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TINY HOUSES: PLANNING FOR AFFORDABILITY AND INCLUSION

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Abstract

The tiny house movement is increasingly topical, and tiny houses have been mooted as an innovative and sustainable way to improve urban housing affordability. But how valid is this claim? Few if any scholarly studies have investigated the tiny house phenomenon in any depth. This study used a combination of quantitative and qualitative methods to analyse the tiny house movement in Australia. An online survey was conducted in 2015 and again in 2017, as well as a series of semi-structured interviews with tiny house dwellers and tiny house builders. Finally, a case study of South East Queensland Australia investigated local government planning schemes and whether these permitted either temporary types of tiny houses (on trailers) or permanent tiny houses (as in granny flats). Interest in the tiny house movement had increased significantly from 2015, with more people living in tiny houses, and a number of builders now building tiny houses (mostly on wheels). Interestingly, there was high interest in tiny houses by single women aged over 50; as well as younger couples in their 20s. Local governments varied widely in their attitudes to tiny houses, with only a few accepting or even recognising that tiny houses exist as a legitimate housing form. The research concluded that tiny houses are a sensitive and innovative way to increase urban density and improve affordability. To move forward however, it is essential that local and state governments modify their planning schemes and local laws, with appropriate conditions, to permit this type of housing in Australian cities.

Keywords: urban, housing affordability, micro dwellings, sustainability.

INTRODUCTION

The continued rise in house prices is a perennial issue in countries such as Australia, the United States and the United Kingdom (CEDA, 2017, Anglicare Australia, 2017). The gap between housing demand and supply, particularly in major urban areas is seemingly resistant to any number of policy measures (Senate Economics Reference Committee, 2015, Pawson et al., 2015b, Worthington, 2011). Concurrent with the rise in house prices has been a rise in house size, particularly of large, detached houses on the expanding suburban outskirts of capital cities. Australia now has some of the largest and most unaffordable housing in the OECD (Cox and Pavletich, 2015). A recent rise in popularity of what has become known as the tiny (or micro) house movement has been mooted to address housing affordability, unsustainable housing and suburban sprawl (Shearer, 2015b). But realistically, can tiny houses offer a part solution to these issues?

Urban housing supply and demand is a complex and multi-faceted issue; related to a combination of a sustained demand for housing in relatively close proximity to the CBD, a lack of affordable land, inflexibility of planning schemes and tax incentives such as negative gearing (Worthington, 2011). Tiny houses can potentially increase densification without driving up prices. This paper seeks to explore the extent of the tiny house movement in Australia, and by doing so, add to knowledge about a largely unstudied phenomenon. It also aims to investigate the potential of tiny house living to address aspects of urban density, housing affordability, and environmental sustainability.

The paper addresses three main questions: 1) what are some common characteristics of tiny houses and the tiny house movement in Australia? 2) What drivers and barriers are characteristic of the tiny house movement? 3) Are tiny houses a realistic approach to housing affordability and sustainability or just another niche market? There is a paucity of scholarly research on the tiny house movement, but the paper builds on previous studies by the authors as well as a literature review on housing affordability in general. It reports on the results of a large scale survey of tiny house advocates in Australia on why they have or are considering building a tiny house, and their reasons for doing so.

THE TINY HOUSE MOVEMENT AS A RESPONSE TO THE HOUSING AFFORDABILITY CRISIS

The tiny house movement is a relatively new phenomenon, and is most apparent in developed nations; and in particular, English speaking ex colonies of the UK, such as the USA, Australia and Canada. These countries share similar features, large and unaffordable housing and high degrees of urban sprawl. All 35 major urban markets in Australia are considered unaffordable, and it is consistently ranked as either first or second in mean house size in the OECD (Cox and Pavletich, 2015, Worthington, 2011, Yates, 2008). Australian cities also have some of the lowest densities in the world, with Melbourne, Sydney and Brisbane in the top 50 global cities for land area, (Demographia, 2017, Hunn, 2017).

Unaffordable housing has many economic, social and environmental impacts, including the increasing economic stratification of cities, inability of workers to live in proximity to employment, exacerbation of traffic congestion and pollution from private vehicle use, and increasing economic insecurity and risk of potential homelessness for highly leveraged homeowners or renters (Dodson and Sipe, 2008, Yates et al., 2006). These issues are acknowledged by policy makers, city managers and housing providers yet attempts to address rising house prices have had little or no impact. Unaffordable housing is a complex and multi-faceted issue, with both demand and supply-side drivers.

On the demand side, the majority of the population reside in urban areas (85%) and employment is centralised in the capital cities, as are public transport and social and cultural activities. Exacerbating this demand are easily accessible mortgage finance, tax incentives such as negative gearing, and a 'strong cultural preference for owner-occupied detached houses' (Worthington, 2011, Pawson et al., 2015a). On the supply side, are slow and inflexible planning processes (particularly at the Local Government Authority (LGA) level), a lack of infrastructure and overly onerous development assessment requirements (Cox and Pavletich, 2015). LGA planning schemes are not always supportive of non-normative developments, as are tiny houses (Shearer et al., 2016). The scholarly consensus on unaffordable house prices in Australia attributes it primarily to demand-side drivers (Pawson et al., 2015a, Cox and Pavletich, 2015). Demand-side drivers are major contributory factors to price rises, but supply side drivers are more pertinent to tiny houses, particularly inflexible and complicated LGA planning schemes.

It must be emphasised that unaffordable housing is equally if not more applicable to renters. Higher proportions of income are paid in rent, with low income renters sometimes spending 60% or more of their total income on housing (Yates, 2008). The rental market is also very insecure, with leases over 12 months a rarity, and multiple restrictions, such as on pets, the norm rather than the exception.

Unaffordable housing is also linked to house size, although the relationship is not linear, as larger houses are often more cost effective per square meter, because of economies of scale and cheaper materials available to large building contractors. Generally speaking in Australia, the larger 'McMansion' houses are situated in the middle and outer suburbs of the cities, and often in master planned estates by large development companies. These very large suburban houses result from cheaper land, the ability to own a detached house with a backyard, developer subsidised finance, sales pressure in display villages and social norms within these estates.

Large houses far from the city can have economic, social and environmental costs including increased Greenhouse gases (GHGs) from private vehicle use, traffic congestion and time spent commuting, economic polarisation of the population, resource use from construction and infrastructure, and environmental degradation from land clearing. Clearly, increasing the density of areas closer to the city and reducing the size of houses, can save significant amounts of resources and energy, as well have substantive social benefits. So how can tiny houses be part of the urban density mix?

The academic literature on tiny houses has to some extent, grown since 2015 (Shearer, 2017), but it is still limited. There are significantly increased numbers of popular media articles about tiny houses, in all types of media, including social media. For example, Australian tiny house Facebook Groups have increased in number from two (2015) to approximately 15 (2017) and member numbers are relatively large; the original Tiny House Australia Group and Page now has over 47,000 members (THA, 2017).

History of tiny houses

The antecedents to the tiny house movement can be traced back to the 1850s, when Henry David Thoreau, in the book 'Walden', promoted self-sufficiency and elimination of debt by building a small house (Anson, 2014, Diguette, 2017, Ford and Gomez-Lanier, 2017, Thoreau, 1854). Later, in the 20th Century, prefabricated tiny houses were built after WWII to ease housing shortages, and in the 1960s, the environmental and alternative lifestyle movement saw a resurgence of the trend (Bares et al., 2017).

The tiny house on wheels trope originated around 1998, in response to planning restrictions, housing affordability and a desire to live more sustainably (Mutter, 2013).

Early adopters included the designer Jay Schafer, founder of the Tumbleweed Tiny House Company, the writer Lloyd Kahn and the architect Sarah Susanka (Mitchell, 2014, Bares et al., 2017). The primary reason for building on wheels was to circumvent planning restrictions, as the USA has minimum house size restrictions. By placing the house on a trailer bed, classified it as a vehicle which did not have to comply with planning law.

Tiny houses are not a homogenous housing form, and given the contemporaneity of the movement, they are not easily classifiable, particularly within planning schemes. Generally speaking, they tend to be either fully mobile (on a trailer), partly mobile (on skids or otherwise relocatable), or fixed (as in a granny flat) (Shearer & Burton, in press). They can also be more environmentally sustainable and cheaper to build than a standard house, and design is considered very important, especially as most early tiny house builders were architects (Mitchell, 2014).

Interest in tiny houses in Australia only began around 2010, (see Figure 1). This has risen dramatically from around 2012, and continues to grow (Google Trends, 2018). Social media activity has risen significantly, with a number of active tiny house Facebook Groups in Australia, some of which have members in the tens of thousands (Tiny Houses Australia, 2017). New specialist tiny house builders are appearing almost daily, it is reported in the mainstream media on almost a weekly basis, and on 13 September 2017, someone even stole one (Shearer, 2017).

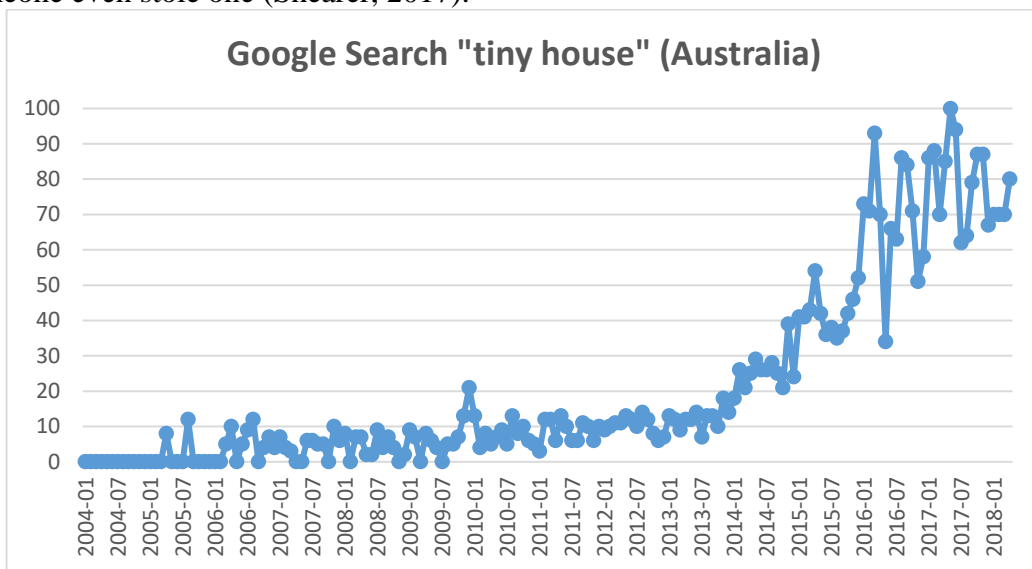


Figure 1. Google Trends Search ‘Tiny House’ Australia only. 2012 to 2018

Environmental Sustainability

Large detached houses and high rise apartments use significant amounts of water and energy in their construction, ongoing operation and eventual demolition (Kilman, 2016, Wentz and Gober, 2007, Wilson and Boehland, 2005). Residential high rises use greater amounts of water and energy per capita than detached houses (Pullen et al., 2006). Traditional building methods use large amounts of resources, and creates waste at all stages of the construction lifecycle, and building operations produce significant GHG emissions. Indeed, housing is second only to transport for GHG emissions (Jones and Kammen, 2011, Carlin, 2014b). Environmental impacts of housing include also the secondary impacts of poor design of the house and the surrounding managed landscape. Finally, unaffordable housing can increase traffic congestion, fragmentation of landscape and increase GHG emissions from private vehicle use.

Tiny houses on the other hand have a smaller ecological footprint, are often part or fully constructed from recycled or renewable materials, and are often off-grid (Kilman, 2016), so use proportionately less resources (Tiny House Build, 2014, Carlin, 2014a). Tiny houses also have secondary environmental benefits, tiny house dwellers frequently emphasize downsizing and minimising possessions, conscious consuming and the sharing of appliances, cars and other consumer goods. Living in an off-grid tiny house forces its residents to directly confront the often invisible use and waste of resources (Kilman, 2016, Anson, 2014). Moreover, the limited space means that they have to socialise and interact in community settings (Kilman, 2016).

Economic Sustainability

Since European settlement, Australian housing has been characterised by detached dwellings with a large backyard, reflecting cultural preferences and the desire for private space (Worthington, 2011). A large sprawled city with detached houses and a small, dense CBD remains the dominant urban morphology in Australia, despite government policies to encourage densification. The mean size of new houses in Australia is around 241m² (Cox and Pavletich, 2009, Cox and Pavletich, 2015, Worthington, 2011, Yates and Gabriel, 2006), and most detached houses are 3 bedrooms or larger, while inner city apartments are 2 bedrooms or smaller. This tends to limit apartment living to singles or couples without children, the most common demographic in the tiny house movement.

Neither large houses in the suburbs or inner city apartments are affordable; Land prices are extremely high especially in inner city areas which are mostly all developed, and zoned for high density living. In the suburbs, planning regulations restrict the types of dwelling, and other planning requirements, infrastructure charges and taxes add further to the cost of land and construction.

Many tiny house advocates express the desire for a smaller house that is owned rather than rented, affordable and owner-built (Shearer, 2015a). They express desires to reduce debt, to transition from full time to more flexible work or retirement, to let to family or even tourists, and to avoid homelessness. Indeed, the strongest drivers for tiny house living are economic (Shearer, 2015a), and this is supported by other studies that indicate the ‘biggest incentive for living tiny is saving money’ (Kilman, 2016).

But are tiny houses more affordable than standard houses? They use fewer building materials, often use recycled or bartered products and save on labour, being largely owner-built (Kilman, 2016), but per square meter, tiny houses can cost *more* than standard houses. Generally speaking, the larger the house, the cheaper it is per square meter, particularly if built by a project builder. Also tiny houses are usually built for cash, so it is difficult to estimate true building costs, especially labour.

The tiny house market in the USA is more mature, with multiple tiny house manufacturers. These ready built tiny houses range upwards from around US\$50,000; slightly more expensive per square meter than a standard project house (Kilman, 2016). In Australia, the relocatable/granny flat/ studio market is relatively mature, particularly in NSW, and such dwellings can be purchased from about \$15,000 (mostly in kit form). Tiny houses on wheels (THoWs) are increasingly available commercially in Australia, but the market and cost varies widely.

Design

Finally, tiny houses are strongly differentiated from other forms of smaller housing by their emphasis on architecture and design (Ford and Gomez-Lanier, 2017). Tiny houses can be viewed as intentional dwellings with ‘a deliberate use of space, materials, light

and function’ (Mitchell, 2014). They are frequently unique, beautiful and creative.

The tiny house movement is also strongly Do It Yourself (DIY), with design and construction commonly undertaken by an individual intending to live in the tiny house. It can also be communitarian, with groups of people working and sharing building tools and materials. Interestingly, and unlike most other construction, more women than men build their own tiny house (Mitchell, 2014, Tiny House Build, 2014).

Many effective tiny houses incorporate design principles from caravans, boats and small dwellings in places such as Japan. In suitable climates, tiny houses include outside living areas such as decks, for entertainment and privacy. In cooler and wetter climates however, tiny house dwellers may be forced to remain indoors or to escape ‘cabin fever’, conflict and lack of privacy by going to public spaces such as coffee shops or libraries.

Design options also take into account the eventual users of the tiny house, and the archetypal tiny house on wheels with a loft bedroom has accessibility issues, especially for older or mobility impaired people. Their small footprint and room size is also often impractical for those using wheelchairs, strollers or walking aids. Nor are they suited, unless with outbuildings, for those requiring storage or creative space.

Tiny houses are suited only to specific demographics such as singles or couples, as they are too small to suit the archetypal nuclear family. Nor are they suited to group living, unless part of a tiny house community. Living in very small spaces requires sacrificing many things taken for granted in countries where people are used to large private spaces.

Where do you put tiny houses?

THoWs were first developed as a counter to planning restrictions, such as minimum house size codes. According to the International Residential Code (IRC) for example, at least one room should be larger than 120 square feet, with others at least 70 square feet (Kilman, 2016, Nonko, 2016)¹. Onerous planning restrictions, complexity and cost are the greatest barriers to tiny houses (Ford and Gomez-Lanier, 2017, Shearer, 2015b).

Australian planning schemes and building codes mostly do not restrict house sizes, but do restrict the size of secondary dwellings, and lot coverage. Planning schemes have significant inconsistencies, differing between LGAs, and within LGA development zones. Secondary dwellings are accepted in most planning schemes, subject to any setbacks and overlay zones that may exist, though they can be expensive to construct. THoWs are not permitted in most urban LGAs in Australia, and are considered caravans, with restricted periods of occupancy. There are currently no provisions in legislation for parking your own ‘house’ on someone else’s property and paying rent.

The Building Code of Australia (MBQld, nd) does not define tiny houses, thus there are few controls on their construction, which has implications for health and safety. This nebulous legal situation leaves tiny house dwellers open to complaints from neighbours. For example a tiny house on wheels was parked in a backyard in inner city Brisbane until a neighbour complained. The Brisbane LGA issued an infringement notice on the owners, stating, ‘...*the siting of the THOW on the subject site constituted building work which is assessable development and that no development permit for building work had been obtained for the THOW*’ (BDDRC, 2016). After legal action, and the Building and Development Dispute Resolution Committee ruled that that it was ‘neither a building nor a structure (as defined)’ thus did not constitute building works, and was considered a road

¹ The IRC now has a Tiny House Appendix Q which includes different provisions for tiny houses, although it is not yet in common use, having only been accepted in one US County and one State (ICC 2017. Overview of the International Residential Code® (IRC®). International Code Council.)

registered moveable dwelling. THoWs thus must comply with the transport regulations, with restrictions on length, width, height and weight.

So, where do you put tiny houses? As discussed, Australia’s housing unaffordability is primarily an urban problem; 87% of the population live in urban areas with over two thirds living in the Capital Cities (ABS, 2017). With this in mind, Bares et al. (2017) identified a range of planning options whereby tiny houses can, with minor modifications, be situated in urban areas (Table 1).

Table 1: Tiny House Planning Options in Australia (based on Bares et al. 2017)

Option	Benefits	Barriers
Granny flat <i>Secondary dwelling close to existing house</i>	<ul style="list-style-type: none"> • Permitted planning schemes. • Can purchase in kit form • Adds to land value • Densification option LGAs • Larger than a THoW 	<ul style="list-style-type: none"> • Requires ownership of the land. • Potential legal issues if house owner wants to relocate it • May incur substantial costs, infrastructure charges
Tiny lots <i>small freehold subdivided lots</i>	<ul style="list-style-type: none"> • Allows the ownership of land • Can build and let out • Allows infill development without high rises • Communal open space and facilities 	<ul style="list-style-type: none"> • Currently not supported by most LGAs in Australia • Tiny lots not cheaper or have smaller houses • Potential issues re parking, needs sensitive planning.
Tiny villages <i>small houses on a lot</i>	<ul style="list-style-type: none"> • Resident owns property under a strata title • Can be let to others • Entry level ownership • Communal benefits 	<ul style="list-style-type: none"> • Not currently supported in most LGAs in Australia • Needs sensitive planning of design, layout, access etc. • Land prices in urban areas
Tiny backyard leases <i>THOW in backyards</i>	<ul style="list-style-type: none"> • Property owner can get rent from the tiny house owner • Tiny house is mobile • Privacy for both parties • Good for THOW 	<ul style="list-style-type: none"> • Unclear in most local laws • May need connection to infrastructure and services • Potential for conflict • Car parking in some areas
Tiny house parks <i>Similar caravan/trailer park</i>	<ul style="list-style-type: none"> • Suited to ageing caravan parks in Australia • Specific zone for tiny houses • Good for communal living 	<ul style="list-style-type: none"> • Stigma about trailer parks • Caravan parks in desirable areas under development pressure • Why are THoWs different?

These options only require minor modification to most planning schemes, and some already exist (granny flats and residential parks). Some are more feasible, granny flats are already part of the urban landscape, but others less so, and for example, houses built on very small lots in high value areas are not necessarily small. It would take political will to modify planning schemes, but the continued house price rises could expedite this.

However, the most pressing barrier is likely not LGA planning schemes but the price of land. The ‘highest and best use’ of inner city land is for very dense housing or commercial purposes. Most Australian cities are low density however, Brisbane Queensland comprises 74% detached dwellings (.idcommunity, 2017), with mean lot size of around 600m², having substantial areas which could be utilised for granny flats or tiny backyard leases. Larger areas further out could be suitable for tiny house communities, and State owned land could be leased to a mobile tiny house community, as these can be moved if necessary, and do not require much infrastructure.

METHODOLOGY AND DATA

This study used an exploratory multi method approach including the results of past research on the subject (Shearer, 2015b, Shearer, 2015a). It used an online questionnaire survey and qualitative analysis of open ended survey questions, as well as content analysis of tiny house groups on social media (Facebook). The tiny house movement is still an area of emerging research (Mutter, 2013), but a literature review of the small number of academic, but mostly popular media sources, was also conducted.

Questionnaire Design

The survey consisted of 5 sections and 18 questions. Sections 1 and 2 were about the tiny house, and asked if a person had built or intended to build a tiny house, the builder, location and cost. The third section asked about the benefits of tiny houses, with the questions were in the form of standard 5-point Likert Scales ranging from 1- Strongly Disagree to 5- Strongly Agree. Most questions had an 'Other' section, to garner qualitative information. Section four asked instead about perceived barriers to building tiny houses, also in Likert scale, and the final section included demographic questions, and an open-ended other comments question. The survey was conducted by snowball sampling of known populations; it was posted as a link to Australian Tiny House Facebook groups, and sent by email to people interested in tiny houses. Statistical analysis included on the quantitative side; frequencies, crosstabs, correlations; and on the qualitative side, content analysis. Given the largely qualitative nature and non-random sampling methodology, no further statistical analysis was undertaken.

THE TINY HOUSE MOVEMENT IN AUSTRALIA: A SNAPSHOT

A total of 442 people completed the survey, almost eight times as many as the previous survey (56). Of the total, 369 useable survey responses were obtained (73 were eliminated due to insufficiently completing the survey).

Significantly more people were interested in tiny houses than in 2015, and in contrast to the very low numbers in the first survey, 14% (52) had either built or were in the process of building a tiny house, with another 68% (249) intending to build a tiny house. The vast majority (67%) of tiny houses were mobile to some degree (either fully mobile, on skids or otherwise relocatable). One third intended to build the tiny house themselves (or with a partner or friends) and, reflecting the growth of the movement, 24% (86) built by a tiny house builder (zero in the initial survey). Most people intended to fund their tiny house with cash (31%) or income from employment (31%).

The intended location of the tiny house had a bimodal distribution, being capital city urban (35%, 129) and 38% (138) rural residential/rural (no greater than two hours from a capital city). The other choices, remote, non-capital city, and no fixed location had less than 10% each. Of interest, 51% (185) said that they had built or wanted to build their tiny house on their own land, with about 16% (57) renting, and 16% (37) did not know. A small majority (25%, 88) preferred to build in Queensland, then Victoria (20%, 70) and NSW (18%, 62). This likely reflects the maturity and activity of the tiny house groups, State population, and the location of the Facebook groups where the survey was posted.

The comments highlighted the aspect of location (particularly given that the first survey found that the biggest drawback to tiny houses was 'nowhere to put them').

Close to public transport and local services including clinics. Nothing outside of major cities where jobs and services are available (Male, 30-39)

The location aspect was linked to barriers, particularly LGA planning schemes; but

it also reflected libertarian tendencies of the tiny house movement as well as the bureaucratic, inconsistent and complex nature of Australian planning.

Needs to be more focus on where we can build without having people complain or having gov step in to say this can't happen...,in Australia where we have great amounts of land we are blocked by different levels of gov particularly at council level. (Female, 50-59)

Interestingly, one respondent mentioned that the location was dependent on the impacts of future climate change.

I have been researching severe climate events in different locations and would want a sound dwelling (eg cyclone certified) in a relatively climate-protected location. (Female, 60+)

Others expressed a more cynical view of LGAs, developers and planning in general.

Skirting the law is the Australian way, after all. ...I prefer the current situation, as big developers have to obey those rules but self-builders can largely ignore them thanks to complaint-based enforcement (Male, 40-49)

Demographically, ages ranged from under 18 (1) to over 60, with the majority being 50-59 (33%) and over 68% were over 40. Two thirds were female (67%), and of these, 52 (n=114) were over 40. A smaller number were aged 18-29 and from 30-39: likely because they are employed full time and/or raising children. A crosstabulation chi-square analysis was performed and a significant relationship was found between gender and age: $X^2(18, N = 369) = 362.58, p = .001$. A similar analysis found a significant relationship between gender and building the tiny house; with females more inclined to use a tiny house builder and males more likely to DIY, $X^2(24, N = 369) = 72.319, p = .001$.

Drivers of tiny houses

The drivers for tiny house living (see Figure 2) were primarily economic, environmental and social. The social indicators were ranked higher than in the previous survey, with high importance given to living off grid, survivalism, and protecting against economic crashes. This is likely due to the geopolitics at the time (November 2017) s, such as the Trump administration in the USA and the potential conflict with North Korea.

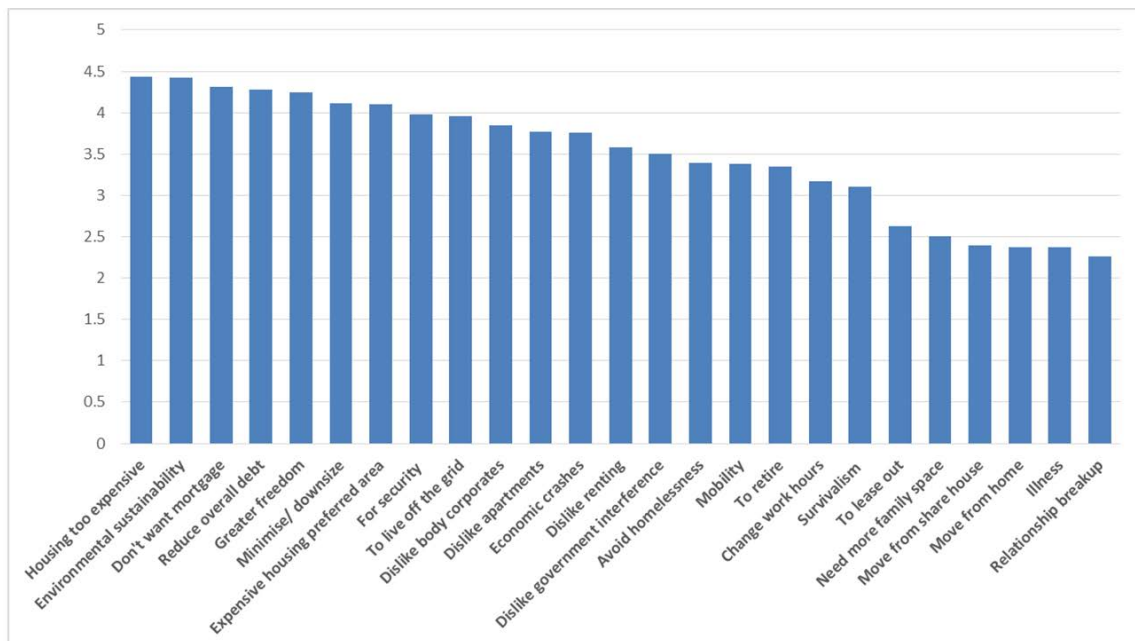


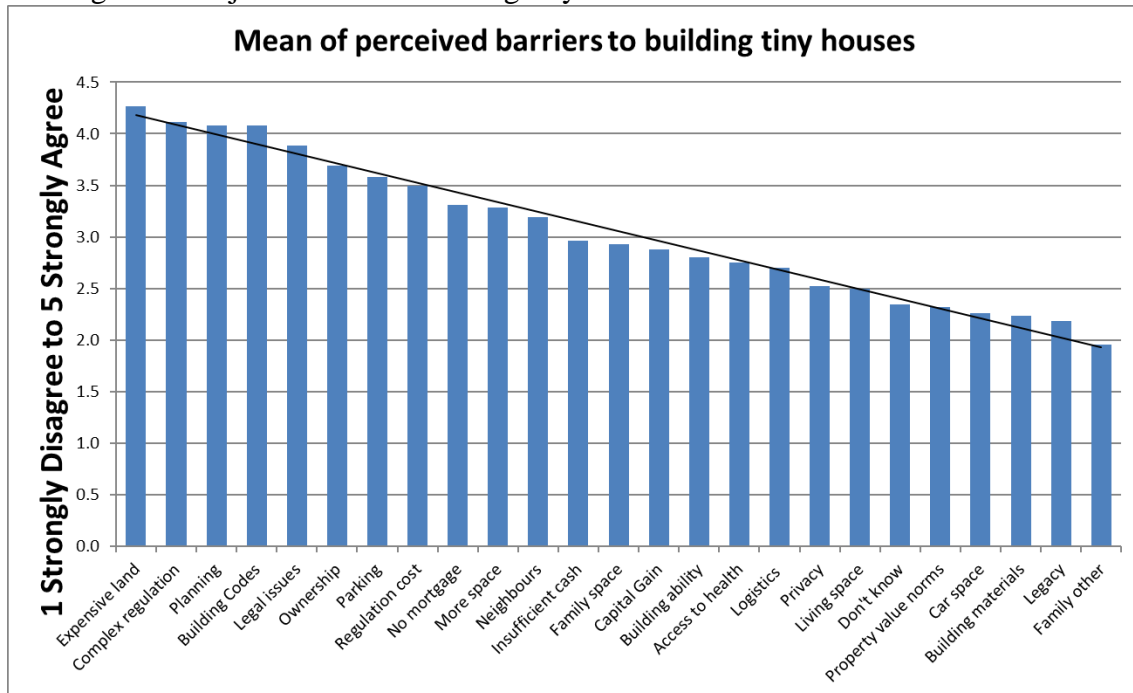
Figure 2: Drivers of Tiny Houses (mean score 5-point Likert Scale, strongly agree to strongly disagree).

I support the ideas of tiny houses for conscious consuming. We all consume too much land. Infrastructure and space for what we need. We then choose to fill up the spaces with more stuff and also travel further to our destinations using more fuel to get there. It's a downward spiral which could be contained by more sensible accommodation choices and a more thoughtful attitude towards resources. (Female, 40-49).

Barriers to tiny houses

The study also asked, in 5 point Likert Scale about the perceived barriers to building a tiny house (see Figure 4). Broadly speaking, the barriers were not ranked as highly as the drivers, with only two having mean scores over 4, both related to planning. Planning schemes, building codes, the legality of tiny houses and nowhere to park the tiny house (ranked 1 in the previous study, now ranked 7) were the major perceived barriers to building a tiny house. Other economic barriers were noted, and included lack of cash, inability to get mortgages and the cost of building permits. The remaining barriers were social, and included neighbour complaints, lack of building ability and too small.

Figure 4. Major barriers to building tiny houses in Australia



Building codes and legislation that is complex, contradictory and outdated is the real problem. Almost everyone could benefit from a tiny house - either to get started, suited for ...lifestyle or circumstances, for extended or growing family, investment or holiday retreat in remote off grid. (Male, 30-39)

WHERE TO NOW FOR TINY HOUSES?

This study found that the tiny house movement has significantly increased in popularity in the past 2 years, with a tenfold increase in tiny house groups, and a doubling of members in the original groups. Greater numbers (although still very low) of people had built their own tiny house. This is likely due to the continued increase in house prices, as well as the popularity of the downsizing movement (linked to a general increase in environmental concern), and the slight easing of planning scheme restrictions.

The drivers behind the tiny house movement are predominantly economic and relate to the cheaper cost of tiny houses, expensive land, desire to cut work hours, and reduce or eliminate debt. Environmental drivers are also important, the desire to live off grid, reduce ecological footprint, to minimise possessions and practice conscious consuming.

Barriers were not ranked as highly as drivers, were largely related to planning restrictions; and were ranked lower than in 2015 (Shearer, 2015b, Shearer, 2015a). Fewer highlighted a lack of information, building ability or access to building materials.

A variety of tiny house groups are sharing information, online and in person through meetups etc., and that innovators and early adopters have motivated more ‘mainstream’ people. Tiny houses particularly appeal to single, older women, a demographic at increasing risk of homelessness, due to insufficient superannuation, marital breakup and long term rental status (Petersen and Parsell, 2015). THoWs could enable older women to live in a separate house on property belonging to family members, and help with care of grandchildren etc. which would have major social and economic benefits.

Tiny houses are no panacea for the wicked problems of housing unaffordability and

unsustainable development, but could be a valuable component in a toolbox of housing options for urban areas. Tiny houses can be economically, environmentally and socially sustainable; they combine green building principles with affordability, and would be relatively simple to slot into current urban physical and legal infrastructure. Contemporary urban areas are largely path dependent, and densification options often result in objections from current residents. Tiny houses are attractive and well built, and can be included into current suburban infrastructure relatively simply.

Australian capital cities are characterised by large old houses on large lots, and small, ageing households. Many are unwilling to sell, given the lack of smaller affordable housing in the same area. Promoting tiny houses could enable densification of these suburbs without the vertical sprawl of inner city high rise development, potentially freeing up the larger houses for new families, with the owner moving to the tiny house and getting rental income from the larger house (anecdotally, this is already occurring in many Australian cities). This would add to the rental stock, allow families to move closer to the city, and facilitate shared living, community and intergenerational mixing.

Moreover, the environmental value of tiny houses cannot be overstated; population growth and urbanisation is putting increasing pressure on scarce resources. Housing is a significant source of GHG emissions, land clearing and other impacts. Reducing construction materials and waste, as well as energy and water use will have a long term positive benefit for the environment. Mobile tiny houses can even be moved in case of extreme weather events, such as cyclones, floods or bushfire; and as temporary dwellings, do not necessitate major infrastructure upgrades.

Tiny housing offers a major disruptive solution to an ever growing affordability and social divide in housing. (Female, 40-49)

This study scratches the surface of a yet unexplored area, and much further research is needed in this space. The study shows however, that tiny houses have the potential to be part of the mix of urban built infrastructure, as environmentally and economically sustainable housing forms. Building tiny houses can also add to employment and training.

Tiny houses appeal to many demographics; especially older, single women, the 'Millennium' generation, the 'creative class' of inner city dwellers and those who, in response to contemporary capitalist culture, tend to be anti-establishment and minimalist (Anson, 2014, Florida, 2000). Perhaps the true significance of tiny houses lies in that disruptive value, and their ability to precipitate a paradigm shift in social norms, to encourage awareness of the waste of resources in modern construction (Kilman, 2016). The emphasis on quality, community, sustainability and minimalism is the philosophical antithesis of the McMansions and shopping malls (Ford and Gomez-Lanier, 2017). Research into the tiny house movement is still in its infancy, and future studies, by this author and others, will no doubt build on the information in this and other articles.

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