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An Empirical Investigation into Students' Experience of Fuel Poverty

The trend of expansion in Higher Education in the UK since 1992 has created a massive demand for accommodation for students, where the housing stock is one of the oldest and least efficient in Europe, and the private rented sector is often singled out for containing some of the least energy efficient, and in worst condition properties. The extent to which students factor in energy efficiency and fuel poverty concerns into their accommodation choices is explored in this paper, along with the perception of the phenomena by students. From a survey of 286 students it was revealed that while students themselves may not consider themselves to be living in fuel poverty, the activities taken in their day-to-day lives suggest the opposite. The impact of the housing stock on student quality of life is investigated as well.

Keywords: Built Environment Quality, Private Rented Housing, Fuel Poverty, Student Housing

1. Introduction

The UK housing stock is one of the oldest and least efficient ones in Europe (Boardman et al., 2005); in particular, prior research has highlighted that the private rented sector has a disproportionate number of housing below decent home standard (Kemp, 2011) – i.e. failing to meet health and safety standards relating to excess cold, mould growth, overcrowding, as well as failing to satisfy minimum criteria regarding the state of repair of the property, the standard of electrical and heating facilities, and a minimum level of insulation (UK Parliament, 2010; Shelter, 2016). The private rented sector also houses a disproportionate percentage of households defined as living in poverty (Kemp, 2011). A study of the UK housing stock from Leicester and Stoye (2016) highlights how households renting from private landlords who had been in the property for less than two years were 11% less likely to have insulation measures than owner occupiers who had lived in their property for the same period.

From a social policy perspective, there is merit in targeting the housing with the worst energy efficiency performance in order to alleviate fuel poverty levels. However, current UK policy is focused on directing a compulsory levy imposed on electricity suppliers towards those areas ranking highest for income deprivation, such as the Energy Company Obligation (ECO) and its predecessor, the Community Energy Saving Programme (CESP) (HM Government, 2009; Rosenow et al., 2013). Such schemes do not necessarily reach those most in need, due to the highly variable nature of household energy consumption which is strongly influenced by socio-economic factors (Morris et al., 2016).

In this context, the *Green Deal* was launched in 2011 to 'support the retrofit of 1.4 million homes' by 2020, focused on creating markets for energy efficiency measures and aimed at incentivising owners to invest in measures and receive pay-back from reduced energy bills (Rosenow et al., 2013; Hope and Booth, 2014; Morris et al., 2016). In principle, the Green Deal's payback mechanism, combined with the 2011 Energy Act which prevented landlords from refusing 'reasonable' requests from tenants for energy efficiency improvements should have helped overcome the split-incentive problem that persists in the private rented sector, where upgrading the energy efficiency of the dwelling is the responsibility of the landlord, yet tenants receive the benefit through lower energy bills and increased internal warmth (Ambrose, 2015; Leicester and Stoye, 2016). However, the Green Deal failed to deliver even a small proportion of its promised energy efficiency measures, and Government backing of the scheme was withdrawn in 2014. While other frameworks have undoubtedly increased energy efficiency in many deprived communities, it is highly likely that other groups of people in need of fuel poverty alleviation measures are overlooked. Indeed, such frameworks do not measure people's specific circumstances (Rosenow et al., 2013). Specifically, when considering findings from schemes in Austria and Belgium where energy efficiency improvements in the private rented sector were associated with 4.4% and

3.2% increases in rents respectively (European Commission, 2013; Carroll, 2016), there is a fear from tenants that requesting energy efficiency measures may lead to rent rises (Ambrose et al., 2016). This combination of cost burden and fear may deter those who are not classified as 'deprived' from requesting and taking-up energy efficiency measures.

In the UK, a widely accepted definition of fuel poverty was provided by Boardman (1991), which states that fuel costs should be no higher than 10% of income in order to maintain a satisfactory heating regime (recently defined as 18°C in all parts of the house; Public Health England, 2016). The work of Hills (2012) provides a general review of Fuel Poverty in the UK, proposing a 'low income, high costs' approach to defining fuel poverty, identifying households who spent more than the median level on fuel costs, and by doing so were left with residual incomes that placed them below the official poverty line (Li et al., 2014). This approach has been adopted as the official fuel poverty measure for England in 2012 though Wales, Scotland and Northern Ireland retain the 10% measure of fuel poverty (DECC, 2016). As such, the fuel poverty concept is highly complex and presents difficulties for policy makers, as it covers not only the physical properties of the housing stock, but also the socio-economic status of the occupants residing in within the property (Middlemiss, 2016). The Warm Homes and Energy Conservation Act of 2000 set out targets for the UK Government to eliminate fuel poverty in vulnerable households (defined as households with at least one member over 60 years old, under 16, or long-term disabled) by 2010 and from all households by 2016 (HM Government, 2000; Middlemiss, 2016). The reality is that, over the past 10 years fuel poverty has increased from 1.7 million households in 2001 to 4.4 million (2.5 million using the 2012 Hills definition) by 2010 under the 10% definition (DECC, 2013). Within national and local governments, the setting of fuel poverty appears to be poorly understood, often confused between being either a purely environmental, or social problem (Rosenow et al., 2013).

The construct and measurement of fuel poverty also by-passes student groups, a key demographic often living in low quality housing. Indeed, Fuel Poverty policy has been historically focused on: elderly populations; increases in seasonal mortality rates (Healy, 2003; Chard and Walker, 2016; Ambrose et al., 2016); financial pressures on those with fixed incomes such as pensions, who are more likely to be paying a higher tariff for their energy due to prepayment meters (Ofgem, 2015).

The recent trend of expansion in Higher Education in the UK since 1992 has created a massive demand for term-time accommodation for students in the UK, where the majority of full-time students live away from the family home (Hubbard, 2008; Smith and Hubbard, 2014). In conjunction with this, the UK has experienced rapid growth in the number of buy-to-let landlords, who have moved in to providing private rented accommodation to young adults (including both professionals and students) in City Centre locations (Leyshon and French, 2009; McKee et al., 2017). The majority of students live in relatively old housing stock, i.e. constructed pre-1991, which is energy inefficient and requiring infrastructure improvements to make them more thermally efficient (Li et al., 2015), but is also characterised by high turnover of tenants. This reduces incentives for landlords to invest in these improvements as well as reducing incentives for the student tenants to demand those (Li et al., 2015).

This paper investigates the extent to which students consider energy efficiency and fuel poverty concerns into their accommodation decision-making. The study also assesses the perceptions of the fuel poverty phenomena by students' population, in an attempt to gain insights about incidence and awareness of the issue. The remainder of this paper is organised as follows: in the next section, the literature background is presented, focused on previous studies both about fuel poverty and on students' living conditions. f

2. Fuel Poverty: Students in Private Rented Accommodation

To date renting privately is still a minority option in the UK which accounts for just 18% of households, but there is a clear exception to this pattern in from the student population, where a niche market has developed in the last decades (Rugg et al., 2002; Li et al., 2015). The student rental market is characterised by intensive concentrations in 'student areas', high demand for multiple occupancy accommodations, short-term contracts and an ability to adapt to any type of property (Rugg et al., 2002). Within the private rented sector in England there are concerns about poor conditions, particularly at the bottom end of the market (Kemp, 2011). The Green Deal struggled to attract uptake despite the benefits of interventions directly benefitting owner occupiers (Marchand et al., 2015), and marketing this type of scheme to landlords remains a difficult proposition, described by Hope and Booth (2014, p. 374) as a situation where 'many landlords simply do not view that there is any benefit from undertaking energy efficiency measures, as it is the tenant, not the landlord, who pays the energy bills'. This situation is exacerbated for student populations due to the short-term nature of student tenancies that reduces their bargaining power with landlords over any sort of improvements (including energy efficiency ones) to these properties. Whilst tenants may request energy efficiency improvements, landlords are not obligated to fulfil them, and unhappy tenants can end up searching for alternative accommodation (Hope and Booth, 2014).

The Energy Performance of Buildings Directive (EPBD; 2002/91/EC), stipulates energy performance requirements for both new and existing buildings (European Commission, 2003; Dixon et al., 2014) and the production of Energy Performance Certificates indicating current and potential energy efficiency levels (Watts et al., 2011). These directives only apply to self-contained dwellings and do not apply to Houses in Multiple Occupancy (HMO), which are accommodations that are let on a room-by-room

basis (Bouzarovski et al., 2012; Bouzarovski and Cauvain, 2016), a common tenancy choice for student groups. The UK Government is providing further incentives to private landlords by providing tax reductions as part of the Landlord Energy Saving Allowance (LESA) of up to £1,500 per property for the implementation of energy-saving measures, including: cavity wall and loft insulation; solid wall insulation; draught-proofing; hot water system insulation; floor insulation (HM Government, 2016). Landlords are increasingly viewing higher energy performance standards as part of marketing a property and potentially increase the renting value (Dixon et al., 2014). This drive however does not appear to have proliferated into the student market.

2.1 Recording Fuel Poverty

There are no clear definitions or guides to fully identify what is meant by the term 'fuel poverty', particularly due to determining what constitutes 'income' (Moore, 2012). For example, should this be gross income, net income, housing costs, or should an equalised income measure be used for determining fuel poverty? In practice, the UK Government used average fuel prices in their calculations, significantly underestimating the risk of fuel poverty since those on lower incomes are more likely to be on pre-payment meters which are the most expensive way to pay for utilities. Any financial-based efforts to measure the incidences of fuel poverty in the student population are likely to be undermined by the lack of economic capital that students possess. Student incomes are likely to be small, based on part-time, discontinuous, precarious and seasonal employment, supplemented by parental support and a system of student loans and credit cards (Smith and Holt, 2007). Parental support can vary to a very large extent, and even be absent in some cases. By the late 2000s, over 80% of students were taking out loans to cover their tuition and living expenses, a figure expected to grow, both in extent and value given the rises in tuition fees up to £9000 (Harrison et al.,

2015). Students from low income and disadvantaged backgrounds can gain financial assistance from Universities and funding bodies, and a range of sporting and academic grants and scholarships are also available. Therefore accurately quantifying student income can be problematic, particularly given the removal of eligibility for students for housing benefit (Bouzarovski and Cauvain, 2016; NUS, 2016). In theory, almost all full-time student households would be classed as 'fuel poor' under the Hills (2012) measure of fuel poverty due to high energy costs relative to their low incomes. Healy and Clinch (2004) state that almost 42% of fuel poor households is given as 'student/government training' and highlight that 'chronic fuel poverty experienced among students is likely to be a result of the numbers who live away from home on modest incomes, and, consequently live in poor housing conditions'. The Shannon et al. (2003) study of fuel poverty in Dunedin, New Zealand highlighted how 61 % of student respondents did not think their house was comfortable in winter, and measurement of temperatures across all participants revealed that over 90 % of the houses experienced temperatures that were below the commonly accepted comfort range during the survey period. Similar findings were reported in a pilot study conducted by the National Union of Students in the UK (NUS, 2016).

Another common technical issue with the fuel poverty indicator statistics that may affect student populations is the concept of 'under-heating', i.e. failing to achieve internal temperatures of 18-21°C. Moore (2012) highlights that in studies conducted in the UK in 'both 1991 and 1996 the correlation between under-spending on fuel and unhealthily cold homes was, unsurprisingly, found to be far stronger than the correlation between a household's fuel poverty status (under the 10% definition) and the temperatures recorded in the home'. For students, spending on household bills may not be a priority, instead prioritising spend on leisure activities, course materials, food and transport.

Research by Anderson et al. (2012) on 'coping with low incomes and cold homes' examines the mitigation activities undertaken by low income households in the UK highlight that that the 'fuel poverty' concept is not meaningful to ordinary householders 'whose everyday experience is of the specific problems of a lack of money and loss of thermal comfort', an outcome which may inhibit students coming forward to declare themselves as being in fuel poverty, in addition to being 'missing' in official fuel poverty statistics.

Not only does the way in which fuel poverty is traditionally measured fail to adequately deal with student populations, but also the way in which alleviation policies are defined is likely to discriminate against students. Energy efficiency schemes such as CESP and ECO schemes focused on income and multiple deprivation of income to target specific areas that would qualify for energy efficiency schemes. CESP provided assistance to 'deprived' communities (i.e. those households in the bottom 10% of LSOAs by income deprivation (HM Government, 2009), whilst ECO began in 2012 as a replacement for the CESP scheme and focused those households on receipt of certain income support benefits, or ranked in the bottom 15% of LSOAs by multiple deprivation (DECC, 2011). As of 2014, the income indices of deprivation in the UK are based on: adults in receipt of income support or job-seekers allowance; children dependent on adults in receipt of income support or job-seekers allowance; and adults and children in receipt of working family tax credit whose income is below 60% of the median income (DCLG, 2011).

Criteria such as those outlined in the index for income deprivation excludes students due to restrictions on the ability to claim for benefits from UK welfare state (NUS, 2016). The Index of Multiple Deprivation (IMD), a composite indicator computed on a periodic basis, expands the deprivation concept beyond income by including variables relating to employment deprivation, barriers to education, geographical isolation from services, crime, and living environment (DCLG, 2011). These indicators further reduce the likelihood of

students qualifying for fuel poverty assistance, since some of the underlying measurements focus on factors such as: proportion of population under 21 not entering higher education; proportion of 25-34 year olds with no qualifications; as well as road distance to a post office, supermarket, primary school, and GP surgery. Students studying at city-based universities are not likely to be recorded as deprived populations according to these measures. The index for living environment deprivation (social and private housing in poor condition) is the only measure which directly links to poor quality housing stock, but this indicator is diluted by the incorporation of other indicators of deprivation that form the overall IMD. However the incidences of fuel poverty in student populations can be associated with secondary effects such as illness, extra spend on secondary heating sources, additional time spent in university facilities (Li et al., 2014). Previous research in New Zealand has alluded to the links between poor quality housing and health effects from damp and water damage (Shanon et al, 2003; Millar et al, 2009).

2.2 Students: Out in the Cold in the Fuel Poverty Debate?

Undertaking a literature search (utilising the academic search engines *Google Scholar* and *Scopus*) using the keywords of [‘student’ AND ‘housing’ AND (‘fuel poverty’ OR ‘energy efficiency’ OR ‘affordable warmth’)] did not return any articles that explicitly focused on the experiences of the student population dealing with poor internal environments in their accommodation. The majority of fuel poverty articles focus on the effectiveness of policy to reduce fuel poverty, strategies to best identify the fuel poor, and the conflict between schemes to reduce carbon emissions and those to reduce fuel poverty. Alongside these studies that examine living arrangements of student populations tend to discuss the wider social and economic impacts of student residential patterns; very little attention is paid to the students themselves. Aspects of the UK media portray student populations as hedonists, living

'lifestyles fuelled by alcohol' (Harrison et al., 2015) and this crude stereotyping presents a difficult image to inspire support for an often maligned section of society. For example, many previous studies on the process by which specific neighbourhoods become rapidly dominated by student residential occupation (termed 'studentification') found this phenomenon associated with negative urban issues, including: refuse disposal, street cleaning, increased burglary rates, and parking (Smith and Holt, 2007; Hubbard, 2008; Leyshon and French, 2009) rather than with the physical qualities of the housing stock and the relative insulation levels.

The primary concern of studentification stems from the influx of student numbers displacing the pre-existing community, and the resulting increases in instability and decline in community groups as private rented Houses in Multiple Occupation (HMO) increases (Smith and Hubbard, 2014). Available evidence, although limited, suggests that HMOs are frequently old, solid wall properties with low levels of insulation and have a higher prevalence of expensive electric heating systems. This infrastructure leads to problems with damp, condensation and mould. The National Union of Students (NUS) found that 47% of students in private rented properties experienced these problems (Eaga Charitable Trust, 2014). The problem of poor quality housing stock is exacerbated in those HMOs where bills are not included with the rent (as per standard practice in privately-rented accommodations) where student tenants attempt to minimise heating expenditure, thus leading to the development of condensation and mould (Goodman and Drayson, 2014).

Studentification, and indeed the wider issue of student accommodation standards primarily apply to students who have completed their first year of University education. In the UK it is common for the majority of students to live in University maintained accommodation in their first year of study, before moving out into private rented, often shared accommodation in the second and subsequent years of study (Smith and Holt, 2007).

Studies on the concept of 'studentification' have shown that student living preferences are shaped by a desire to live close to University Campuses or buildings, and price of rent (Smith and Holt, 2007; Smith and Hubbard, 2014) and they are also pressured into living in areas by landlords specialising in student accommodation, and also by Local Authorities attempting to 'contain' student populations (Hubbard, 2008). As a result, 352 (3.5%) of all wards in England and Wales are labelled by the Office of National Statistics (ONS) as being 'student communities'. 150 Wards have in excess of 20% of the population classified as students (ONS, 2014). In certain University towns, the volume of students causes imbalances to the population of the entire area. As a notable case, it is worth to mention the town of Loughborough (in the East Midlands region), that has a term-time population of nearly 18%; for this reason, there are constant concerns in Loughborough and other Cities across England that the private rented sector aimed at student populations is allowed to deteriorate after conversion to multiple occupancy housing (Smith and Holt, 2007; Smith and Hubbard, 2014).

Outside of the UK, research by Thomsen and Eikemo, (2010) examines the quality of student housing stock in Trondheim, Norway. A survey of 1444 students residing in accommodation outside the jurisdiction of the University revealed that, despite occupying some of the worst standards of housing in the City, students generally had a positive view of their living conditions. The study revealed that 14% of student housing experienced problems with damp compared to 4% of the general population. However students were more concerned with living close to the City Centre, near to amenities, place of study, and being in a location conducive to meeting new friends and sharing experiences than to being overly concerned with the quality of dwelling that they reside in (Thomsen and Eikemo, 2010), an indication of low expectations for the quality and internal warmth in the property (Ambrose et al. 2016). As a consequence of these low expectations (common to the lower end of the privately-rented sector), tenants are likely to tolerate cold homes that are unaffordable to heat

and use additional mechanisms (under-heating and wearing additional layers of clothing; spending time outside the home or extra time in bed) to deal with the consequences of this, rather than lobbying landlords to improve the energy performance of the property. As a result, landlords are not under any pressure to address poor energy performance (Ambrose et al., 2016).

The studies from Trondheim and Loughborough also reveal the role of landlords and letting agents in instigating a designation of 'student areas', pressuring and enticing students to congregate in certain areas of the Cities (Smith and Holt, 2007; Thomsen and Eikemo, 2010; Smith and Hubbard, 2014).

3. Theoretical Concepts and Methods

The results presented in this paper draw on findings from a quantitative survey of students enrolled at the University of Sheffield for the 2013/14 academic year.

Sheffield is home to a population of 62,000 students (enrolled at the City's two Universities). Students' housing requirements are satisfied through approximately 16,500 purpose-built bed spaces (in student accommodation) and through the private rented sector (PRS) (Sheffield City Council, 2013). However, the student population has repeatedly expressed dissatisfaction with the state of the PRS in the city, highlighting poor conditions in terms of overcrowding, repair and maintenance, along with security and safety concerns. This problem is exacerbated by a high graduate retention-rate, which contributes to a high proportion of population in their late 20s and 30s.

Similar situations are not unusual across the UK. Previous researches reveal many commonalities concerning student housing, the increases in HMO properties, and designation of 'student areas' across a range of English Cities such as Leeds, Newcastle, Bristol,

Nottingham and Southampton (Smith and Holt, 2007; Clapaham et al., 2014; Petrova, 2017). Therefore it is reasonable to expect Sheffield students to share similar to the experiences of students residing in similar Cities across England[1]. For instance, the *Core Cities Group* (including the largest and economically most important cities outside London), includes Local Authorities all characterized by large student populations and similar housing markets. It is suggested that student housing and community issues are not specific to one area (Smith and Hubbard, 2014), and that from analysis of 2001 census data it is shown that there are 22 towns and cities across the UK with at least 1 ward of 10% or more full-time students living in private housing.

As such, Sheffield was chosen as a typical UK University environment. The primary research data collection method for this study was through a web-based questionnaire distributed through a mailing list at the University of Sheffield of students subscribed to receive survey invitations. This included 2500 students from undergraduate through to PhD level, including full-time and part-time students.

3.1 Theoretical Framing

Students are often disadvantaged by a lack of knowledge and interest in energy efficiency measures, and a lack of awareness of the concept of fuel poverty. This brings about two potential theoretical framings of the issue. The first is an agency theory perspective of the rental housing market (IEA, 2007). Under agency theory the landlord and the tenant have differing incentives (the landlord wishes to maximise rental revenue and minimise costs, the

[1] The complex political geography of the United Kingdom limits this study to generalise about England. At the time of writing, Scottish Universities did not charge tuition fees to Scottish students. Scotland's devolved Parliament is responsible for housing, and passed laws in 2013 regulating the activities of letting agents and private landlords, with Wales and Northern Ireland following suit in 2016. These measures do not apply in England (McKee et al., 2017).

tenant wishes to minimise housing cost expenditure and maximise the comfort of the internal environment), leading to the arising of split incentives (IEA, 2007; Ambrose et al, 2016). At present there is little incentive for landlords to attain high standards of energy efficiency in their properties, since it is the student tenants that will benefit from such measures. Research from New Zealand suggests that the benefits of energy efficiency improvements extend beyond financial gains and significantly impact the health of occupants (Millar et al., 2009; Ambrose, 2015), yet the tenant (who occupies the property on only a short term basis) has little incentive to install energy efficient measures (Bradbrook, 1991) as the upfront costs to do so, and the lack of long-term benefit provide barriers to action. Bradbrook (1991) highlights the 'carrott and stick' approach as describable to bring together incentives of the landlord and the student tenant, such as through tax credits and legal requirements.

A second theoretical perspective is that of energy cultures, and in particular the roles of existing cultural norms. Stephenson et al. (2015) draw together ideas from structuration theory and practice theory to present how the interactions between material cultures, practices, norms, and external influences shape behaviours and relationships with energy practices. In the context of student housing, these household norms arise from the importance assigned to housing characteristics, for example the desire to live in relatively cheaper accommodation that is closer to University buildings. Material cultures relating to the expectations of student properties may indicate that is acceptable, and even socially expected, for students to live in relatively poor quality properties (Hubbard, 2008). Energy costs are typically a smaller proportion of household expenditure, and are invisibly embedded into many household practices and therefore it is easy for students to ignore them. The cost to increase awareness of energy efficiency measures, schemes, entitlements and finance may outweigh the benefits from installing the measures themselves (IEA, 2007).

These concepts, combined with external influences, where control over the physical structure of the property, type of heating, and decision to insulate lies elsewhere leaving the student tenant with a narrow line of control leads to a situation where is likely that a significant amount of flat-sharers amongst young adults, and particularly students, live in conditions that would be described as fuel poverty (Bouzarovski and Cauvain, 2016; Petrova, 2017) .

This energy culture is linked to information asymmetry, it is costly and time consuming for individual tenants to learn enough about fuel poverty and its potential solutions (Ambrose, 2015), and it is unclear if the residents themselves acknowledge or recognise that they are experiencing fuel poverty in the first place.

3.2 Questionnaire Survey

A questionnaire survey was constructed based on previously published fuel poverty and student-based studies (Thomsen and Eikemo, 2010; Anderson et al., 2012; Scott et al., 2014) as well as coping strategies in elderly populations (Chard and Walker, 2016). The link to the survey webpage was distributed through an internal mailing list at the University of Sheffield to coincide with the end of the heating period (between February and April). It is also a popular time for returning students to make housing choices for the following academic year and therefore represented a time when students would be prioritising their housing preferences. Students were also sent a cover letter (in an electronic format) explaining the purpose of the study, and given the option to contact the research staff directly with enquiries.

20 questions were included in the survey; the questionnaire was coded through an online software, and advanced participants through questions dynamically based on responses. One reminder email was sent in order to increase the response rate. No incentive was offered; as

such, respondents were volunteers, and the composition of the sample might not reflect the one of the entire population. Open-ended responses were analysed through content analysis.

303 students responded to the survey request, although not all surveys were completed in full. 286 finished the compulsory section of the questionnaire, leaving 17 incomplete surveys which were discarded. Therefore N=286 student respondents can be considered (equivalent to an 11.44% response rate). The questions covered issues relating to energy use in the home, experiences in maintaining comfortable internal temperatures, and knowledge and experience of fuel poverty concepts. This included: tenure, coverage of factors influencing choice of accommodation, household heating systems, the responsibility for paying energy bills, perceived thermal comfort, as well as priorities and strategies for dealing with energy bills often in the absence of regular income. Gauging student knowledge of energy efficiency and fuel poverty issues further, a series of questions asking for views on how to improve energy efficiency measures in the housing was also sought. Finally, comment boxes were provided for respondents to explain and enhance responses to questions.

3.3 Results Analysis

Students living in University accommodation were surveyed alongside those living 'off campus'. This was done to ensure that the findings were capturing the impacts of private sector accommodation (regarded as the most vulnerable and exposed to fuel poverty), and not a general attitude of the student population as a whole. University accommodation is generally offered as part of an 'all-in' package, including energy usage and bills and therefore we expect that fuel poverty is not a consideration for students in this type of accommodation. In this exploratory study, descriptive statistics were calculated in order to highlight the extent of fuel poverty awareness and occurrence, as well as understanding the ways in which students cope with low internal temperatures. Chi-square tests were run to assess the

statistical significance between off-campus and university accommodation students regarding housing conditions, internal living environments, and coping strategies.

4. Results

4.1 Respondent Characteristics

Respondent characteristics were voluntary, and therefore a complete picture cannot be drawn from our responses. From Table 1, Female students were far more likely to respond to the survey (over 70% of gender declarations were female); just over 21% of the students are renting a university-provided accommodation, with the rest living off-campus. The respondent characteristics also show that the majority of students (74%) live either in flats or terraced housing, and that 82.5% rent from either a private landlord (61.2%) or from the University. First year students are most likely to live in University accommodation, with a small number of Masters and PhD students. The remaining cohort of undergraduate students tends to live off-campus, and this is reflective of the findings presented in the academic literature (Hubbard, 2008).

******Insert Table 1 Here*****

4.2 Housing Choices

Students were asked to prioritise factors determining housing decisions, based on their importance, by using a Likert scale ranging from '1' (meaning that the criterion is not at all important) to '5' (meaning that the criterion is 'very important'). Of those students living off-campus, it became clear that the cost of rent was a very important factor (Table 2) in students' accommodation decisions, with 86% considering the cost to be either 'important' or

'very important', and just 8% considering rent to be 'not at all important' or 'not important'. Conversely, the focus on rent means that there is likely to be a preference towards the lowest quality housing. Neighbourhood safety and proximity to the University were also considered to be important factors (receiving, respectively, an average 3.95 and 3.80 rating), and 58% of students indicated that housemate opinions were 'important' or 'very important' in shaping their accommodation decisions, while the age of the house criterion was considered to be the least important. The results for preferences do hint of awareness of energy efficiency characteristics in housing. 58% of students surveyed suggested that the presence of energy efficiency measures is 'important' or 'very important' in deciding what properties to choose (for a total average rating of 3.64), and 68% consider double glazing to be 'important' or 'very important' (although it must be noted that double glazing is not necessarily sought after just for energy efficiency purposes, providing also advantages in terms of sound insulation and safety).

*****Insert Table 2 Here*****

4.3 Quality of the Housing Stock and Keeping Warm

Figures 1 and 2 show the breakdown of responses from the survey by experiences of internal temperatures in accommodation during the winter months. In Figure 1, 58% of the respondents highlighted that their accommodation is cool (either comfortable or too cool). Whilst 'comfortably cool' is not problematic, the results also highlight that 66% of respondents would prefer a warmer house during the colder months, an outcome which does have implications for fuel poverty. This heating problem becomes more pronounced when breaking down the sample by on-campus and 'off campus' students. A small proportion (25%) students living in University accommodations responded that their accommodation

was too cold, or that they desired a warmer accommodation during the winter months (see Figure 2).

*****Insert Figures 1 and 2*****

Figure 2 highlights potential fuel poverty issues in private sector student accommodation. 74% of students surveyed living in private sector housing expressed a desire for warmer housing during the winter months, and 42% felt that their accommodation was too cool during the winter months and that this finding is statistically significant ($\chi^2(1, N = 242) = 16.26, p < 0.01$).

Examination of the methods employed by students to keep warm during the winter months is highlighted in Table 3. The most popular strategies to keep warm included: putting on extra clothes and hot drinks; these practices are similar to those observed in the general population (Ambrose et al., 2016). Where significant increases in the performance of these activities do arise in cold homes are: going to bed early and cutting back spending on energy use, and hot water bottle usage. It can be noticed that when filtered by those students who wished for warmer housing during the winter months, or that their housing was too cool, these results become more pronounced, as shown in Table 4. What these results reveal is that there is an underlying issue of students living in inadequately heated accommodation and that their response to rising energy bills is to cut-back on energy usage, further exacerbating the problems they experience with cold homes. It can be also noticed that a low, but significant, proportion of students started cutting back their expenditure on essential goods (such as food) for keeping up with energy bill payments, suggesting that some segments of the student population may be affected by a 'heat or eat' dilemma in winter months (Beattie et al., 2014).

*****Insert Table 3 Here*****

Insert Table 4 Here

4.4 Attitudes to Fuel Poverty and Energy Issues

From these responses it appears that there is a problem with fuel poverty and the affordability of energy in off-campus accommodation in Sheffield. However, the student responses indicate that this is a low priority in their housing decisions, and that by asking students directly whether they consider themselves to be in fuel poverty after providing the definition reveals that students do not consider themselves to be in fuel poverty, shown in Table 5. This emerging finding clearly represents a difficulty in attracting support for policies to alleviate these issues.

Insert Table 5 Here

These results indicate that the overwhelming majority of students surveyed do not consider themselves in fuel poverty. However there is a rise in the proportion of those living in off-campus accommodation that consider themselves to be in fuel poverty when compared to those living in university provided accommodation although this is not statistically significant at the 0.05 level ($\chi^2(1, N = 218) = 3.36, p = 0.07$). Given the results from student internal living conditions, it could be suggested that students under-report themselves for fuel poverty issues, possibly believing that it does not apply to them as a concept. Therefore, this is an issue that requires further in-depth consultations given the methods employed by students to keep warm during the winter months, and that a large proportion of students either report being too cool, or a desire to maintain warmer internal temperatures during the winter

months.

5. Discussion

The findings from our survey of 303 students from the University of Sheffield highlights that there is an underlying experience of cold internal temperatures, and activities undertaken amongst the student population to keep warm during winter months. These experiences are more pronounced in off-campus populations than those living in University accommodation. The literature underlying this study and survey highlights how research into fuel poverty neglects the student population, and that contemporary research into student accommodation and populations is geared towards establishing the patterns of student population clustering and the impacts this has on relationships between the university community and the rest of the urban environment. This research usually focuses on community displacement, instability of tenancies, and wider practical issues such as car parking and rubbish disposal. The quality of the housing stock and the quality of living conditions is usually overlooked for the duration of student tenancy. Concerns of the housing stock condition are only evaluated in terms of the return of the housing stock to more 'traditional' tenancies, associated with decline for future residents (Smith and Holt, 2007; Hubbard, 2008) as a result of poor maintenance rather than from an energy perspective.

The traditional living arrangements for university students is associated with an initial year living in University accommodation followed by moving into privately rented, 'off campus' accommodation for following years. Studies conducted by (Rugg et al., 2002; Kemp, 2011) conclude that student populations are able to adapt to different types of accommodation, but inevitably the short-term nature of student tenancies lead to concentrations in terraced housing, often of low quality. The short-term nature of these

tenancies further reduces the incentives for landlords to undertake energy efficiency improvements to their properties for tenant benefit. The findings from the survey of University of Sheffield students correspond to these results.

Previous research into fuel poverty focuses on the definition of the concept; however, as discussed previously, given that students generally are not working nor in receipt of income-support benefits, they are not recorded on any official statistics as experiencing fuel poverty. Therefore, they do not qualify for fuel poverty alleviation schemes. The 2014 report from the Eaga Charitable Trust already recommends that HMOs are subject to minimum energy efficiency requirements set by the Government of EPC of E grade or higher. Universities would be able to demand that landlords letting to students meet these minimum standards or higher to gain accreditation but no legislation exists to make these standards compulsory.

Whilst student populations place greater emphasis on rent, proximity to university, and neighbourhood safety, there is recognition in the importance of energy efficiency levels in the housing stock, albeit of less importance at present (Thomsen and Eikemo, 2010). While students do place some importance on energy efficiency measures in Sheffield, further research is required to establish the role that landlords, letting agents, and planners play in encouraging students to locate in certain areas of the city (Hubbard, 2008) which may include areas of low energy efficiency levels. Responses from students indicate that 63% of students responding that are living in off-campus accommodation have experienced problems with energy bill payments over the past year, a 58% have taken steps to keep warm. Despite these struggles to maintain internal temperatures and keep warm to a comfortable extent, only 15% of the students surveyed considered themselves to be in fuel poverty. These findings may stem from a lack of awareness of the fuel poverty concept, or due to the fuel poverty concept generally being associated with low income and elderly residents, which students do not

consider themselves to be part of. Given that students are overlooked by policy makers, and that students themselves are not identifying themselves as a vulnerable target group, it is unlikely that the poor quality of student housing will be addressed without significant changes in research and policy focus to raise awareness of this issue. On a practical side, universities could play a stronger role in addressing these issues, by engaging with providers, policy makers, and student bodies, trying to implement the following interventions:

- Engagement of Energy Providers and Landlords to ensure that students can benefit from the cheapest energy suppliers.
- Promotion of energy efficiency retrofitting schemes addressing low heat retention properties in the privately rented market (especially for houses in multiple occupation), either through providing incentives to private landlords or through mandating minimum efficiency standards when letting to students or young professionals.
- Engagement with Local Authorities to address chronic inefficiencies in the private rented sector, and in particular in student housing, such as facilitating energy efficiency schemes and identifying areas that could be targeted.
- Engagement of local Students' Unions for Raising "Fuel Poverty awareness", as the collective power of these bodies can exert greater pressures on housing providers and policy makers than individual student households.

6. Conclusions and Policy Implications

Recent expansions in Higher Education in the UK since 1992 have created a massive demand for term-time accommodation for students, massively outstripping the supply of University provided accommodation. In general, the UK housing stock is one of the oldest and least efficient in Europe, and the private rented sector is often singled out for containing some of

the least energy efficient, and in worst condition properties. While all these elements may be strong determinants for fuel poverty across student population, it is apparent that the current definition of fuel poverty overlooks student groups. The issue of 'student fuel poverty' seems to be largely overlooked in academia and policy focus, as also recently pointed out by a study from the National Union of Students (NUS, 2016).

Our research on a sample of the student population from the University of Sheffield suggests that there is an underlying fuel poverty problem, particularly with regards to students living in privately-rented, off-campus properties. These students are experiencing situations that are in common with residents living in fuel poverty. Joining of the two concepts of studentification and fuel poverty can help to shape the direction of future research in terms of how the physical community infrastructure (in particular the housing stock) impacts on student comfort. This would require policy-making that tackles the root causes of the condition of the accommodation provided to students and the impacts this has on their quality of life and general wellbeing. The implications for housing policy in the UK is that there is a need for tightening of energy efficiency regulations for private sector housing in general (which contains some of the lowest energy efficiency levels), and in particular, there is a need to empower Universities to provide landlord certification of suitable accommodation to ensure that student accommodation meet the necessary energy efficiency standards, and therefore minimise the risks of fuel poverty arising in student communities.

Overall there is a need to facilitate a connection between research into studentification, with that of the energy efficiency and fuel poverty agenda. Whilst students may not actively identify themselves as living in fuel poverty, the results here suggest that there is an overlooked issue of students living in sub-optimal conditions. Expanding the study to investigate the incidences of fuel poverty, and awareness of fuel poverty and energy issues by cohort of degree level, city/location of origin, and neighbourhood of residence during term

time can enrich the results and compared to student populations beyond Sheffield. Further research is needed to establish the ways in which the magnitude of students' Fuel Poverty, and methods that can be applied to improve the condition of student accommodation to alleviate this. This requires action from student groups (such as the NUS), Universities, Local and National Governments as well as landlords and housing providers.

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Table 1 - Characteristics of Respondents from Sheffield University

		Total Valid Respondents	**University Accommodation**	**Off-Campus**
All Respondents	All	303	61	242
Respodent Sex	Male	63	13	50
	Female	152	33	119
	Other	1	0	1
Respondent Age	Under 18	0	0	0
	18 – 21	55	29	84
	22 – 25	50	9	59
	26 – 29	30	5	35
	30 – 33	12	2	14
	34 – 36	5	0	5
	36+	18	1	19
Faculty	Arts and Humanities	38	10	28
	Engineering	32	10	22
	Medicine, Dentistry and Health	26	2	24
	Science	62	17	45
	Social Science	57	7	50
	International Faculty	1	0	1
Level of Study	1st Year Undergraduate	37	28	9
	2nd Year Undergraduate	25	1	24
	Final Year Undergraduate	23	0	23
	3rd Year Undergraduate or higher (excluding final year students)	15	0	15
	Masters	42	9	33
	PhD	74	8	66
Employment Status	Part-time during term-time	46	2	44
	Holiday/Seasonal Employment	18	4	14
	Un-paid internship/Voluntary	5	2	3
	Not currently in employment	122	35	87
	Other	22	2	20
Tenure	Rent from private landlord	175	0	175
	Rent from University	61	61	0
	Rent from relatives (including parents)	6	0	6
	Own with a Mortgage	18	0	18
	Own outright	12	0	12
	Other (Please Specify)	3	0	3
	Rent from local authority or social housing provider	11	0	11
Accommodation Type	Flat	128	58	70
	Terraced house	97	1	96
	Semi-detached house	40	1	39
	Detached house	17	0	17
	Other (Please Specify)	4	1	3

Table 2 - Importance of Variables in Making Housing Decisions

Question	Not at all Important	Not Important	Moderately Important	Important	Very Important	Mean
Proximity to University	6 (3%)	9 (5%)	55 (28%)	74 (38%)	52 (27%)	3.80
Proximity to Friends/Other Students	18 (9%)	41 (21%)	78 (40%)	48 (25%)	11 (6%)	2.96
Proximity to Shops and Pubs	3 (2%)	10 (5%)	68 (35%)	89 (45%)	26 (13%)	3.64
Proximity to Transport (Train Station/Bus Route/Tram Stop)	6 (3%)	24 (12%)	65 (33%)	68 (35%)	33 (17%)	3.50
Proximity to City Centre	10 (5%)	59 (30%)	77 (39%)	37 (19%)	13 (7%)	2.92
Appearance of the Area	2 (1%)	13 (7%)	77 (39%)	80 (41%)	24 (12%)	3.57
General Aesthetics of the House	3 (2%)	11 (5%)	50 (26%)	94 (48%)	38 (19%)	3.78
Presence of Double Glazing	10 (5%)	14 (7%)	39 (20%)	82 (42%)	51 (26%)	3.77
Presence of Energy Efficiency Measures (e.g. insulation, new boiler)	4 (2%)	20 (10%)	58 (30%)	75 (38%)	39 (20%)	3.64
Cost of Rent	11 (6%)	3 (2%)	14 (7%)	56 (29%)	112 (57%)	4.30
Neighbourhood Safety	1 (1%)	6 (3%)	46 (24%)	92 (47%)	51 (26%)	3.95
Age of the House	27 (14%)	71 (36%)	56 (29%)	33 (17%)	9 (5%)	2.62
Housemate(s) Opinions	24 (12%)	21 (11%)	38 (19%)	79 (40%)	34 (17%)	3.40

Figure 1 - Comments on Internal Temperature of Housing in Winter Months

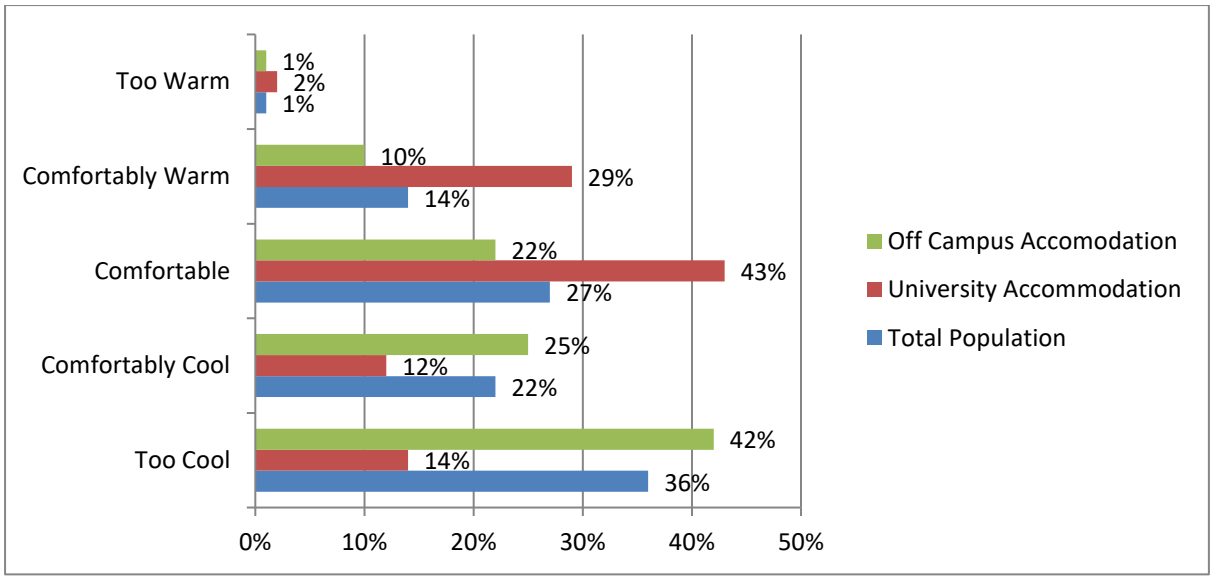

Figure 2 - Comments on Preferences for Ideal Housing Temperatures (when compared to currently experienced ones) in Winter Months (October to March)

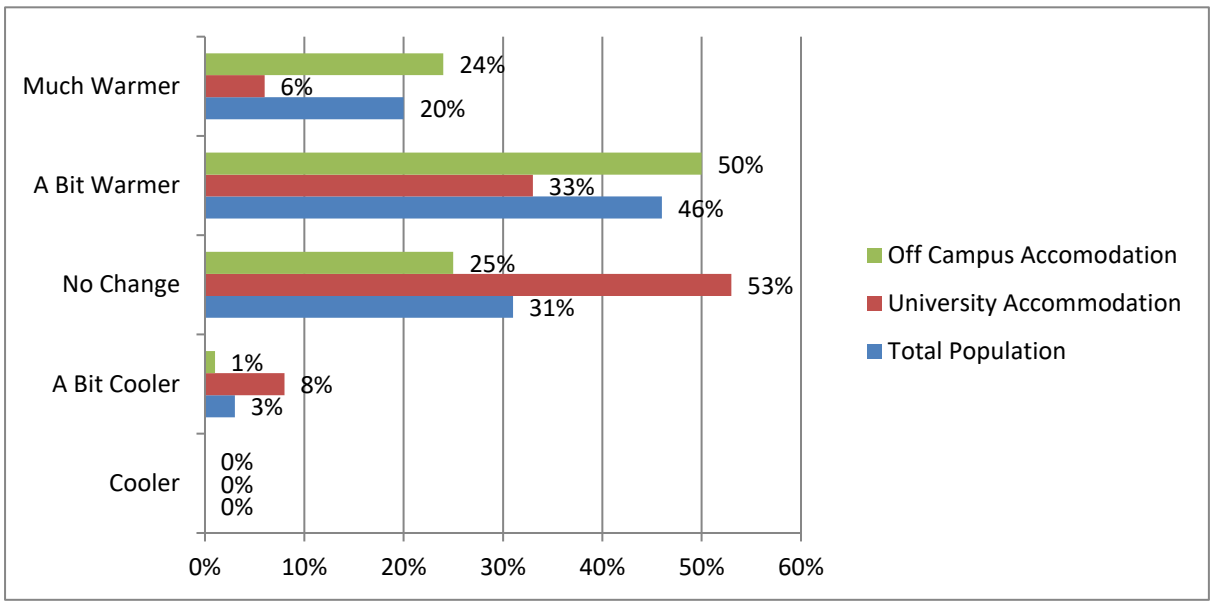

Table 3 - Which of the following actions have you taken over the past year to / keep up with energy bill payments?

	Total Population	**University Accommodation**	**Off Campus Accomodation**
No Problems	39.9%	59.0%	37.6%
Cut Back Spending on Energy Use	30.2%	11.5%	33.8%
Cut Back Spending on Food	8.6%	4.9%	9.1%
Borrowed Money From Friends/Family	6.0%	6.6%	6.1%
Used Savings	8.3%	1.6%	9.1%
Sold Possessions	1.0%	1.6%	0.8%
Increased Overdraft/Credit Limit	4.0%	0%	4.6%
Taken out commercial loans	1.0%	1.6%	1.1%
Earned Extra Income	7.0%	0%	8.0%
Put on Extra Clothes	64.5%	68.9%	64.3%
Used Hot Water Bottles	31.9%	27.9%	32.7%
Gone to Bed Early	18.6%	11.5%	18.6%
Taken Exercise	18.3%	14.8%	19.0%
Had Hot Drinks	61.5%	65.6%	62.0%
Stayed with Friends/Relatives	4.3%	3.3%	4.2%
Closed Curtains During Day	19.3%	16.4%	20.2%

Table 4 - Actions to Keep Warm by Students Cold during the Winter Months

	House is too Cool	**Would like a Warmer House**
No Problems	40%	42%

Cut Back Spending on Energy Use	58%	52%
Cut Back Spending on Food	22%	17%
Borrowed Money From Friends/Family	12%	10%
Used Savings	17%	16%
Sold Possessions	2%	2%
Increased Overdraft/Credit Limit	15%	8%
Taken out commercial loans	2%	1%
Earned Extra Income	19%	14%
Put on Extra Clothes	95%	95%
Used Hot Water Bottles	53%	52%
Gone to Bed Early	41%	33%
Taken Exercise	30%	29%
Had Hot Drinks	91%	91%
Stayed with Friends/Relatives	6%	9%
Closed Curtains During Day	33%	31%

Table 5 - Do Respondents Consider themselves in Fuel Poverty?

	Total	University Accommodation	Off-Campus Accommodation
Aware of Fuel Poverty Concept	114 (50%)	18 (37%)	96 (53%)
Not Aware of Fuel Poverty Concept	115 (50%)	31 (63%)	84 (47%)
Consider themselves to be in Fuel Poverty	33 (15%)	3 (7%)	30 (17%)
Don't Consider themselves to be in Fuel Poverty	185 (85%)	43 (93%)	142 (83%)