

The replication and reduction of automobility: findings from Aotearoa New Zealand

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ABSTRACT: In this paper, we examine the factors that contribute to the replication or reduction of automobility amongst young adults. Semi-structured interviews conducted in Aotearoa New Zealand, with 51 drivers and non-drivers, aged 18-35 years old, form the empirical material. The findings build upon previous research and extend understandings of how seven explanatory factors; perceptual, value and preference, social, built environment, economic, legal/ policy and technological, work both to continue the current automobility paradigm, and to challenge it by adopting alternative mobilities. We use the Energy Cultures Framework as an analytical tool to explore the ways through which material factors, norms, practices, and external context can replicate or reduce participation in the hegemonic mobility paradigm. This approach offers useful insights into the interactions between what the research participants think, have and do, and how this is resulting in a reduction in automobility norms amongst some younger people. It also identifies and highlights potential opportunities to leverage upon current change trends to assist a systemic transition away from automobility towards a culture of multi-mobilities.

KEY WORDS: Automobility; Mobility trends; Norms; Energy Cultures Framework; Aotearoa New Zealand; Climate change mitigation

1 INTRODUCTION

Automobility is the hegemonic mobility paradigm. Since the introduction of the Ford Model T, bringing affordable private vehicles to the industrialised world, the car has represented freedom, independence and prestige (Steg, 2005, Mokhtarian et al., 2015). We now live in a world designed to accommodate, and even prioritise, private vehicle ownership and untrammelled car-based access between and within places. The system of automobility characterises a perpetual routine of car-dependence, which continues throughout generations. However, the 'Peak Car' phenomenon (Goodwin, 2012, Goodwin and van Dender, 2013, Metz, 2013, Newman and Kenworthy, 2011) has reported a destabilisation in car-based travel in some industrialised countries, and this has raised questions around the underlying causes and long-term consequences of decreased car-dependence (Dennis and Urry, 2009).

Within this phenomenon is another trend that has drawn the attention of academic and policy audiences internationally; the proposition, and evidence, that young people in some industrialised countries may be developing different mobility-related aspirations and expectations than other

generations (Delbosc and Currie, 2013, Institute for Mobility Research, 2013a, Kuhnimhof et al., 2011). This research has indicated a reduction in automobility norms that have previously been replicated from generation to generation, but why this is occurring is less clear. Given the rapidly changing socio-economic, cultural and technological landscape in which mobility decisions are now made, the factors that replicate or reduce automobility norms require examination.

In this paper, we empirically examine the factors that contribute to the replication or reduction of automobility norms through a qualitative study of young adults in Aotearoa New Zealand (Generation Y or 'millennial generation', 18-35 year olds). In doing so, we respond to 3 research questions: (1) What are the factors that contribute to the replication or reduction of automobility? (2) What are the mobility cultures of replication and reduction? and (3) How might the concept of Energy Cultures help frame these factors so as to identify ways to promote a cultural shift away from automobility?

2. LITERATURE REVIEW

While changing travel practices have many implications, particularly in regards to infrastructure provision and geographies of mobility, these changes are critically important in light of the contribution private road-based transport makes on a global and national scale to greenhouse gas (GHG) emissions. Most transport GHG emissions are from Organisation for Economic Co-operation and Development (OECD) countries, with 80% of total global motorised passenger kilometres arising from 10% of the world's population (Sims et al., 2014). Growing demand for private transport in emerging economies will further exacerbate global climate concerns. Policy, technological and behavioural responses to encourage the uptake of low-carbon transport modes have been posited and trialled with varying degrees of success (Bamberg et al. 2011; Brand et al. 2013; Marsden et al. 2014). However there is a clear need for a rapid transition away from high emitting transport modes, which are currently supported by the hegemonic transport system, automobility.

Urry (2004) conceptualises automobility as *"a self-organizing autopoietic, nonlinear system that spreads world-wide, and includes cars, car-drivers, roads, petroleum supplies and many novel objects, technologies and signs"* (p.27). In the context of the current research, automobility norms are understood to be personal and societal expectations that give primacy to car-based travel and the transport systems that support this. As a cultural object, the car has a range of meanings and values beyond the facilitation of mobility, making automobility more resilient to external challenges to its dominance than would be explained by a purely functional perspective (Schwanen, 2016). For instance, automobility norms are often unaffected by congestion that reduces the utility of transport infrastructure, and extends travel time. Moreover, technological innovations designed to reduce carbon dioxide (CO₂) emissions (e.g. electric and hybrid vehicles) or to increase safety (e.g. [semi]

autonomous vehicles) may extend the dominance of automobility through an enhanced experience and decreased fuel costs (Wells and Xenias, 2015). 'Autofreedom' (Meyer, 2015) has been a prominent discursive tool for the reproduction of automobility norms, and a key rationalisation for transport funding that prioritises road infrastructure. Nevertheless, emergent trends and social innovations which are particularly evident amongst younger adults, such as sharing cultures, and 'collaborative mobilities', may begin to challenge the hegemony of automobility and car dependency (Kent and Dowling, 2013).

Attempts to reduce automobility, and promote diversity in modality, have largely focused on incentivising alternative modes, and disincentivising car-based transport (Henderson, 2002, Henderson, 2009), using various forms of policy and market interventions. The reported changes in travel behaviours amongst generation Y are of particular interest as they do not appear to be associated with overt policy actions or change to physical infrastructure, but instead emerging from a diffuse set of influences that are not yet well understood. The research presented in this paper contributes to this field through an examination of the factors affecting how automobility is replicated or reduced amongst generation Y.

There have been a range of explanations put forward as to the causes of the observed reduction in automobility amongst some young people in some regions. Urbanisation has been used to explain travel practices in a variety of geographic locations (Millot, 2004; Cidell & Prytherch, 2015; Oakil et al. 2016). Indeed it has been argued that urbanisation can explain declining car ownership and/or licensing (Licaj et al. 2012), as these items and competencies are not required or can even be burdensome in urban centres, where active and public transport are more readily available to accomplish daily mobility needs. Urbanites are also more likely to have access to niche mobility services including Uber, Zipcar and bike sharing schemes (e.g. London's 'Boris' Bikes) thus decreasing the necessity for private vehicle ownership and/or licensing. Rural regions, on the other hand, can be restricted by prohibitive distances between locations (thereby reducing the relative attractiveness of active modes) and limited public transport services.

However, many other factors have also been proposed. In a 2014 *Journal of Transport Geography* research note, Hopkins and Stephenson (2014) presented a series of factors that had been hypothesised in recent literature as contributing to the replication or reduction of automobility. These factors were grouped into seven explanatory categories; individual, social, built environment, environmental concern, economic, legal/ policy, and technological¹. We use a modified version of their table (Table 1, supplementing 'individual' for 'perceptual', and environmental concern for 'values and

¹ Please see original table for associated references provided by Hopkins & Stephenson.

preferences') as a starting point for our own empirical research, and suggest that while the original table did not go beyond 'individual' and 'social' explanatory factors for replication, there are a range of other factors contributing to the on-going hegemony of automobility including infrastructural investments and pragmatism (Nenseth & Hjorthol, 2007). This table is not intended to be exhaustive, but to illustrate the range of factors sitting within each explanatory category.

Table 1 Modified Table of Factors that Replicate or Reduce Automobility

Explanatory category	Reduce automobility	Replicate automobility
Perceptual factors	Perceptions of freedom and autonomy; psychosocial benefits of protection, autonomy and prestige.	
Value and preference factors	Expectations and aspirations for mobility aligned with non-car modes. Rising awareness of environmental impacts associated with transport, health and exercise motivations for active transport	Pragmatic aspects of the car for organising daily life
Social factors	Willingness to use alternative transport modes, aspirations for low-carbon transport mode use.	Driving as a 'rite of passage'; cars as a status symbol; the role of friends, parents and partners.
Built environment factors	Public and active transport infrastructure; transport alternatives.	Lack of infrastructure to support active or public modes. Housing developments requiring car-based travel.
Economic factors	Disproportionate impacts of the global financial crisis affecting the income and employment of generation Y; increasing cost of first home purchases, learning to drive and car ownership; increasing number of young people in tertiary education.	Sunk investments 'locking in' car-based travel, increasing house prices forcing first time buyers into the suburbs and further from work.
Legal/ policy factors	Emergence of a graduated learners scheme and theory tests increasing the difficulty and effort associated with gaining a licence.	Policy and funding preferences for road infrastructure.
Technological factors	Impact of Information Communication Technologies (ICT); Internet and social networking.	Advanced vehicle technologies and personalisation of vehicles improving the driving experience.

Source: Modified from Hopkins & Stephenson (2014)

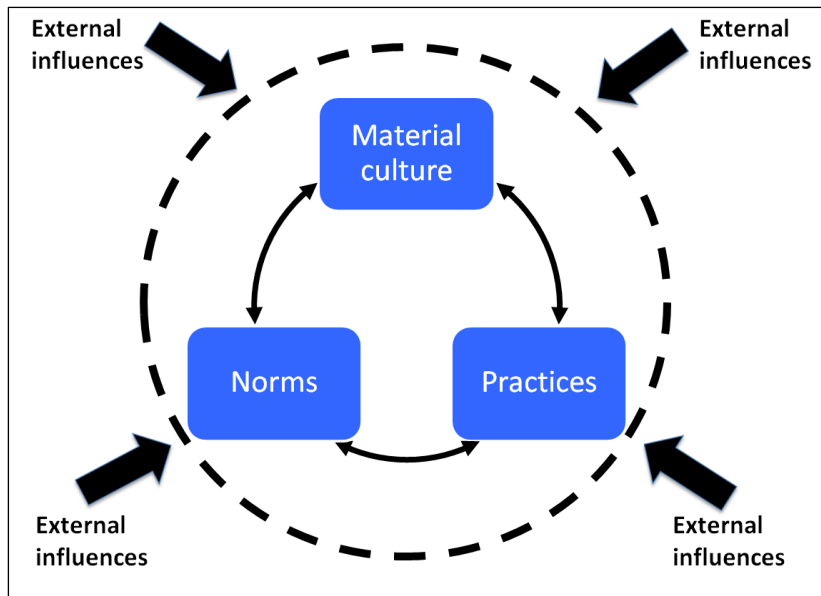
2.1 MOBILITY CULTURES

As discussed in Hopkins and Stephenson (2014), the concept of ‘mobility cultures’ is a helpful framing for exploring factors involved in the stasis and change of automobility. The term ‘mobility culture’ has been applied in a range of, mainly urban, contexts (Klinger et al., 2013, Klinger and Lanzendorf, 2015, Institute for Mobility Research, 2013b). It is used to refer to the material and symbolic aspects of a transport system, in a particular socio-cultural setting, and an *“integrative approach incorporating both habitual practices, including underlying preferences and lifestyles, as well as rather objective and structural components such as infrastructure and spatial characteristics”* (Klinger et al., 2013: p.21).

The ‘Cultures’ Framework (Figure 1, Stephenson et al., 2010, Stephenson et al., 2015), adjusted in relation to ‘mobility’ (Hopkins & Stephenson 2014), provides a useful structure to explore the ways in which automobility can be reinforced or reduced through influences at a structural level as well as through the decisions and actions of individuals. Transport is a significant contributor to energy sector GHG emissions and energy consumption, but its adaptation to ‘mobility culture’ turns the focus of this cultural framing from energy outcomes to mobility outcomes. The framework (Figure 1) suggests that cultural influences on individual mobility derive from the interactions between their practices (e.g. everyday mobility activities), norms (e.g. expectations about mobility) and material culture (e.g. access to or ownership of mobility technologies such as a car or bicycle). These in turn are influenced by external factors over which the person has little or no control such as the existence of public transport infrastructure, the price of fuel, or policy and regulations.

The dynamic nature of the ‘mobility culture’ concept is of particular interest here. The framework suggests that car-dependency is replicated where the three core elements are aligned to automobility; but that change in any one of these elements may lead to less car-dependency and a tendency to influence other elements away from automobility. This is not to say that any one factor (material culture, norms or practices) alone would result in a new mobility culture, but rather that the misalignment might contribute to shifts in the other elements of the framework, and lead to a condition where change is possible. External influences (i.e. those over which the actor in question has little or no control) can lock-in a culture of automobility, or drive change in one or more of the internal elements away from car dependency. The dotted line in Figure 1 represents the fluid and dynamic relationship between the inner and outer; which may change dependant on the scale at which the Framework is applied.

FIGURE 1 The ‘Cultures’ Framework



Source: Stephenson et al. (2015)

In this paper we analyse our interviews in light of the factors identified by Hopkins & Stephenson (2014), and then relate these to the ‘cultures’ framework, which is helpful in inviting structured consideration of the role of the external environment in shaping norms, practices and material choices. The framework also aids the researchers in expanding upon and developing the original table, a key contribution of this paper.

The value of applying this framework to the present research is as an analytical tool enabling a deep exploration of the physical, socio-cultural, economic, and policy contexts that coalesce to construct a ‘mobility culture’. Moreover, the ability to apply this model at different scales (e.g. from cultural influences on individual mobility, to national-scale ‘mobility cultures’) has clear benefits when examining the replication and reduction of the hegemonic mobility culture at a system-wide level. While it is beyond the capacity of this paper to do justice to the vast literatures on the process of diffusion, there is a strong tradition of research examining the diffusion of energy-related innovations (e.g. Darley & Beniger, 1981), and social norms (e.g. Nickerson, 2009). It is also well-established that the embeddedness of an individual or social group within a specific cultural, socio-spatial and material context can contribute to the diffusion and adoption of new practices. Indeed Gelfand and Jackson (2016: p.177) identify norms in particular as ‘mechanisms for adaptation’ which consequently can become “*a means by which cultures can evolve in changing socioecological conditions*”. Furthermore, norms can have an indirect effect; for instance, the common behaviour of people (descriptive norm) in one country can affect a moral judgement (injunctive norm) of a behaviour in another (Eriksson et al. 2015), thus contributing to the diffusion of normative practices across scales. The concept of

mobility cultures builds on this literature by inviting a focus on norms as well as the practices and materiality of automobility,

2 METHODS

A qualitative research approach was adopted to elicit in-depth, detailed perspectives on automobility. Interpretivist, qualitative studies are particularly valuable for uncovering the lived experience of the research participants (Røe, 2000), and for understanding the complex nature of travel and travel behaviour (Clifton and Handy, 2001, Handy, 2002). The empirical research involved semi-structured interviews with 18-35 year olds. The participants were not sought to be representative of either a 'replicate' or 'reduce' mobility culture, but rather to gain a heterogeneous range of mobility cultures that provide some insights into the characteristics that might replicate or reduce a particular pattern of mobility (e.g. motorised transport). This paper presents meta-cultures of replication and reduction, which can exaggerate the existence of these characteristics within the sample. Participants were recruited through educational and employment organisations, as well as posters in community centres. All participants were entered into a draw to win one of three NZ\$100 supermarket vouchers.

The interviewing approach was employed to explore the participants' experiences, perceptions and opinions (Patton, 2002) of transport, modality and car-dependency. Both drivers and non-drivers were included in the sample, defined by the level of drivers' license held, car ownership and/or access, and self-identification as a driver or non-driver. For example, some participants with a full driver's licence and access to a vehicle still perceived themselves to be a 'non-driver'. A total of 51 interviews were conducted between July and September 2014 (Table 2), in three locations: 17 in each of the cities of Auckland and Dunedin, and 17 interviews with participants who had grown up in rural New Zealand, these interviews were conducted in Auckland, Dunedin and Balclutha, a small rural centre (Table 3). We were interested in whether rural or urban upbringing might affect automobility norms (Licaj et al. 2012) and therefore sought participants who had grown up in both urban and rural contexts.

The interviews lasted between 18 and 71 minutes, with a mean interview length of 38 minutes. Participants were asked a series of questions relating to daily travel practices and decision making, modal choice, and perceptions of different transport modes. In order to explore how the participant's practices changed over time, questions asked the participant to reflect on past, present and future mobilities, and the factors that determined decisions such as mode choice.

TABLE 2 Summary Table of Participant Characteristics

Location	Gender (% female)	Average age; and age range (years)	Occupation (%)	Licence (%)
Dunedin	65 (n=11)	25; 19-35	Student FT = 18 Employed FT = 53 Employed PT = 24 Unemployed = 5	Full = 35 Learners = 35 None = 30
Auckland	59 (n=10)	24; 18-34	Student FT = 24 Student PT = 12 Employed FT = 40 Unemployed = 24	Full = 35 Restricted = 6 Learners = 24 None = 35
Rural	35 (n=6)	20; 18-31	Student FT = 82 Student PT = 6 Employed FT = 12	Full = 24 Restricted = 24 Learners = 24 None = 28

Key: FT = full time, PT = part time.

TABLE 3 Interview Locations and Details

Location	Number of interviews	Location	Details
Auckland	17	North Island, NZ	Auckland is New Zealand's largest city, and has a population of 1.42 million, and a density of approximately 2,500/km ² .
Dunedin	17	South Island, NZ	Dunedin is a University city on the South Island of New Zealand with a population of 118,000, and a density of approximately 38/km ² .
Balclutha	17	South Island, NZ	Balclutha is a town on New Zealand's South Island. It has a population of 3,900 and a density of 3/km ² .

The audio transcriptions were uploaded to Nvivo10 software, a valuable tool for aiding qualitative analysis, which allows the researcher to become familiar with the interview material in order to code confidently (Basil, 2003). The coding process used thematic analysis, with a focus on identifying factors that were associated with the replication and reduction of automobility norms, and more specifically drawing from the seven themes presented in Table 1. Once the themes were identified, they were then analysed in relation to the elements of the Energy Cultures Framework; determining the material culture, practices, norms and external context that were replicating automobility, and those that were reducing automobility. From here, the findings are presented along with a revised table, and these findings are discussed and interpreted in light of the Energy Cultures Framework.

3 FACTORS THAT REPLICATE AUTOMOBILITY NORMS

Using the process of analysis described above, we empirically developed and extended the modified replication and reduction table (Hopkins & Stephenson, 2014, Table 1), and present a revised table based on evidence from the interviews (Table 4).

In relation to automobility replication, we found that many of the interview participants expressed traditional conceptualisations of independence, freedom and autonomy in relation to car use and learning to drive. Freedom to travel without scheduling constraints and at more convenient times than those of public transport were perceived to be important features replicating a culture of car dependency. Car use, interviewees stated, also allows for flexibility in daily scheduling and multitasking on trips. For example, one participant noted that by being able to drive to work, despite living within walking distance, she could make productive use of lunchtimes and journeys to run errands such as supermarket shopping. This framing of efficiency, manifesting through multi-tasking, may serve to replicate automobility norms.

“... I’d like to get a University [staff] car park and then I’ll be driving to work again. Just for the extra flexibility. You know I can go out and do a full load of groceries in my lunch break...”
(Hannah, aged 25)

“It’s [car travel is] just the freedom of being able to travel” (Bonnie, aged 29)

Enjoyment of driving was also a factor contributing to driving behaviours, and this reinforces how car-dependence is driven by more than functional use. Multiple meanings were attached to vehicles which went beyond their utilitarian significance.

“Well it’s not just a mode of transport. It’s a storage area and it’s an escape vehicle... It’s being prepared. It’s arriving somewhere and someone says ‘Oh anyone got a pen?’, ‘Anyone got a headlamp?’, ‘Anyone got, a tarpaulin?’, ‘Yep got that’ [Laughs]” (Hannah, aged 25)

Driving also was seen as necessary in order to take part in social activities, and to have ‘more of a life’ than would be possible without driving.

“I guess it lets us do more stuff than we would be able to if we were restricted to walking or cycling or the bus. So basically it gives us more of a life. That’s kind of how I would see it”
(Hannah, aged 25)

Recreational activities in rural or ‘out of the way’ locations were particularly noted as requiring personal use of a car, such as skiing, motocross, hunting and tramping². Without a car, these activities were perceived to be harder to participate in. Living in rural locations appeared to enhance car dependency and replicate the associated needs for car-based travel through a lack of alternative transport modes, and reliance on parents or family members. During adolescence, social events

² Walking or hiking in the hills and mountains.

moved away from the home or school environment, this thereby increased the perceived need for private car transport in order to participate.

"[Growing up] it [driving] was the only way that I could kind of get out and have my own social life and the freedom of that because being stuck in the countryside, I was reliant on my parents and picking me up and dropping me off places if I wanted without having my own car" (Albert, aged 30)

Employment and employability appeared to replicate car dependency due to demands for licenced employees, and commuting to work. Many non-licence holders or those with a learner's licence spoke of needing a licence to find employment. Within the participant sample, 9% were unemployed, with others working in temporary or part time positions whilst looking for permanent employment. Many of these participants considered that learning to drive and car ownership were fundamental requirements for finding employment.

"[If I could drive] probably I would have got a job. I probably would have been able to apply for more jobs and go to more interviews, maybe if they won't employ me that reason [not being able to drive] at the moment. I feel like the whole living out of town and the transport thing is an issue... I might have had a job already by now if I had a car" (Lisa, aged 21)

Thus Lisa identified her inability to drive as a barrier to employment. While she was able to access the city centre by bus, potential employers frequently responded negatively to this, and often demanded a driver's licence. Rural participants similarly saw private transport as essential for employment. For one rural participant, driving and car ownership allowed him to study and work in two geographically distant places.

"I have to drive there, like from home and to [college] each weekend... I can come home and work on the farm and at my part time job. At the start of the year we're milking which was quite handy because I go up [to college] on the Friday night and milk and stuff like that through the weekend and so [I] get money" (Gerry, aged 19)

Another had considered other options but concluded that personal transport was essential, especially farm-based work, demanded private transport and would therefore replicate a culture of car dependency;

"Being so rural, it's kind of hard. I don't know whether you come up with a bus system or something but if there was something like that I'd probably take it. It's kind of hard being quite out there [rural] and in the future I'd probably most likely be up the High Country [central South Island] somewhere so travelling by myself in a vehicle is probably the only way to go really" (Maria, aged 19)

Perceived safety around using active or public transport modes also enforced a culture of car dependency for some participants, particularly those working non-standard hours (e.g. shift work, hospitality).

"I work quite late sometimes or I'm required to and haven't really been able to do that so it's a little bit difficult for me to perform my job because if I finish late, there's no way I'll want to

catch the train after 9pm even on a weekday in Auckland, I just don't feel safe" (Bonnie, aged 29)

While the use internet-enabled shopping, and home delivery, as well as online communications were identified as factors which could reduce automobility norms, this research also found evidence of a desire for physical interactions, and face to face communications that may replicate the need for private car-based travel, particularly if infrastructure, norms and values prioritise private modes.

"I'm kind of still a traditionalist in the way that I prefer like actual conversations for like catching up with friends, I'll use things like Facebook and texting to organise to meet up with people, or to Skype them but I won't like have a deep and meaningful conversation via text or via Facebook because there are still the subtleties that you can't get across" (Kenneth, aged 18)

The availability of parking close to the destination seemed to be an important influence on mode choice, and preference for private car travel for the interview participants. Perspectives on the availability of parking are highly place-specific. For example, participants driving to Dunedin's city centre were generally happy with parking provisions and perceived Dunedin to be a 'car-friendly city' whereas those who worked or studied at the hospital or University tended to express negative perceptions about parking availability and conveyed frustration with private car travel.

TABLE 4 Revised Table of Factors that Reduce or Replicate Automobility

Explanatory category	Reduce automobility	Replicate automobility
Perceptual factors	New conceptualisations of freedom which can be fulfilled through public and active transport modes. House location decisions factoring in access to key destinations by active and public transport modes.	Traditional conceptualisations of freedom reliant on private car travel.
Value and preference factors	Environmental consciousness and concern are used to prioritise low-carbon transport modes, and awareness of the environmental impact of transport mode choice.	Unaware or unable to consider the environmental impacts of transport mode choice, this could include 'tragedy of the commons' perceptions. Pragmatic use of vehicle to accomplish daily travel needs.
Social factors	Social norms prioritising active transport modes as healthy and environmentally conscious choices. Positive perceptions of public transport modes. Social norms of urban living and reliance on public transport.	Learning to drive as a 'rite of passage' for teenagers. Learning to drive as a necessary skill. Cars as a status symbol. Encouragement to learn to drive from friends, parents and partners.

Built environment factors	Easily accessible transport alternatives, transport hubs and multi-modal transport options. Housing close to urban centres and/or transport links, frequent and low cost public transport options, high quality active transport infrastructure.	Poor access to transport alternatives (e.g. AT/PT). Lack of active and public transport infrastructure and provision.
Economic factors	Conscious of the relative financial costs of travel (by car compared to other modes). Lack of disposable income to spend on car ownership or learning to drive. Changing priorities related to discretionary spending (prioritising overseas travel etc.). Rising cost of home ownership and saving for mortgage deposits. High rates of further education delaying regular income. Perceptions of relative transport costs between transport modes.	Financial support from family to learn to drive or gift a vehicle, prioritising car dependency. Prioritisation of traditional choices, disinterest in overseas travel. Perceived need of private transport for employment or to increase employability.
Legal/ policy factors	Perceived difficulty, time commitment and hassle associated with learning to drive. Illegal driving practices reducing the perceived need for licencing.	Perceived ease of learn to drive process. Perceived affordability of licensing.
Technological factors	Use of the Internet for shopping, and reducing the need for private car travel to access shops or carry heavy goods. Use of social networking to communicate with friends but not to substitute travel, using Information and Communication Technologies to arrange meet-ups and social events.	Preference for personal shopping and potentially out-of-town shopping centres. Preference for face to face communications.

4 FACTORS THAT REDUCE AUTOMOBILITY NORMS

From the interviews we also found evidence of factors contributing to the reduction of automobility norms. Freedom, flexibility and autonomy are traditionally associated with automobility, but in this research, some interviewees used these concepts to explain their (active or passive) non-participation in the car-dominated transport system. Independence, interviewees stated, can be gained without a private vehicle as long as the public transport network is regular and efficient. Thus for Arianne, independence wasn't associated with private transport, but with the availability of transport modes to suit individual needs.

“Well you could have independence by living somewhere with decent public transport so you’re not tied to a very sparse timetable. You can pretty much plan on being able to go where you want to go, when you want to go” (Arianne, aged 32)

A similar view was also articulated by Aiden, who noted improvements in public transport systems in urban centres, and argued that because of this, the car is not the only way to have the freedom to move around the urban environment.

“I think being more urbanised, and because public transport and stuff is improving, even though it’s still got a long way to go. I think we don’t necessarily associate the car with freedom anymore, it’s not the only way to be free and move around” (Aiden, aged 18)

One participant identified a sense of freedom from *not* owning a car, and from being able to select the most appropriate mode for the particular journey type.

“I think that there’s a lot of freedom in not needing to have to drive a car. There was an idea since the fifties that to be free and to be an individual you needed to drive a car. But for me, living in the 21st century, freedom is actually being able to catch public transport anywhere or being able to cycle anywhere and not being bound by one transport mode” (Kenneth, aged 18)

The articulation of freedom emerging from these participants is that it is not tied to using a particular transport mode, but rather in having access to a range of modes and choosing the most suitable mode for the trip purpose. Freedom from the cost of vehicle ownership was also identified by one participant:

“Everyone at work is whingeing that their WOFs [warrant of fitness] are due, and registration, and fuel going up. I pass the fuel station every day and I see it go up and down, and when it goes up considerably, I know there’s going to be a lot of whingeing that night. It just doesn’t affect me” (Bryan, aged 27)

The acceptance of shared mobility appears to be an important factor in reducing car dependency norms. Participants discussed how their social networks, families and colleagues would help them to achieve their mobility needs. While shared mobility is still reliant on access to a motor vehicle, it may indicate an appetite for car sharing, for example when commuting. Participants without a car or driver’s licence spoke of using a range of social, personal connections to move within and between their urban and rural places. For example, for some participants, the availability of parental chauffeuring appeared to reduce not only the desire to learn to drive, but also the desire to get a licence. Many non-driving participants spoke of relying on parents to help with journeys to study, work or socialise, even where they live away from their family home.

Participant: “Monday to Friday, going to work, my parents go back and forth. They work at the University and I work on the one-way street... So most days get a ride with them. I mean they’re going to work, I’m going to work, go with them.” Interviewer: “And do you naturally leave around the same time?” Participant: “Well, I kind of just leave when they leave. Like my hours are pretty flexible so just go when they go. There’d be like a five minute inconvenience at most” (Nicolas, aged 23)

The built environment and home location appear to have a significant impact on car dependency, and the perceived *need* to drive and own a vehicle. Participants' reflections show how car dependence can relate to the proximity of their home to work, study and social locations.

"A couple of my friends don't have licences... But some of them live very close to the university, they don't need a car. But I feel like I do need a car because of where I live and if I want to get a job and move away from studying" (Lisa, aged 21)

Saturated road transport infrastructure appears to contribute to a less appealing transport reality and this may encourage people to explore alternative transport modes. One example relates to parking, with participants discussing the stress associated with locating a parking space close to work. Yet changes to work parking provisions led one participant to start cycle-commuting, and eventually to the sale of his car. Making driving infrastructure less automobile-friendly (e.g. reduced parking availability or removal of free parking), may motivate some individuals to seek out alternative modes, particularly those with aspirations and expectations aligned with active or public transport modes.

"It [starting cycling] was almost by accident. When I got a job that parking wasn't free, it made me think what other methods I could do to actually get to work without paying all the parking permits. Cycling racks were freely available so I gave it a try and ended up only driving to work a couple of days a week and it's slowly kind of gradually crept up on that. Then eventually I sold my car because I was finding I was only using it once a fortnight or so" (Albert, aged 30)

While the built environment, including transport infrastructure, was an important influence on both the replication and reduction of car dependency, it was evident that many of the non-drivers interviewed were strategic in designing their lifestyles and choosing to live in areas that could still provide mobility access. The necessity to live somewhere with good transport connections was identified as particularly important for non-drivers and non-car owners. Through this process, a virtuous cycle was created whereby the need to drive was also diminished, reducing car dependency norms in the long-term.

"I've just kind of shaped it so that I live in places in Dunedin that are close to everything so I don't need to drive" (Anna, aged 31)

Environmental concerns did not seem to be a major factor in reducing automobility, but some participants provided evidence of general awareness of the environmental impact of driving, and reported that this awareness contributed to a reduction in automobility practices in some cases, usually when combined with other factors such as financial savings and supportive infrastructure. Some interviewees differentiated between the existence of cars and the ways in which cars are generally used. For example, one participant argued that sole occupier vehicles are not an appropriate transport choice.

"Ideally I would want to be able to get to everywhere I wanted to by public transport, just because it's kind of stupid just for me to have a car that I just use by myself [Laughs]."

Interviewer: "So why do you think it's stupid?" Participant: "I don't know, one person in a car, using heaps of petrol" (Joanne, aged 22)

And for one participant, greenhouse gas emissions were a feature in modal choice decisions.

"Obviously driving is carbon emission heavy and if it is actually a short distance, you don't need to drive. And the bus is super convenient and you don't have to worry about parking and stuff; you just get off the bus and walk to your class" (Lyndsay, aged 24)

The cost of car ownership, running and maintenance also contributed to mobility practices that favoured alternative (non-private vehicle) modes. For example, Joanne chose to not own a vehicle because of the costs associated with car ownership, and due to alternative financial priorities.

"My car was a very old Honda and basically just stopped getting a warrant³, it couldn't get a warrant. So I took it, sold it for scrap and then decided not to use my savings on getting a new car because I'm trying to save." Interviewer: "What are you trying to save for?" Interviewee: "Travel. I figured let's try living without a car because it does take up a lot of money. It's been going fine and I'm saving more" (Joanne, aged 22)

Non-driver or non-car owner status offered a range of additional money saving benefits which were identified by the research participants, which go beyond car ownership costs to include the activities undertaken with a car. Joanne goes on to state that spending is reduced through decreased spontaneity, travel and discretionary spending such as shopping trips.

"The fact that I don't have a car means I'm not doing spontaneous trips to little places, meaning that I can save more money. So if I didn't have savings goals then it would be annoying that I can't go out to the Peninsula, go to the beach to go for a swim or something just whatever I want to do immediately. So right now it's actually working out really well because it's cheap [Laughs]. That's what I'm looking for" (Joanne, aged 22)

The Internet was also identified as a means through which shopping could be achieved without requiring car-based travel, particularly for heavy items or during particularly busy periods.

"If it's going shopping or something like that and you need a car to take your stuff home, I get online shopping delivered so I don't have to go and pick it up" Interviewer: "So is that food shopping?" Participant: "Food shopping yeah, or other stuff as well, sometimes clothing and stuff. You can get it delivered. I do go the mall as well but when I'm busy and working a lot, I use online stuff in lieu of driving somewhere." (Donna, aged 30)

5 DISCUSSION: THE MOBILITY CULTURES OF REPLICATION AND REDUCTION

The research reported in this paper used a qualitative approach to explore the range of factors that contribute to the replication or reduction of automobility. The sample consisted of young adults (18-35 year olds) from Aotearoa New Zealand, and included self-identified drivers (e.g. with a driver's licence) and non-drivers (e.g. without a driver's licence, or with a licence but not driving). Using the

³ The Warrant of Fitness (WoF) is a motor vehicle road safety and roadworthiness test, similar to the MOT in the UK, and the Shaken in Japan.

findings from the generation Y interviews, we revisited the findings from the literature review on factors leading to stasis or change in automobility (Hopkins & Stephenson 2014, summarised in Table 1). Table 4 summarises the factors that the interviews suggest may be leading to replication and/or reduction in automobility, using the seven modified categories from Table 1.

The findings identify a number of change trends which could contribute to new perceptions of private car travel, and could lead to reduced automobility norms for some people. The empirical material provides evidence of new interpretations and meanings of independence which could challenge the hegemony of automobility. The interviews suggest that in some cases, independence could be associated with multi-modality, and that freedom can be associated with the absence of car ownership and its associated costs. This new articulation of freedom and independence could be a powerful norm reducing automobility preferences. Moreover, where daily mobility needs can be accomplished without a private vehicle or driver's licence, this appears to decrease the perceived need to participate in automobility and thereby increase preference for active, public, and shared transport modes. Yet there are considerable interactions between materialities, practices and norms of the research participants on both individual and aggregated scales, as well as further factors emerging from the external context that impact upon the agency of the individual to make mobility decisions.

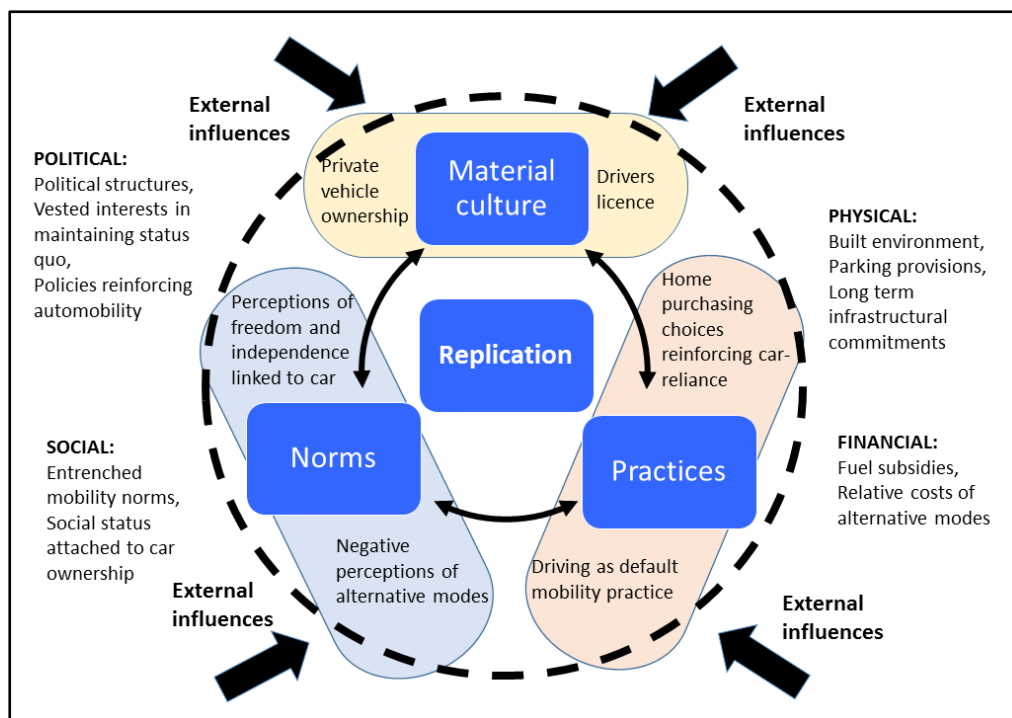
The Energy Cultures Framework (Figure 1) provides a helpful lens through which to further consider how these factors interplay to consolidate or destabilise car-dependency amongst the participants. Taking the three core elements of the framework and the external context, we depict two idealised mobility cultures: a traditional mobility culture which replicates automobility, and an emergent mobility culture in which automobility norms are less prominent. The empirical material, in conversation with academic literatures, presents a range of internal and external factors that can contribute to stasis and change in traditional mobility cultures. Features of the external context were not always explicitly identified by the research participants, however the interviews suggest four key dimensions of external factors that are likely to exert pressure on the mobility culture; political, physical, financial and social factors (Figures 2 & 3). The two archetypal mobility cultures depicted in these figures are not intended to suggest that individual interviewees fell into only one or other of these 'culture groups', but rather they are generalised representations of traditional and emergent mobility cultures deriving from content from all of the relevant interviews.

5.1 *The Traditional Mobility Culture of Automobility Replication*

A traditional mobility culture, replicating automobility trends including car-dependent mobility practices, was evident in many of the qualitative interviews with generation Y. Figure 2 depicts the

material culture, practices and norms that are part of this culture, and highlights some external influences which can perpetuate or even ‘lock in’ this mobility culture. The material culture is dominated by a driver’s licence and its implied competencies, and vehicle ownership or access. These materialities can contribute to auto-centric mobility practices, and reinforce the norm that automobility provides freedom and independence. As a result of car use, choices of home location are less constrained by proximity to work, school, or leisure locations. Instead, concerns such as availability of car parking may contribute to modal choice and trip necessity decisions. This circular logic can work to reinforce car-dependence as geographically distanced locations will contribute to the need to drive and decrease the likelihood of seeking alternative transport modes. This can be reinforced further by the physical environment (e.g. the availability of transport infrastructure and services) and relative costs of driving compared to other transport modes. For instance, if the infrastructure incentivised active and public modes, and dis-incentivised car-based travel, it could contribute to a fracture in the traditional mobility culture or destabilise its hegemony.

FIGURE 2 A Traditional Automobility Culture



Norms associated with the traditional replication of automobility may include negative perceptions of alternative modes. For example, some participants who drive to work, live walking distance to work yet they highlighted the inconvenience of active transport modes:

“I always thought [that] maybe I could start walking to work. But then it’s kind of a dilemma of walking home up the hill. And if I have things to do like during the day at lunchtime, I have to pop away and do something. It’s just inconvenient” (Mary, aged 28)

Perceptions of driving as ‘private time’ between home and work, along with perceptions of the car as a private space may also replicate automobility and reinforce private car use, thus decreasing the likelihood of uptake of car-sharing or ride-sharing opportunities. An important norm associated with the replication of automobility norms appears to be the traditional perceptions of freedom and independence intertwined with driving and car ownership. Automobility and freedom are often viewed as synonymous, and a norm of perceived ‘autofreedom’ (Meyer, 2015) was strongly represented by the research participants. Social expectations that young people *should* learn to drive as a ‘rite of passage’ into adulthood, may contribute to parents supporting the cost of driving lessons and providing vehicle access. This could enforce automobility, by creating an external context that prioritises the skills and materialities of an auto-centric mobility system.

5.2 An Emergent Mobility Culture of Automobility Reduction

While traditional ‘autofreedom’ perceptions were evident in this research, so too was a counter perspective; alternative conceptualisations of freedom contributing to a new ‘multi-mobilities’ culture that is reducing automobility (Figure 3). This mobility culture utilises a wide range of material items to help to facilitate mobility. This includes artefacts such as bicycles, rain jackets, bus passes and walking shoes, as well as an internet connection which can simplify the use of public transport modes or substitute physical mobility. These materialities contribute to mobility practices centred on multi-modality, or a preference for active or public modes. Home locations can be influenced by proximity to key locations (e.g. work, school) as well as access to public transport. Consequently, a supportive external context can be important in ensuring that housing and transport infrastructure allow for these mobility decisions to be made.

The norms supporting this emergent mobility culture may include awareness of the carbon intensities of transport modes, an interest in increasing physical activity, and aspirations to dematerialise. Practices in this mobility culture are characterised by use of a range of transport modes, rather than a single mode. This difference in modal choice between the mobility culture of replication and the mobility culture of reduction is articulated by Nicolas who states that:

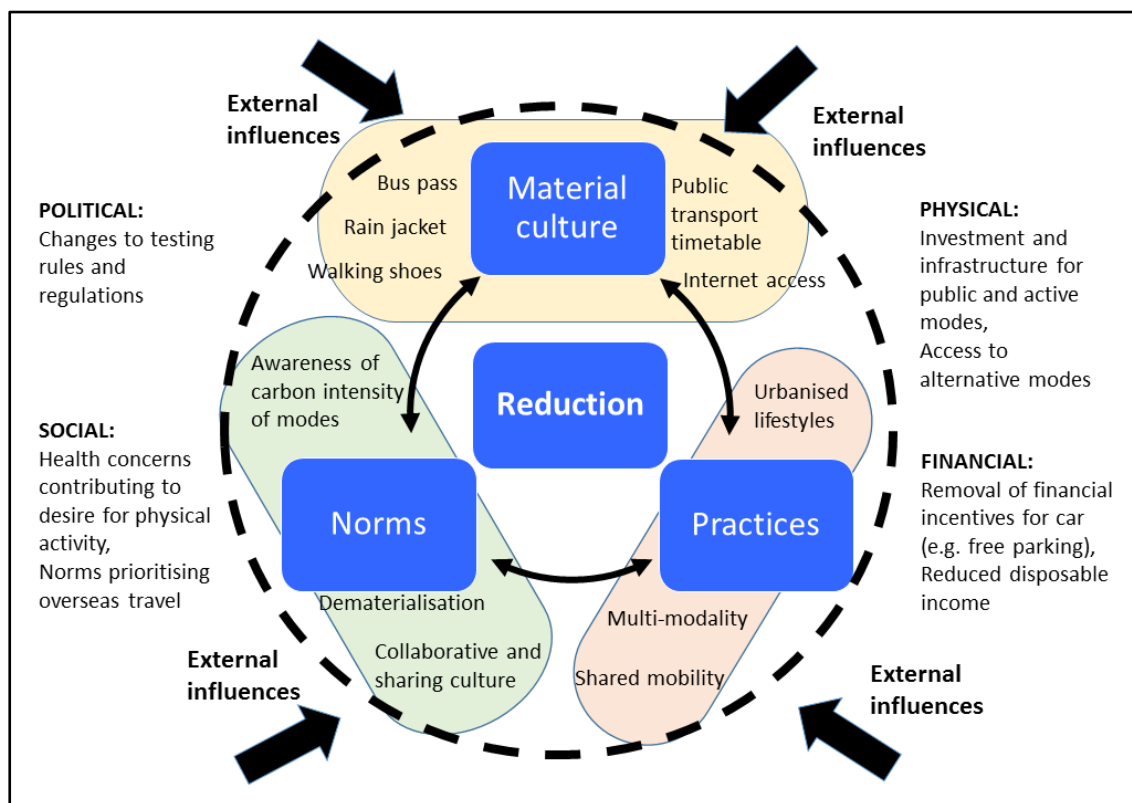
“If you don’t have a vehicle and you want to get somewhere you have to consider the other options... For the most part if you don’t have a car, you’ll kind of think like “what is the best way to get here?” And often the best way is very easy and it could be like walking, taking the bus or a friend is going. Whereas if you have a car, I feel... like people [who] have a car don’t even consider, they just get in the car and go there” (Nicolas, aged 23)

This perception was widely articulated by non-driving research participants, who argued that car owners will default to car use, whereas non-drivers and those without a personal vehicle are more likely to explore the range of transport mode options for a particular journey. This might suggest that

the role of ‘habit’ could be more influential for the traditional culture of replication than for the emergent culture of multi-mobilities. While the role of habit is well-established in transport literatures, further qualitative research comparing the habits of drivers and non-drivers would be a welcomed addition.

A range of external factors could also be contributing to the destabilisation of automobility (Figure 3). This heterogeneous group of influences is creating a context in which alternative mobilities are enabled and performed. For some, a declining disposable income resulting from an unstable job market is disincentivising learning to drive, and making vehicle ownership unachievable. For others, competing interests such as overseas travel, desire for home ownership and higher education challenge automobility norms, and promote new thinking about transport and travel. The nature of transport infrastructure is also influential, with one participant changing to an active mode when free parking was removed from his city centre workplace.

FIGURE 3 An Emergent Multi-Mobility Culture



6 CONCLUSION & IMPLICATIONS

Climate change mitigation responses demand drastic reductions in the CO₂ and other GHGs emitted into the atmosphere. Private transport represents a significant proportion of these emissions, and in

some cases, there are clear low-carbon alternatives available (e.g. active and public transport). The system of automobility has locked-in car dependency in many industrialised countries, and increasingly in emerging economies. However, the research presented in this paper provides evidence of a counter multi-mobility culture, challenging the hegemony of automobility. The paper empirically builds upon previous work presented in a *Journal of Transport Geography* research note, and extends the factors that could replicate or reduce automobility for generation Y. The research presented in this paper relate to a select number of participants of generation Y in New Zealand. It is not clear from this research whether these results would be relevant for other age groups and generational cohorts. Future research might build upon this research to investigate the replication and reduction norms amongst older generations. Of particular interest could be the baby boomer generation, for whom licensing and vehicle kilometre travelled are increasing in many contexts.

By applying the energy cultures concept to the empirical material, two overarching archetypal mobility cultures are presented. Developed from the interview material, the two mobility cultures present the material culture, norms, practices and external context that could be replicating or reducing automobility. Research to date has highlighted the foundational norms (e.g. autofreedom) that fit with automobility and secure its hegemony. However, this research provides evidence of emerging norms, including new conceptualisations of freedom and independence, a desire to 'dematerialise', increasing willingness to share transport, and a range of competing priorities, that each destabilise automobility. Drivers of these new norms are varied, but may be collectively reaching a 'critical mass' whereby they are resulting in some nations in declining rates of car use amongst youth, potentially the start of a significant shift in a longstanding and previously self-replicating culture of automobility.

These findings have wide ranging implications. For instance, they provide evidence of interest in multi-modal transport systems, and the capacity of this to achieve desires for independence and freedom. This finding suggests that transport policy and planning should be looking beyond car-based infrastructure, and that paying attention to the external influences which are replicating (Figure 2) or reducing (Figure 3) automobility could assist in more targeted approaches to encouraging the emerging multi-mobility culture. For example, further investment in cycle lanes and walking infrastructure could contribute to increasing the uptake of active transport modes in lieu of private car transport. Additionally, the emergence of new norms, practices and mobility materiality in peoples' lives provides fertile ground for multi-mobilities becoming a self-replicating mobility culture in a similar way to which automobility has in the past.

The qualitative research presented in this paper relates to generation Y New Zealanders, and is not broadly generalisable to other countries and age groups. However, since generation Y change trends have been identified in a number of industrialised countries, similar meta-cultures of reduction and

reproduction are likely to be evident, yet with country-specific attributes. Further research is necessary to determine the similarities and differences across these countries, and this approach could contribute to a better understanding of why these change trends are evident in some industrialised countries but not others. Moreover, through increased understanding of the interplay between the personal and contextual factors that replicate or reduce automobility for generation Y, interventions to promote the growth of multi-mobility cultures can be designed.

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