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Older learning engagement in the modern city

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ABSTRACT

This research employs novel techniques to examine older learners' journeys, educationally and physically, in order to gain a 'three-dimensional' picture of lifelong learning in the modern urban context of Glasgow. The data offers preliminary analyses of an ongoing 1500 household survey by the Urban Big Data Centre (UBDC). A sample of 1037, with 377 older adults aged 60+, was examined to understand older learner engagement in formal, in-formal, non-formal and family-learning contexts. Preliminary findings indicate that all forms of older learning participation are lower than younger and middle-age counterparts. However, there is a subset of 'actively ageing', socially and technologically engaged older adult 'learner-citizens', participating in educational, physical, cultural, civic and online activities (including online political discussions and boycotts). These older learners were more likely to be working, caretakers and report better health overall. Long-term disabilities were associated with less engagement in non-formal learning activities. Additionally, engaged older learners' GPS trails show more city activity than their matched non-learning-engaged counterparts. Place-based variables, such as feeling safe and belonging to the local area, moderated adult participation in learning activities. The full data-set will be accessible to researchers and the general public via UBDC, providing a complex data source to explore demographically diverse learners' within an urban context.

Introduction

Learning in later life has been well researched by psychologists, sociologists, educationalists and gerontologists over many decades, and there is much rigorous academic work that has helped to debunk some of the popular stereotypes surrounding the decline of cognition, activity and overall engagement of older persons. Findsen and Formosa (2012), for example, have presented theoretical and empirically grounded work concerning implications for policy-makers and practitioners in terms of practice in their handbook on older learning, and this text provides an overview on the historical, epistemological, philosophical and gerontological aspects of the topic as well as implications for policy and practice. The present

paper uses a large-scale quantitative survey, followed by GPS tracking to empirically examine the active engagement in learning, civic/community life and mobility of older persons in the city of Glasgow.

Mayo (Ibid.) suggests research around older adult learners is itself an important catalyst for social change, to examine older learners as 'social actors' in their own learner journeys, as opposed to more 'pathologising portrayals' of older adults in a state of decline:

> Adult education is also replete with literature in which older adults learn and impart the fruits of their learning, resulting from a social construction model of old age. This is one that can make them react politically and collectively to disabling environments, often in the form of older adults' movements or political parties. (Mayo cited in Findsen & Formosa, 2012, p. xiii)

Such research must also acknowledge the complex interaction of socio-economic status (SES), geographic place and personal factors, such as disability, on participation for this diverse demographic group of learners (Ibid.; Osborne & Houston, 2012).

This paper will present an overview of empirical work surrounding the individual and community benefits of older adults engaging in lifelong learning (LL). It will then discuss the role of learning cities' promotion of cultural and civic engagement in urban settings for older learners. Finally, it will present the work of the Urban Big Data Centre at Glasgow (UBDC), analysing preliminary data from its integrated Multimedia City Data (iMCD) Project specifically in relation to older adults' recent participation in various types of learning, cultural and civic engagement and physical mobility in and around the city of Glasgow (using GPS). Before examining some contemporary empirical work on older adult cognition, learning engagement and civic participation, we first address the concept of the 'older' learner.

Older learning

Findsen and Formosa (2012) point out that much policy and practice in the field of adult education, most notably widening participation to Higher Education, tends to be focussed strongly on younger people and young adults. Indeed they argue:

> … lifelong learning policy and research tends to remain located in, and around, the younger and adult 'territories' of the life course. Older adults are generally excluded from both theoretical and empirical analysis on the assumption that their advanced calendar age is not sufficiently unique to generate new knowledge trends in lifelong learning. (2012, p. 1)

One example in the UK illustrates this phenomenon. According to the Universities and Colleges Admissions Service (UCAS, 2015), in the UK, a mature student is defined as anyone aged 21 and over at the start of their studies. According to the most recent UCAS analyses, UK acceptances for mature students (to full-time undergraduate programmes) have improved over the previous year, but remains on average 5% lower than acceptance rates prior to 2010 (UCAS, 2014). Acceptances for 18-year olds remained largely unchanged (Ibid.). The report summarises:

> Offer rates to applications from these older age groups fell sharply between 2008 and 2011. Offer rates have increased since 2011, and increased further in 2014, but not by enough to offset the earlier falls. Offer rates to the older age groups remain substantially below previous levels, in contrast to younger age groups. (UCAS, 2014, p. 26)

Of those who are successful entrants, UCAS (Ibid.) presently estimate that approximately 40% of these adult entrants are over 30 (with 10% over 40) and many have family, work and life commitments that may interfere with progression and retention, particularly for mature

female students (Solomon, 2012; Stone & O'Shea, 2013). Research into the area of widening access and increasing participation to formal undergraduate programmes, has disproportionately focused on young adult learners (e.g. Gallacher, 2006). Whilst progress has been made in levelling out inequities in access to tertiary – Further (FE) and Higher Education (HE) – stratifications and inequities in adult learning persist, and in some instances are worsening, with limited funding translating into progress for some groups and disadvantage for others (Ibid.; Layer, 2005). The present paper will focus on participation inequity within and beyond formal learning, addressing non-formal, informal and family learning participation gaps.

In terms of operationalising 'older' learners, a general consensus in western gerontology and social psychology literature indicates the age of 65 as the beginning of 'old age', based on physiological as well as political and policy changes in the life span (World Health Organisation, 2015). This distinction leads to a disparity in the literature between those researching 'mature' students (21+), and those examining 'old' or 'older' adult learners (usually, 60, 65 or 70+). According to a review of peer-reviewed publications in the area of older adult learning, it was found that older adults generally were portrayed as a largely homogenous group, with a hesitation to delineate chronological age ranges for research, and instead using terms such as 'post work' (Chen, Kim, Moon, & Merriam, 2008). This review also reports that gendered and SES implications are largely ignored, as well as those of disability.

However, Chen et al. (2008) acknowledge the double-edged sword of portraying older learners homogenously as motivated and capable learners. They highlight the variation in barriers to learning which include physical health, aptitude with technology and openness to change. Githens (2007) addresses this issue by directly considering the heterogeneity of older learners, and challenging traditional concepts of 'retirement' and points out the particular relevance of technology for adult learners and the need to overcome persistent stereotypes of 'the elderly' as technology-phobic and resistant to change:

> E-learning and distance education can play a role in helping older adults become integrated with the rest of society. As demographic and cultural changes affect the place of older adults in society, online learning programs become increasingly appealing to older adults. (Ibid., p. 239)

Roberson and Merriam (2005) discuss forms of older adult learning engagement, and note that such learning may take place in a formal educational setting (such as Further or Higher Education programmes), happen non-formally outside institutions of learning, but still within a structured setting (they give the example of Elderhostel programmes), but that the most pervasive is informal learning (which they define as non-classroom based, self-directed learning activities). They examined qualitatively the experiences of older adults undertaking self-directed learning in rural environments and concluded: 'The findings indicated changes in late life, especially those related to time, family, and loss are integral to the process of self-directed learning' (p. 269).

The present article examines whether such life factors as time commitments, family involvement and caretaking are relevant as 'barriers', and possibly even 'motivations', for undertaking learning in an urban context. Additionally, it retains the focus on not only enrolment in formal courses leading to qualifications, but also non-formal learning undertaken in a structured way (but not leading to formal qualifications) and informal self-instigated (although not necessarily independent) learning, as well as activities that take place specifically in a family setting (termed *family learning*).

Benefits and costs at a national level

The literature concerned with why adults learn is longstanding and extensive, and it identifies a number of factors as potentially important. Osborne (2014) highlights two main reasons that adults themselves express for participating fully in LL activities: cognitive interest and employment/employability. However, he further highlights two often under-estimated potential motivations for engaging in LL: health and community benefits. Such motivations and their potential benefits have been highlighted by a number of researchers in the UK, and are now widely accepted. For example, the Marmot Review (2010) identified strong correlations between health and engagement in learning. It identified education as a key predictor of adults' health, highlighting that poor educational outcomes can 'cast a long shadow' over one's lifespan. The review argues that LL is integral in reducing health inequalities:

> Studies of adults in their 30s and 40s show a correlating relationship between measures of participation in learning and outcomes such as life satisfaction and/or psychological wellbeing. (p. 1071)

Interestingly, the report argues that these effects stem largely from leisure activity learning, rather than work-based learning, a notion which will be examined in the older learners of Glasgow.

Various other empirical works, such as that of Feinstein and Hammond (2004), who analysed data obtained from the 1958 British Birth Cohort study, provide further support for such health benefits of education to adults. Again, it should be noted that good health may not only be an outcome of learning engagement, but also a precursor to engagement in the first place.

Despite such positive outcomes of older participation in learning, the present economic conditions within the UK and globally mean that education resources and financial support for widening participation, and supporting older learners is dwindling, particularly for those adults from less-privileged backgrounds (Findsen, 2012). In light of these findings, income and location of residence are analysed as key factors for participation in the present population.

Learning cities and older civic engagement

These broader conceptions of benefits of learning have recently become embedded in holistic urban models of learning, the most high profile of which is the idea of the 'learning city'. This concept has been in use for over two decades with authors such as Florida (1995) and Larsen (1999). Whilst these authors, and others, tend to emphasise business perspectives and the development of a learning infrastructure that would promote inward investment, there has been a parallel set of arguments about learning cities supporting learning networks, promoting and enhancing social cohesion/inclusion, and enabling empowerment and social justice (Smith, 2003). These are familiar themes in the lifelong literature as a whole. UNESCO (2013) has brought the learning city to the fore in this decade by establishing its Global Learning City Network, and identifying what it argues are their 42 Key Features. The model's 'pediment' speaks of these wider benefits of building a learning city, namely, individual empowerment and social cohesion; economic development and cultural prosperity; and sustainable development. Many of these factors are operationalised and

measured within the present survey (described below) and discussed in the preliminary analyses.

Alongside the push for lifelong goals in learning, there is similarly a drive for older adults' lifelong participation in community and civic activities. Such activities include the drive for volunteerism, which has been found to lead to similar physical and mental health as learning participation (see Gottlieb & Gillespie, 2008; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003), as well as delivering direct benefits to communities. There are parallels between educational and broader civic participation; McBride (2006) acknowledges that there are barriers to civic participation for older adults, which are largely in line with those for engaging in education, including physical, health, economic and social factors. She suggests that increasing institutional capacity is one method for overcoming obstacles to promote wider inclusion for this population, highlighting citizen action as a key human right. Zunzunegui, Alvarado, Del Ser, and Otero (2003) examined social networks, social integration and social engagement in relation to cognitive decline (in Spain). They found that social integration within community networks and ties with relatives were significant factors in preventing cognitive decline longitudinally for older adults. Having strong friendship groups were also a significant factor for the women in the sample, and friendships have been a noted component of successful outcomes for mature female learners (Solomon, 2012). However, Martinson and Minkler (2006) caution against a 'one size fits all' approach arguing that older adults should find the life balance that suits them (where in fact they have such a choice).

Much research is lacking on older learners' access to learning and examining geographic inequalities of learning engagement within UK cities, particularly in Scotland. Present work by Osborne, Kintrea, and Lido (2016) is examining the direct effects of location and deprivation on the attainment gap, not only at school level, but on progression and attainment in further and higher education in Glasgow. The research that does exist in this area tends to focus on US cities (Roscigno, Tomaskovic-Devey, & Crowley, 2006) and school-aged learners (Gorard, Rees, & Salisbury, 2001), with very little emphasis on how place affects the engagement of older adults. The present study can visually map the participation of older learners from various parts of Glasgow, and assess their mobility and participation in 'city life' and their local communities.

'Big Data' and technology for LL research

Osborne and Lido (2015) have advocated the use of big and complex data-sets within the field of education, using larger (administrative and social media) data, alongside more novel technologies to reflect LL complexity and their educational (and physical) journeys. Eynon (2013) provides an overview for the use of 'Big Data' for education and summarises the various ways in which data can be 'big'. For instance, Big Data may be numerically large or beyond the capacity of most relational database systems to manage. More significantly, it may be continuous (in real-time) with ongoing data collection, or it may be 'big' due to the complexity of the data themselves and the need for novel methods to capture, analyse, interpret and visualise. Data-sets are becoming bigger and more open, and it is important to tap into such resources to improve our knowledge of city-wide participation.

> The interest in Big Data is growing exponentially … [However] In the field of education, Big Data is still a relatively niche topic, but it is clearly beginning to grow. (Ibid. 237)

Most big data research in the field of education concerns analysis of large administrative data-sets in the field of 'learning analytics' and seeks to target the efficiency and cost-effectiveness of education delivery (e.g. Niemi & Gitin, 2012). These studies include research aimed at increasing transparency, competitiveness and enhancing the performance of schools and teachers (Eynon, 2013). Yet recent work has begun moving beyond simple conceptions of 'big' (meaning large online student statistics, or number counting, such as entry or attrition rates) to more complex/complicated pictures of learning. Eynon suggests that future big data work in the field of education must apply these same tools to 'empower, support and facilitate practice and critical research' (2013, p. 237).

At UBDC Glasgow, data-sets continue to be amassed regarding people's daily living in and around Glasgow – how they use their time, their mobility, measuring individual/household demographic profiles, as well as attitudes, values, literacy/knowledge and behaviours in the city.

The research

The present iMCD project, run by UBDC Glasgow, seeks to yield a three-dimensional picture of people's daily activity and mobility, education demographics, and participation in formal, non-formal education and informal learning (including in the workplace, community and family) in the city. The project has three major data collection strands (the first two of which will be preliminarily analysed here), which will comprise an open 'data product' for academics, policy practitioners and the general public to access and analyse, housed alongside other large publicly available data-sets (e.g. city council administrative data) within UBDC's data archive.

The iMCD strands are:

- A representative household survey
- Tracking of real time urban sensors (including GPS and Lifelogging cameras)
- Internet-based visual and textual media capture

The concept of the iMCD draws on 'Digital Mobility Information Infrastructure' (DMII) in urban areas proposed by Thakuriah and Geers (2013). The concept comprises three tiers of information sources including infrastructure-based, mobile, portable and wearable sensors, and socially generated data; background data from censuses, administrative data sources; other data programmes for a wide variety of contextual socio-demographic, built environment and other place-based attributes. An early demonstration of this concept is the Chicago area Spatial Decision Support System (Minocha, Sriraj, Metaxatos, & Thakuriah, 2008; Cottrill & Thakuriah, 2010).

This research analyses preliminary data from the 1500 household iMCD survey to examine the predictive relationship of age, and other key variables to learner engagement in the City of Glasgow. It further attempts to examine demographic differences in individuals engaged in various types of learning amongst age groups to better assess the demography and activities of a subsample of learning-engaged older adults. This enables an examination of 'who' are the learning engaged older-adults in the city, and the GPS trails allow us to assess 'where' they are going and 'what' they are doing within the urban environment.
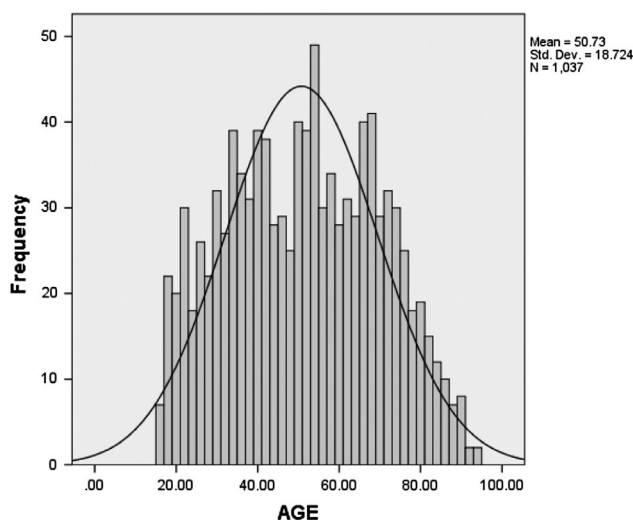
Figure 1. Age distribution of sample.

Sample

The total sample consists of a representative sample of 1500 households in the Greater Glasgow Area, targeted using the Royal Mail Postcode Address File (PAF) with a stratified random sampling design to ensure a representative sample of the Glasgow–Clyde Valley planning region population, for age, gender and ethnicity. The sample is also stratified by deprivation for a roughly even number of respondents in each deprivation decile. This preliminary analysis presents data from 1037 adult interviews from 710 households (of which approximately 502 are 'complete' with every adult member interviewed). The diversity of age is seen in Figure 1 – the average age was 50.73, with a standard deviation of 18.72, the respondents ranged from 16 to 93. The sample consisted of 45.2% male respondents and 54.8% female. The third oldest of the sample consisted of those above 60; however, conceptually, it was decided to include those at the age of 60 in the older adult group, yielding a sub sample of 377 (with approximately the same gender split as the overall sample).

Survey collection

The data were collected from eligible adult household members via confidential and ethically approved, face-to-face interviews lasting 30–45 min each. Each survey covered a wide range of topics related to behaviours and daily activity. Given a thorough review of behaviour change models, a tripartite approach (Ajzen, 1991) was used in the survey, to assess attitudes, behaviours and literacies/knowledge in the domains of: *education, transport, sustainability, technology, and cultural and civic engagement.* The survey questions were chosen following an exhaustive review of (UK and European) national surveys. To assess content validity, a team of eight subject matter experts (SMEs) from inter-disciplinary backgrounds adopted a rating system for inclusion of domain items.

The draft survey content was compared against the 42 UNESCO indicators for learning cities (UNESCO, 2013), in order to ensure that it could directly measure (or allowed

Table 1. iMCD Survey variables of interest.

Demographic variables of interest	Education variables of interest
Age	Qualifications gained & school-leaving age
Ethnicity	Formal education courses within the last 12 months
Country of birth	Non-formal education courses within the last 12 months
Asylum-seeker status	Informal education courses within the last 12 months
General Health	Parents' level of education
Long-term physical and mental health conditions (disability)	Helping others to learn in the last 12 months
Marital status	Family learning activities in the last 12 months
Sexual orientation	Motivations to learn
Religion	Barriers to learning
Working status	Attitudes towards the value of education
Number of Children	Information-seeking
Housing demographics	Literacies- financial, digital, environmental and health
Income (including benefits received)	Maths competency/literacy/job use
Neighbourhood attitudes	Language skills (English & additional languages spoken)

indirect comparisons at the city/country level with) key concepts for a successful learning city. In addition, national survey literature was also reviewed to ensure the inclusion of internationally validated items (e.g. the Adult Education Survey national quality reports, 2014). The variables measured included (Table 1).

The survey collected extensive demographic background information, as well as data on learning engagement over the past 12 months in formal education (structured/leading to nationally recognised qualifications), non-formal education (structured but not leading to national qualifications) and informal (self-led unstructured or experiential) learning. These variables were consistent with definitions from the international Adult Education Survey (2015) and Werquin's report for the OECD in 2010: 'Recognising non-formal and informal learning: Outcomes, policies and practices'. These were then operationalised in line with UNESCO's handbook on learning activities (2006), and the UK Government's Office of National Statistics harmonised guidelines (for time period of previous 12 months and examples of activities). Therefore, formal learning was considered to be intentional, structured learning leading to a formal qualification. The formal learning question read: 'During the last 12 months, have you taken part in any course or apprenticeship intended to lead to a recognised qualification, regardless of whenever you completed the course or obtained the qualification?' The non-formal learning question concerned any learning in the last 12 months which was intentional and structured, but not intended to lead to any formal qualification (including work-based training courses). Finally, informal learning was defined as 'any other' intentional learning activities in the last 12 months not mentioned above, and the examples were given 'such as learning a language, a hobby, reading about something in the library or teaching yourself new skills at work.' Additionally, 'show cards' were used to give examples of the various forms of learning. These were followed by mode of learning, hours and weeks committed to the learning, funding and motivation. Questions were asked separately about 'helping others to learn' in the last 12 months, and whether these 'others' were older or younger family members, or not family members at all – in this way 'family learning' was separately measured.

These demographic and education-related questions were collected alongside measures of participation in civic and cultural activities (including volunteering, visiting cultural sites and taking part in a host of political activities from voting to protests). A travel diary

was also collected from the participants' movements in the previous 24 h, and various transportation questions were asked.

Sensor data collection

Upon completion of the survey, participants were asked if they wished to take part in further research, and were followed up to take part in the sensor portion of the project. Data are presented here as a sub sample of respondents who agreed to carry a GPS sensor for one week (and to complete a written travel dairy for comparison). Some of these participants will also have carried a lifelogging camera for two days in order to collect images of their journeys; however, this is beyond the scope of the present paper.

Analytical approach

The data were analysed using SPSS, and initially linear regression was employed to assess demographic factors successfully predicting engagement in all types of learning. As age was the strongest predictor, the sample was divided for further analysis, with the bottom third being classified as 'younger adults' (16–40) and the top third being classified as 'older learners' (60 and over), the remaining age range is classed as the 'middle or middle-aged adults' (41–59). This yields an older learning group slightly younger than the field consensus of 65 mentioned earlier; however, it is largely in line with recent UK government guidelines for 'older adults'.

Cross-tab chi squares were used to pinpoint differences between older adults and younger adults in the sample as well as differences between 'Learning-Engaged' older adults vs. non-engaged older adults. Analysis of Variance (ANOVA) was used to examine the mediating effects of geographic location (local authority and postcode) as well as long-term health conditions on the age–learning engagement relationship.

Results

Engagement of older adults in forms of learning

When trying to predict who in the sample had engaged in any learning activities in the last 12 months, linear regressions revealed that there are three key variables predicting total learning engagement (the sum of formal, non-formal education and informal learning activities undertaken in the last 12 months) for our sample. The strongest predictor was age; $\beta = .22$, $t(700) = 5.97$, $p < .001$, which accounted for 5% of the variance in total learning engagement on its own. The second significant predictor of whether adults engaged in learning was their general health, $\beta = .10$, $t(699) = 2.56$, $p = .01$, with those reporting better health participating more. Having plans to move out of their geographical area within the next 12 months were also a significant predictor, $\beta = .08$, $t(698) = 2.11$, $p < .05$, whereby those who planned to move were more likely to engage in learning activities, perhaps indicating learning activity engagement is linked with social mobility out of an area, or it may simply be associated with housing changes in older adulthood – this is an area for future research. These three factors predict 6.4% of the variance in likelihood to engage in learning for our sample. Finally, having a long-term physical or mental health disability was a marginally
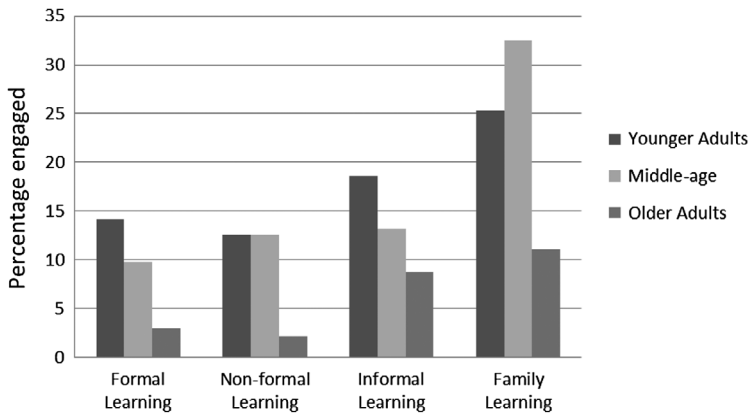
Figure 2. Percentage of adults engaged in learning over the last 12 months.

significant predictor of total learning engagement, $\beta = .08$, $t(697) = 1.87$, $p = .06$, adding 0.4% variance explained to the model. Those reporting a long-term physical or mental health condition engaged in fewer learning activities than those with no such long-term health conditions. Differences in participation among the three age groups can be seen in Figure 2 and will be explored further below.

As can be seen in Figure 2, Chi Square Crosstabs reveal a persistent pattern of relatively less recent engagement in all types of learning activities by the adults 60 years of age and over, compared to adults in the other two groups. These respondents reported significantly less engagement in all types of learning, including formal learning, non-formal learning, informal learning and family learning than their younger counterparts. Perhaps the first two findings regarding structured learning are unsurprising, but engagement in unstructured, self-initiated informal learning and family learning (even with younger family members) is also significantly lower in the older adult age group. The 60+ sub were approximately half as likely to engage in family learning activities as their younger counterparts and one-third as likely as their middle-aged counterparts ($p < .001$). They further report less desire to learn, although with fewer reported barriers to learning, and less information seeking concerning learning opportunities (χ^2 from 13.90 to 40.22, all $p < .001$). It is interesting to note here that participation in non-formal (largely reported to be work-based) learning does not differ between the young and middle-aged groups, and in fact, the middle-aged group report engaging in the most family learning, with higher reports of helping others to learn.

Therefore, when considering learning engagement activities as a total, the older adults participated the least, followed by the middle age adults and finally the younger adults participate the most ($p < .001$), which may be as predicted; however, for those 242 older respondents reporting an average number of hours committed to learning per week, there are no age differences (all $p > .05$), with all learning – engaged participants reporting on average five to six hours per week on such activities. Therefore, older learners who do engage in learning activities, do so with the same time commitments as younger and middle-aged learners. There is also a significant difference in the age at which these learners left school ($p < .001$), with older respondents reporting an average school leaving age below 16 ($m = 15.78$) and younger learners reporting school leaving above the age of 16 ($m = 16.91$), $F(2, 1008) = 75.53$, $p < .001$. The older respondents were significantly less likely to have

started a further or higher education course after leaving school (23.1% of older adults compared to 52.4% of younger adults), and more likely to have started a job directly (66.2% of older adults, compared to 27.6% of younger adults), $p < .001$. Older adults were less likely to hold higher education qualifications (25% compared with nearly 40% of younger adults with higher degrees). Those older adults with higher education qualifications were, as would be predicted, more likely to presently be engaged in a learning activity of some form ($p < .001$), as past educational success is one of the strongest predictors of future educational engagement (Stuart, Lido, & Morgan, 2009, 2011), and progression to postgraduate study (Stuart, Lido, Morgan, Solomon, & Akroyd, 2008).

When asked about their attitudes towards the value of learning, there were no age differences, and contrary to the recent Times Higher coverage that degrees are being seen as devalued, particularly in Scotland (Else, 2015), the majority in all age groups (approximately 80% of our sample) would advise a 16-year-old to stay on in full-time education to get higher education qualifications rather than getting vocational qualifications or getting a job.

Learning engagement profile of older learners

For the sub sample aged 60 and over, 12.2% were engaged in some form of learning, which would appear to be far lower than the NIACE (2015) participation rates for UK older adults of 21% (however, caution must be used as their cut-off age is 55 rather than 60). Of these learning-engaged adults, 23.9% were involved in some form of *formal* learning within an institution, the majority of which occurred in classroom settings and for work-based motivations. Again this engagement is lower than national UK averages, for instance, it is lower than the 2007 AES estimates of 7.7% (with a narrower age range, and participation rates have fallen further in the 2011 data collection).

With regard to *non-formal* learning, 17.4% were involved in such structured learning (not leading to formal qualifications), categorised by the majority of participants as 'face to face' or 'classroom-based', and which the majority had undertaken for personal interest. However, nearly a quarter of the older non-formal learners undertook this learning for work-based motivations.

Finally, 71.7% of the older population engaged in other forms of learning not included above, termed *informal* learning. These activities ranged from website to IT skills, researching Robert Burns to cooking, learning musical instruments, sewing and sculpture. However, the majority here reported their informal learning activity as learning a new language (primarily Spanish, but also Swedish, Chinese and other languages).

Surprisingly, there were no sex differences in participation, nor nationality differences (although most respondents were Scottish-born). There was some evidence that older Catholic and Christians were more likely than expected to engage in learning than those from the Church of Scotland ($p < .001$). Learning-engaged older adults were also more likely to also be presently engaged in work ($p < .01$), and were significantly more likely to be caretakers of others (due to age, disability or mental health reasons, $p < .01$). This is revealing, given that personal commitments, such as family obligations and caring roles, are more typically seen as barriers to study for younger learners (e.g. Solomon, 2012), perhaps highlighting the transitional and transformational role of learning in the lives of older adults.

In line with previous research outlined above (e.g. Marmot Review, 2010), engaged older learners were significantly more likely to rate their health as 'very good' (50% compared

with 22.4% of non-engaged older adults, $p = .001$). Alternatively, within the older adult sub sample, those reporting a long-term physical or mental health condition were less likely to participate in non-formal learning ($p < .05$), although such participation differences were not found in engagement with formal and informal learning. Therefore, although it is not possible to tell if this is a cause of learning engagement or a result of it, existing health conditions appear to be a barrier to participation in non-formal learning activities, perhaps because the majority of these named activities were in the workplace or for work-based motivations, rather than in formal HE settings with devoted student disability support units.

Active aging activities

When further examining the subgroup of learning-engaged older adults, unrelated t-tests reveal a general pattern of engagement in cultural and civic activities, and even physical activities, when compared with the non-engaged older adults, which can best be summarised as a pattern of 'active ageing'. This supports the concept of LL being associated with actively engaged citizenship. These adults were more likely to have left school post-16 (in line with their younger adult counterparts, $p < .001$). These learning-engaged older adults in our sample report more physical activity ($p = .001$), theatre/live performance attendance ($p < .001$), visiting of cultural/historical sites ($p < .001$), and use of community centres ($p < .05$) and libraries ($p = .01$). They are also more likely to say they have participated in a boycott for political, ethical or environmental reasons ($p < .01$) and to use the Internet ($p < .001$) and to have received training on computer skills ($p < .001$). They were also marginally more likely to belong to a group concerned with political or social issues and to have contributed to a political discussion online (both $p = .09$). Although it is not possible to examine socio-economic background (as these data were not collected), such engagement above (nor any of these findings) was not affected by older adults' reported annual income, nor by sex of participant. It should be noted that weighted variables considering pensions, savings and other benefits have not been considered at this point. The role of geographic place will now be considered and how variation in deprivation and belonging within the Greater Glasgow area affects participation.

Place and the older adult learner

For all adults, in addition to age predicting learning engagement, linear regressions revealed that *feeling safe when walking alone at night* in the area [$\beta = -.28$, Wald's $\chi^2 = 4.14$, $p < .01$], and marginally their *local authority area* [Wald's $\chi^2 = 12.11$, $p = .06$] also emerged as significant predictors (or in this case barriers) to learning engagement overall. In addition, a *sense of belonging to one's neighbourhood/local area* emerges as a significant predictor for adults engaging in formal and non-formal (structured) learning activities. Age moderates these relationships, strengthening the impact of feeling safe on overall learning engagement and neighbourhood identification/belonging on engagement in formal/non-formal (structured) learning. Older adults, and particularly women, report the strongest sense of belonging with their neighbourhood ($p < .001$), and alternatively, they report feeling the least safe walking alone at night ($p < .001$), which makes neighbourhood safety and belonging interventions fruitful for promoting older adult learning in the city. Regional differences in these patterns will be explored from the full data.
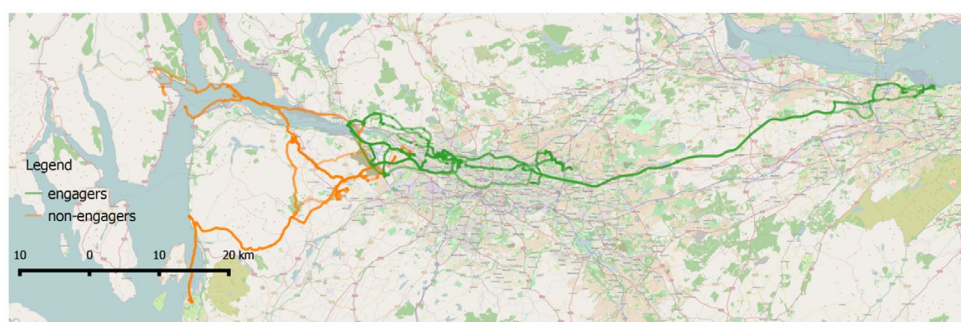
Figure 3. GPS Map detailing movements of learning engaged and matched non-engaged older adults across Scotland.
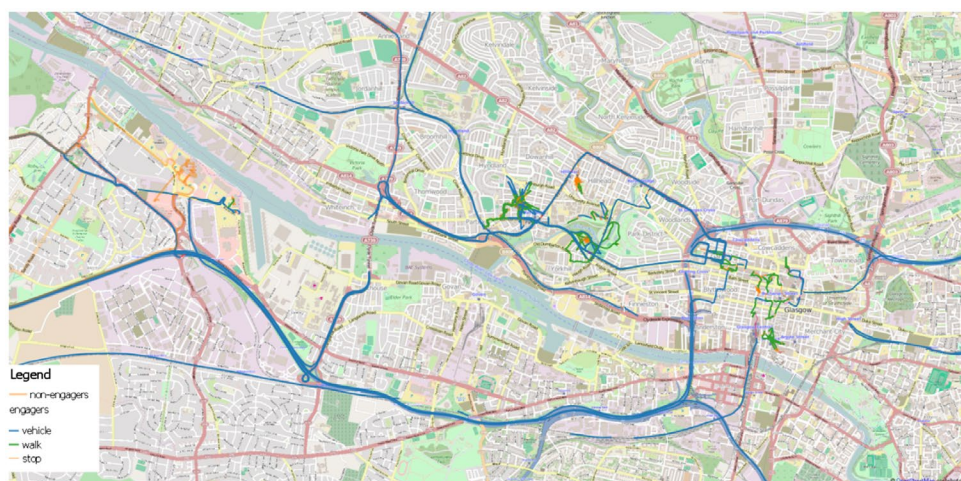
Figure 4. GPS Map detailing movements of learning engaged and matched non-engaged older adults in Glasgow.

GPS findings

GPS trails were collected and a preliminary subset of 155 trails has been retrieved thus far. Of these, 13 older adults were 60 and over within the Greater Glasgow area. An analysis of these older participants revealed that three were learning-engaged. These participants were then matched demographically, as closely as possible to three non-learning engaged participants, yielding a sample of 'engagers': one 61-year-old woman and two men, aged 64- and 77-years old. In parallel, for the non-engagers, the sample included one 63-year-old woman and two men, aged 65- and 75-years old. A visual inspection of the older adults' mobility overall shows a predominantly mobile population, travelling actively within and beyond the Greater Glasgow area, including commuting and travel patterns to the east to Edinburgh and to the west towards the island of Arran. In line with the physical activity statistical findings, Figure 3 shows an example of engaged older learners' GPS trails having more wide-ranging activity than their matched counterparts, and overwhelmingly more engagement with the city of Glasgow than those who are not engaged in any form of learning (movement analysis are based on the method provided by Siła-Nowicka et al., 2016). As can be seen in Figure 4, the matched non-engagers are moving more within the rural areas and periphery of Glasgow rather than the city centre.

Discussion

In conclusion, it is clear that for the economic and social well-being of the city, more should be done to engage older learners in urban settings, such as Glasgow, where older learning participation falls far below their younger (16–40 years) and middle-aged (41–59 years) counterparts. Preliminary findings support implications of learning engagement for health and physical mobility in older adult city citizens; there is no 'one size fits all', as learning engagement was varied, and mobility was complex and higher than expected. Comparisons with UK national statistics are problematic due to varying cut-off ages and definitions of learning (particularly non-formal learning); however, this work suggests preliminary interventions may emerge from this data-set to promote the inclusion of older learners in Glasgow, which seem low in all forms of learning assessed. On a more positive note, the engaged older adult learners, although a minority sample (12.2% of the 60+ group), can be categorised as actively engaging in educational, cultural, civic, online and even physical activities within the city and beyond (as shown on their GPS trails). More than 70% of this engaged sub-sample were engaged in informal, unstructured learning, and over a third (29.6%) were engaged in structured (formal and non-formal) learning. Therefore, the emphasis for future research is largely on promoting access to and engagement in unstructured learning for older adults. Physical and mental health barriers to such participation warrants further investigation, as there were implications that those reporting a disability reported less participation in non-formal learning. Finally, the role of place needs to be further explored, as feeling safe and belonging affected adults', and particularly older people's participation in learning activities.

Our findings do not seek to promote a 'deficit model' of adult learning (as cautioned in Findsen, 2012); however, our actively ageing older learners do in fact report more positive health. Likewise, dis-engagement with learning is associated with poorer reported health and dis-engagement in other social, and even geographical, areas. Therefore, it is of paramount importance to examine closely the profile of the physically and mentally active, engaged older learner-citizens in Glasgow. Perhaps most importantly, engagement with self-initiated informal learning and specifically with regard to helping others within the family to learn something new, might be the most important forms of learning to target for intervention amongst these older adults.

The subset of participants engaged in various types of learning was also physically, socially, culturally, civically/politically and technologically active. These learning-engaged older adults are also more likely to be working and caring for others (which may or may not be seen as a positive learning indicator) as well as participating in online social engagement, boycotts and moving around the city centre. These findings, therefore, highlight the importance of learning engagement in all forms of daily life.

These findings also have direct policy implications concerning the 'digital divide' (consistent with NIACE, 2015 findings for the UK), revealing that for older adults, learning basic training for and having access to, technology is the key to LL success in an urban setting. This is broadly in line with Selwyn, Gorard, and Furlong's (2006) in-depth examination of older learners in the digital age when advocating for broader conceptions of LL, to take into account affordability and accessibility offered via digital learning. Key to such a change would be revaluing the role of older adults' learning in this 'brave new world' of flexi-working and distance learning, for those choosing to work and learn into later life.

> This lifelong learning drive involved, and continues to involve, more than a narrow technical adjustment to the organisation of educational provision. It is an attempted transformation in learning opportunities in order to better meet the implicit demands of the learning society/ knowledge economy. (2006, p. 5)

It is clear that although age is a barrier to engagement in learning overall, our population contains a sub-sample, the so-called 'silver surfers' or 'silver citizen-surfers', who are technologically savvy enough to engage in political and social interactions online and mobile enough to engage with their physical city environment. Although caution must be used in such small cell sizes, for these engaged older adults who do participate (not just in learning but in 'city-life'), income, family and work commitments are not deterrents, but rather are associated with increased activity.

Although we cannot comment on cause–effect relationships, the replication of positive health associations with learning engagement is of interest, in that these extend beyond formal learning to all types of the learning we assessed (the higher the engagement overall in all types, the more positive the health reported is). It is worrying, however, that those who report long-term physical and mental health conditions report less engagement in non-formal learning. It is therefore important to acknowledge the very real physical and mental health limitations in place for older participants in the sample, and to direct programmes in the non-formal domain towards home-learning options for structured learning programmes. This further reinforces the need for technology training and outreach, particularly in the more rural parts of the Greater Glasgow area. Alternatively, long-term physical and mental health disabilities were neither associated with less formal learning participation nor with self-led informal learning and family learning (perhaps given the formal support offered in the former and the flexibility offered by the latter). Further research is needed for disability support and access for non-formal learning activities offered in and around Glasgow – for instance, disability support offered by non-formal work-based learning programmes.

Thus, such findings around digitally engaged 'silver surfers' and 'actively ageing' older learners have direct implications firstly for increasing access to the basic technological training some of these older learners report having in urban areas such as Glasgow, which will reduce the barriers involved in older persons' geographic location and mobility/health restrictions. Place variables, such as feeling safe and belonging to one's area, must be considered when designing and advocating for older learner participation in urban environments. Obviously providing technological skills for these adults can increase participation in all forms of learning online, and yet one-third of the engaged older adult learners describe their experience as classroom-based and face-to-face. Therefore, although education in Scotland remains free, and income itself may not be a barrier to participation, our place-based findings advocate facilitating these older adults to explore the city with interventions to make travel for learning purposes easy, accessible, safe and free. More research is needed into the nature of not just rural residency, but into mobility in rural locations and its negative impact on learning engagement in urban contexts.

Although socio-economic background and multiple deprivation indices have not yet been analysed at present, there is some evidence that local authority characteristics will further moderate engagement in urban learning activities in Glasgow. This will be further explored with the full data-set, as will more specific income-related variables, such as benefits and pensions. Additionally, the 'Educational Disadvantage and Place' project is

presently ongoing (Osborne et al., 2016), with the aim to better understand the relationship between place and educational disadvantage in the Glasgow City Region, in order to identify the drivers of disadvantage, as well as of lifelong success, and to inform policy options for narrowing the gap in educational attainment experienced by young people from disadvantaged backgrounds.

It is important to note that prior qualifications and later school leaving seem to play a role in recent learning participation as well, with previous qualifications increasing likelihood of recent learning engagement, and older adults being associated with fewer qualifications, earlier school leaving and subsequently less recent learning participation overall. This highlights the importance of breaking the 'learning cycle', and ensuring lifelong engagement is targeted not just at those holding formal qualifications. It is of interest that barriers traditionally highlighted as problematic for mature learners (21 and over) in formal learning (e.g. Higher Education) settings, appear to be associated with increased learning engagement for our sample. For instance, work and family are often seen as barriers to successful higher education progression and attainment (e.g. Solomon, 2012), but in our research, the most engaged older learners also have otherwise busy and engaged lives. It is possible that such life experience fuels further inquiry, or perhaps having to work or provide care for others may require further learning/training that is not necessarily desired. Our findings provide some evidence that work-based motives are of key importance for lifelong formal learning and of secondary importance for lifelong non-formal learning, but that self-led informal learning is largely for pleasure (although the minority reported other-based motives for this learning).

The survey and GPS data, taken together, provide an integrated picture of active learner-citizens in a modern urban context. It is clear that more can be done to engage older adults in the city of Glasgow and to fulfil the UNESCO requirement for an actively engaged population in line with a sustainable learning city. According to the UNESCO visualisation of the learning city (2013), a strong 'Pediment' of a city's 'individual empowerment and social cohesion' can be seen in its citizens' literacy, voting, volunteering, community activity and social mobility. In other words, the strong foundation of a learning city is the inclusion of a wide range of its population in active citizenship. It can be seen here that although they constitute a statistical minority, those older adults who are engaged in the city of Glasgow are also active on many of the UNESCO indicators above. The sample shows evidence of strength in the UNESCO column *Inclusive learning in the education system*, revealing higher number of years in formal schooling, more HE qualifications and current participation. Further qualitative work could follow-up these active older citizen-learners to examine their motivations and the facilitators for their ongoing lifelong engagement and the extent to which such a drive to engage is inter-generationally transmitted.

The iMCD data-set, and other data-sets accessed through UBDC, will enable a large number of future research questions to be answered within the field of adult learning (and beyond) and to develop necessary interventions to promote older adult learning in all domains. The integration of the survey data on formal, non-formal education and informal learning participation across demographic groups, alongside GPS trails, travel diaries, Lifelogging images, and catalogued textual and visual (social) media data, will enable novel research questions to be answered. These data will yield a more nuanced picture of people's daily activity, mobility, participation in formal, non-formal and in-formal learning (in the workplace, community, family etc.). These can be further examined alongside wider attitudes

(sustainability, political/civic attitudes) and literacies (health, financial, political, sustainable, maths and foreign language). The UBDC was created with the aim of ultimately promoting behavioural interventions, and is therefore a model for how big data can be applied, not just by academics, but also by practitioners across a number of sectors, to improve the lives of adult learners, not just within the city of Glasgow, but in urban environments worldwide.

Disclosure statement

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