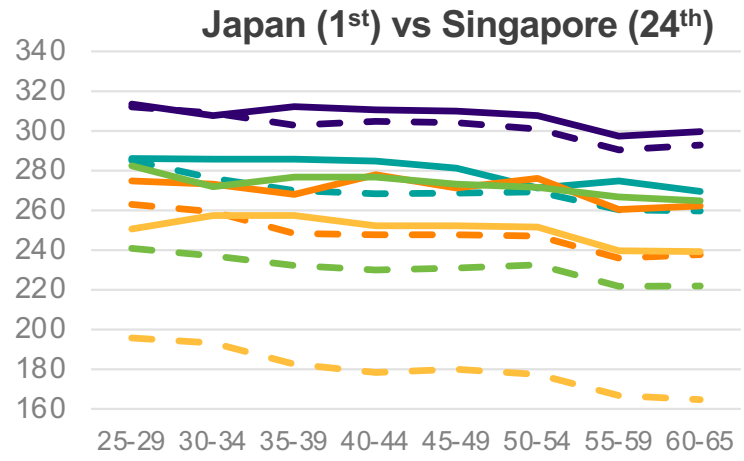


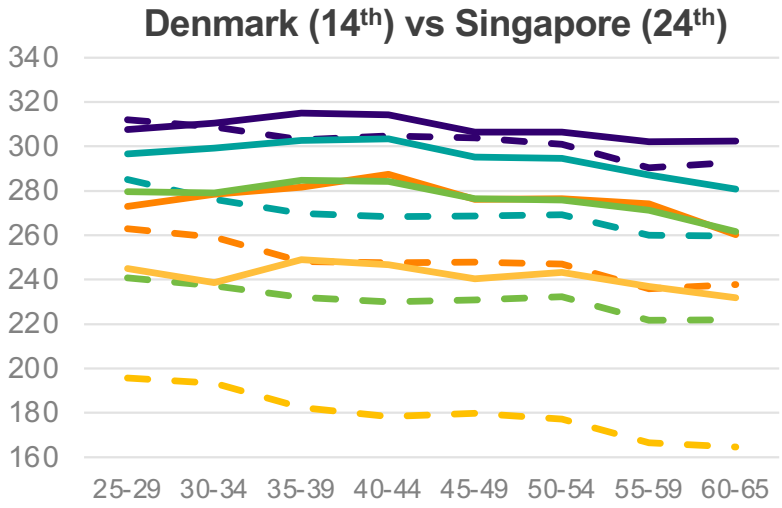
Ageism complicates.

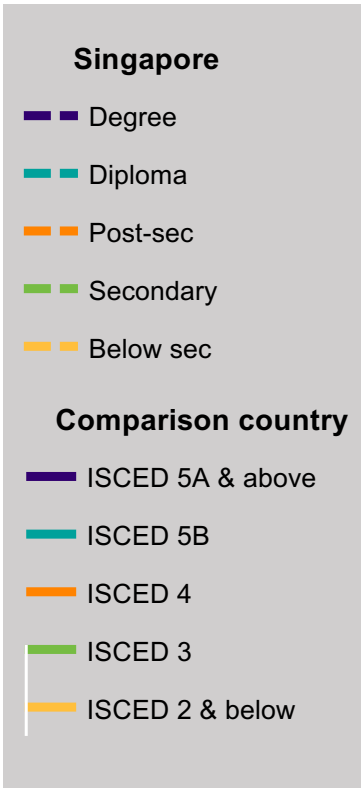
Ageism affects self-esteem, and cognitive performance.

SG context. Historically weak at sustaining lifelong potential.





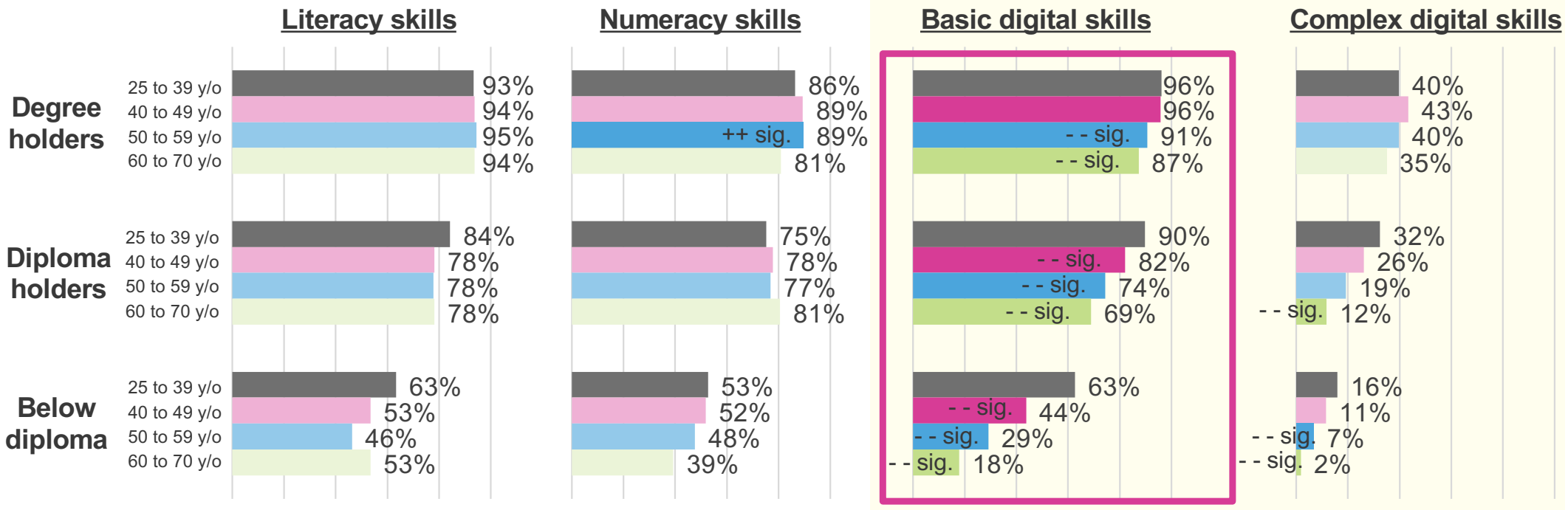




Source: PIAAC (2012-2014)

SG context. Education drives confidence.

How confident are you with your… ?
(% Very confident, confident)



Complex digital skills tend to be built into selected occupations in Singapore with the requisite social/workplace support. This may explain why age differences persists for basic but not complex digital skills.

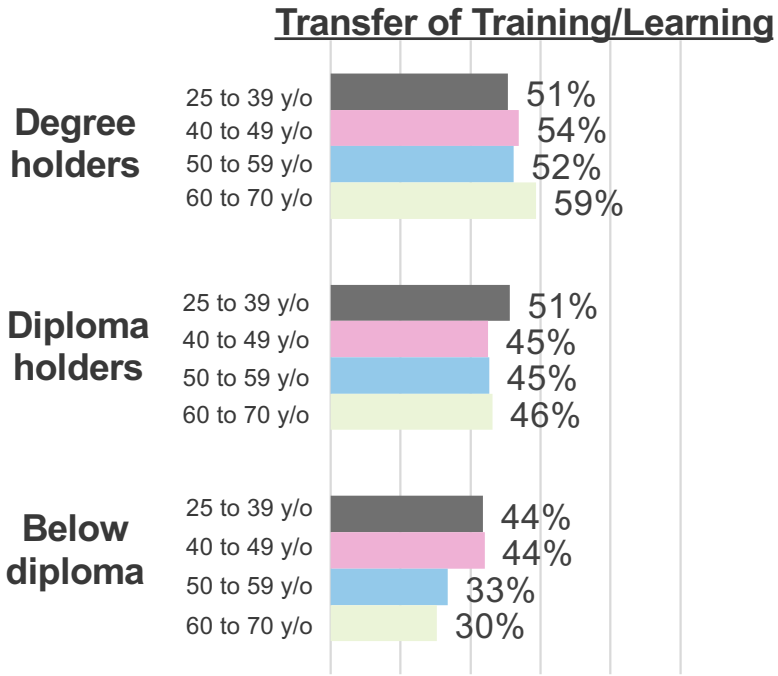
++ : Indicates that age group is positively significant vs. 25-39 y/o of respective education category. / - - : Indicates that age group is negatively significant vs. 25-39 y/o.
Source: Singapore Skills and Learning Survey 2021-22, IAL

Source: Singapore Skills and Learning Survey 2021-2, IAL

SG Context. Job & labour market matters.

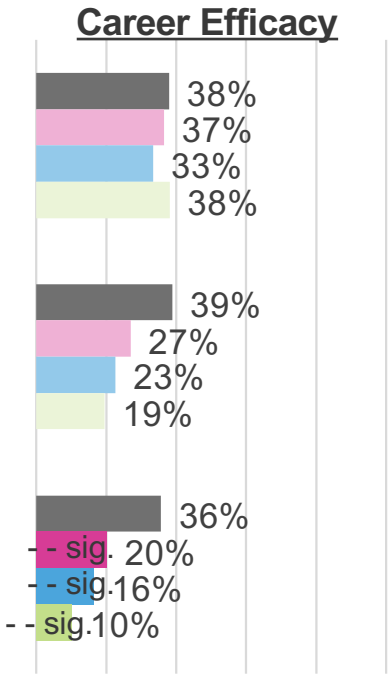
No age effects on transfer of training/ learning

Rather, transfer of training/learning is explained by factors such as job learning requirements, job prospects, learners' learning orientation and learning motivation.



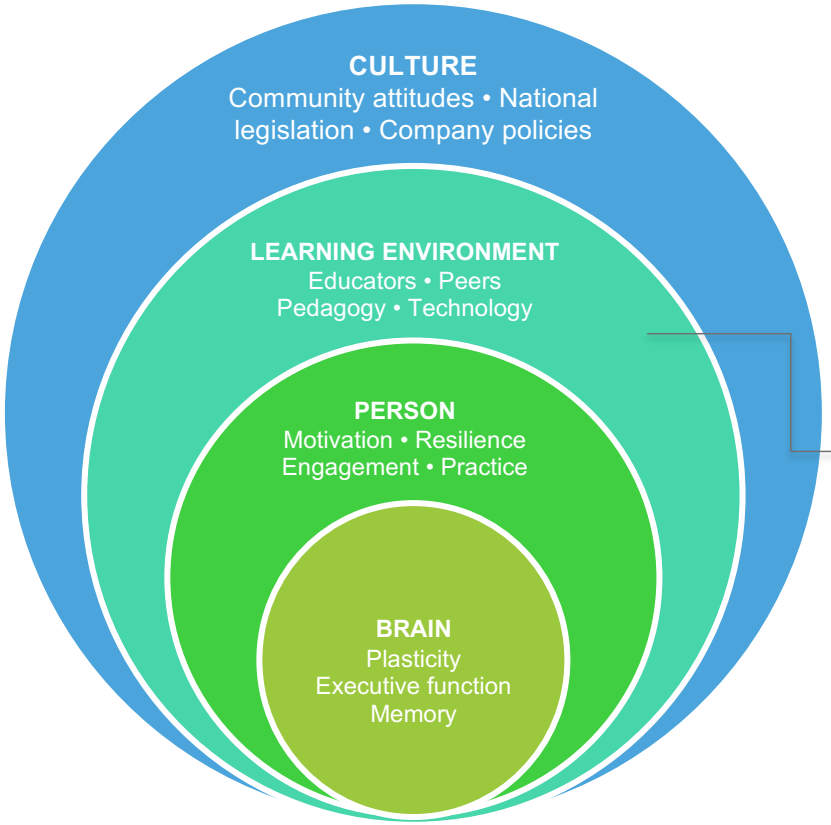
Career efficacy declines with age for below dip

For degree / diploma holders, career prospects, trust, deep learning, intrinsic motivation, and inclination to skills mastery are positively associated with career efficacy.



++ : Indicates that age group is positively significant vs. 25-39 y/o of respective education category. / - - : Indicates that age group is negatively significant vs. 25-39 y/o. *Source: Singapore Skills and Learning Survey 2021-22, IAL*

Implications. Optimising the learning environment.



Source: *Adapted from Thomas et al. (2020)*

Strategy 1. Consider biography of mid-career learners

Strategy 2. Advance embodied learning / cognition processes

Strategy 3. Optimise for positive neuroplasticity (physical training, mental stimulation, social engagement)

Strategy 4. Harness prior knowledge through knowledge recontextualization techniques

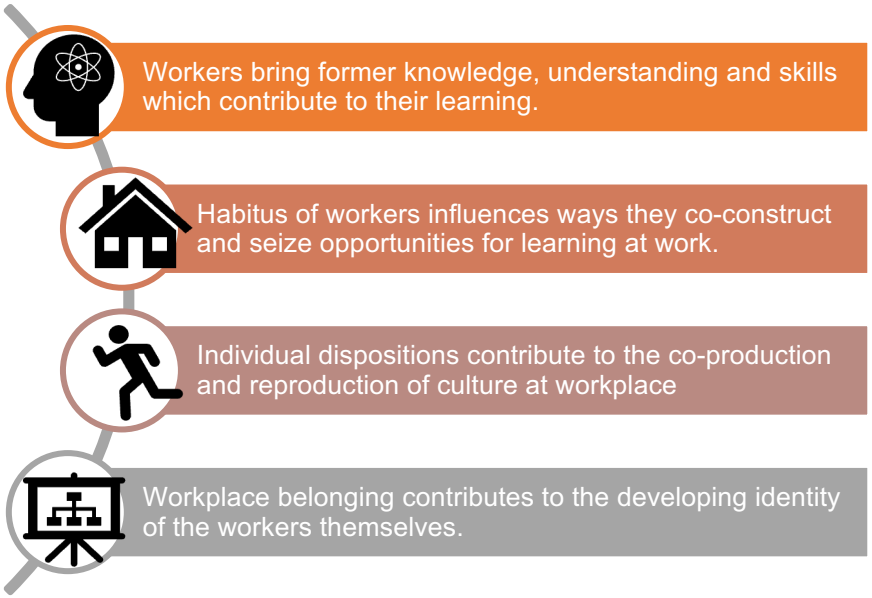
Strategy 5. Use information retrieval techniques: spaced learning, interleaving, multimodal approaches

Implications for training mid-career learners

1

Biography of mid-career learners

Leverage biographies to understand the motivation of learners. Mid-career learners vary widely, especially in Singapore where educational qualifications strongly impact opportunities. Degree holders have enhanced job prospects and environments, potentially fostering greater motivation for learning, whereas non-degree holders may face challenges. Educators should find additional ways to support non-degree holders. For example, **how training is framed** can affect trainee attitudes (Kraiger & Ford, 2021). Leveraging adult learners' **metacognitive skills** may also enhance motivation e.g. by **involving them in decision-making and allowing them to track their own progress** (Thomas et al., 2020). It is crucial that learning programmes be designed attractively to support rebalancing the lower training participation rates of those with lower credentials for their employability and longer-term wellbeing.



(Hodkinson et al. 2004)

Tip: Pre-course surveys – Educators can conduct pre-course surveys to better understand the biography of their learners prior to the start of the training.

2

Advance embodied learning and cognition processes

Go beyond the classroom. Crafting programmes that are **meaningful, engaging, social and relevant** are vital**.** Research demonstrates that real-world practice and application enhances learning outcomes compared to traditional classroom settings, supporting the retention of newly-learnt skills.

- Educators should experiment with programmes that are **work-integrated, or wholly conducted at the workplace**.
- Engagement in learning is more than just interest; it requires learners to respond to and act on training content by restating, generating answers or explanations, consciously monitoring, and evaluating progress toward learning goals (Kraiger & Ford, 2021). The more actively engaged learners are in learning events, the better the outcomes.
- **Proactive brokering of learning opportunities** through stakeholder discussions such as with line managers may be necessary for workers in **suboptimal job environments**. Although challenging, this is crucial for supporting at-risk groups - not only to increase their participation rates in training but also in maximizing the likelihood that successful learning can take place.

Tip: Brokering of learning opportunities – Metz et al. (2020) suggest that brokering is a key factor to the successful implementation of policy and programmes. Brokering connects otherwise **disconnected individuals or groups** in the system.

Tip: Going beyond the classroom – A 9-year longitudinal study of adult literacy graduates found that it was the **engagement with literacy practice after schooling** that was crucial for improving literacy proficiency in the long term. People are more likely to persist in the long term if they have strong social support, so making practice meaningful and relevant is key. (Reder, 2012)

3 Optimise for positive neuroplasticity (physical training, mental stimulation, social engagement)

Offer mental stimulation and social engagement (and physical training where possible). Training programmes, including for mid-career learners with less initial education or in low-skilled jobs, should be designed to offer mental stimulation. Goals should be designed to be challenging yet attainable. Additionally, learning activities should enable social engagement, including social feedback. These create optimal conditions for positive neuroplasticity.

Tip: Ensure social engagement regardless of medium of instruction – Asynchronous learning offers learners greater flexibility, but there may be a trade-off in terms of social engagement. The design of asynchronous activities should still enable social engagement as much as possible e.g. technology-enabled social support through peers, feedback loops.

4 Harness prior knowledge through knowledge recontextualization techniques

Draw on learners' knowledge and experience. Sound pedagogical design for mid-career learning requires significant attention to enabling the recontextualization of learners' knowledge and experience. This includes helping learners understand and interpret connections between new material, what the learners already know or what they need to know to perform their jobs. Techniques to encourage flexible behaviour or to demonstrate risks of biases from prior knowledge may help prime learners towards positive use of their prior knowledge.

Tip: Encourage learners to use personal examples – Gingerich et al. (2014) examined two groups of students. The first group was prompted to generate their own personal examples of a concept, whereas the other group was given the examples by the instructor. The study showed that the personal example group retained the information more from the prompts, which helped them integrate the new concept with their existing knowledge base. This makes it easier to retain and access when needed.

5

Information retrieval techniques: spaced learning, interleaving, multimodal approaches

Leverage information retrieval techniques. Older adult learners perform poorer in tests on information processing speed, reflecting memory search demands (Ramscar et al., 2014). **Spaced learning**, where new information is repeated across multiple sessions and days, enhances retention. Educators can take strategies that encourage (1) frequent retrieval of recently learned material, and (2) active reconstruction and reinforcement of the material for easier future recall. Retrieval can be facilitated by educators, self-directed, or collaborative with peers (the latter also boosting motivation) (Kraiger & Ford, 2021). Additionally, **interleaving** —switching between topics within a single lesson—enhances learning. **Multimodal presentations** are helpful too. Consider technology to support learning top-ups and spread-out practice (Thomas, Knowland & Rogers, 2020).

Tip: Promote distributed learning over longer periods – A 2015 study conducted by Spruit et al. presents compelling evidence for spaced learning: surgical residents employing **spaced practice** of surgical skills over **extended intervals** retained their surgical skills more effectively than those engaging in **short-term, intensive practice.**

Tip: Encourage varied instead of blocked practice – Fazeli et al. (2017) found that golfers who engaged in random or interleaved golfing practice experienced **more accurate skill retention** than their peers who used blocked practice (i.e. practicing one skill at a time before moving on to the next). They also showed a more **structured mental representation** than those in blocked practice, one that was more similar to that of skilled golfers.

Conclusion

1

Science of learning shows lifelong potential through neuroplasticity to strengthen the adult brain

Cognitive decline is not linear nor inevitable; middle-aged brain has its strengths

2

SG is historically weak in supporting lifelong learning potential

New strategies needed to optimise the learning environment

3

Consider five age-inclusive ways to support mid-career learning

● biography ● embodied learning / cognition processes ● optimise for positive neuroplasticity ● harness prior knowledge ● employ information retrieval techniques

Thank You.

Approach

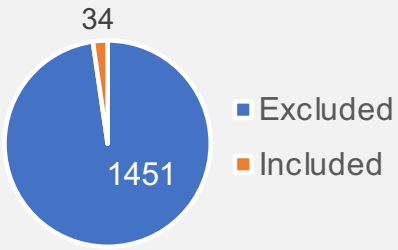
Areas of focus

1. Do mid-career learners learn differently from younger adult learners?
2. Should distinct training approaches be applied to mid-career learners?

1. Literature Review (n= 63)

Analysis of academic literature on learning and training of older adults, drawing from the fields of neuroscience, psychology, adult education etc.

Systematic search across 27 databases (n= 34)



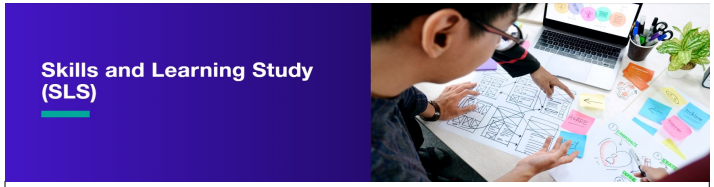
Results from systematic search: **n=1451**

After selecting articles with significant mentions of learning & training of younger vs older workers : **n=34**

Purposeful search of key articles (n= 29)

2. Empirical Analysis

Analysis of training and learning patterns among Singapore resident workforce using data from IAL's Skills and Learning Survey (2017 & 2021)



IAL's Skills and Learning Study (SLS) is a nationally representative dataset of Singapore's resident workforce (Singaporean citizens and permanent residents) aged 25 to 70 years old.

Data available:

2017 (n = 4,500) and

2021 (n = 4,439).