Housing investment and health in Liverpool

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This is a study of the impact of housing investment on health status and use of health care services by low income residents of Liverpool. It was undertaken with the guidance of a steering group consisting of

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Warm thanks also: to all those residents who were willing to be interviewed and have their homes surveyed; to staff of Liverpool HAT for their assistance with information; to area-based staff for their help with contacting residents; to staff at Merseyside Information Services, the Department of Public Health at the University of Liverpool and Gerry Addyman for undertaking interviews; to the report editor Patricia Stubbs.

The study was commissioned and financed by Liverpool Housing Action Trust, The Housing Corporation and the former National Health Services Executive of the North West Region of England.

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Preface

The impact of housing investment on health status and use of health care services by low income residents of Liverpool

This study and the report itself are a collective effort. The Steering Group made a creative input, especially in recommending us to address the psychosocial route to health as well as the physiological route via physically improved living conditions. Of the research team, Jan Gilbertson from CRESR at Sheffield Hallam University contributed to the overall development of the project and managed the data processing and analysis. Mike Grimsley was responsible for conceptual development and for the multivariate statistical analysis. Roger Critchley led the programme on temperature monitoring and the analysis of energy efficiency.

Of the academic partners, John Brazier and Russell Slack from the School of Health and Related Research at the University of Sheffield developed and analysed the SF-36 Health status measure and the take-up of health and community services. David Ormandy from the University of Warwick and Phil Parnham from the School of Construction at Sheffield Hallam University contributed in various ways to the house conditions and energy efficiency surveys. Kay McDermot developed the measure of independent living and undertook assessments in a special study. Household interviews were undertaken by Merseyside Information Services, members of the Department of Public Health at the University of Liverpool and Gerry Addyman. Geoff Green had overall responsibility for the project and brought together the elements of this final report.

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Executive summary

Method

1. Research project

The whole research project is a 'before and after' study of residents of 22 tower blocks owned by Liverpool Housing Action Trust (HAT). It was commissioned by HAT and partners in the Housing Corporation and Department of Health. The aim was to assess whether moving to new housing has an impact on residents' health and quality of life.

2. Methodology

At the heart of the study are two waves of property and household surveys (1997 and 1999/2000) across an intervention and control group, measuring changes in energy efficiency, temperatures, thermal comfort, security, the renewal process, heath status and use of health care services. The research was designed to compare outcomes in the two groups in order to identify any positive changes in health and quality of life arising from the HAT investment programme.

3. Logistical challenges

Originally scheduled for completion in 2000, study timelines were extended because of slippage in the redevelopment process, causing higher than anticipated attrition rates between the baseline and follow-up surveys. The energy efficiency of some tower blocks was also higher than anticipated, reducing the chance of detecting significant changes. The research team adapted the study to meet these challenges.

4. The residents

The people at the heart of our study are a remarkable group of survivors – mainly retired people who used to work in manual occupations on low incomes. Their representatives were very supportive of the study throughout.

Results

5. Living conditions: energy efficiency

Though residents reported that HAT's investment in 'catch up' repairs greatly improved living conditions after the tower blocks were acquired from Liverpool City Council in 1993, average levels of energy efficiency in 1996 were still much lower than the national average. The redevelopment process generally brought about dramatic improvements. However, research team surveyors discovered that a significant minority of residents, transferring from certain energy-efficient tower blocks, experienced relatively small improvements. This more complicated picture obliged the team to look beyond a simple comparison between the residents transferring from tower blocks and those staying put.

6. Living conditions: temperatures and thermal comfort

Most tower-block flats were difficult to heat and the majority of residents experienced fuel poverty. After moving, residents could afford to heat their bedrooms and living rooms to a comfortable level. Average winter temperatures improved from 15.0°C to 20.0°C in living rooms and in bedrooms from 14.0°C to 17.7°C. These averages were pulled down below national benchmarks by a significant minority of tenants who either had difficulty controlling their new central heating system or, in the absence of utility bills, were apprehensive about fuel costs.

7. Feelings of safety

Over 90 per cent of the tower-block residents (more than the British average) felt safe in their flats but only 40 per cent (less than the British average) felt safe walking out alone at night. Despite their apprehension about the security implications of a move to ground floor accommodation, residents of the new property feel as safe as before in their homes and safer out alone – the proportion feeling safe or very safe out alone increasing from 40 per cent to 55 per cent. Fear of crime is linked to physical disability and poorer mental health.

8. Housing management

HAT is a star performer in the management stakes with about 85 per cent of residents satisfied with its performance in providing a range of services. It compares well both with the previous property owner and with registered social landlords elsewhere.

9. The process of renewal

Residents are generally satisfied with the process of housing redevelopment and with the choice of their new home. But about half were stressed by the uncertainty of the move or the upheaval of moving. Residents who were stressed, worried or frightened by the process reported significantly poorer mental health, lower vitality and social function, and more pain. The outcome of the process was very high levels of resident satisfaction with their new homes.

10 Health status and use of health services

Using the SF-36 measure, the health of HAT residents is poor compared with the general population – even after taking account of differences in age and sex. Critically, residents of the new property report no systematic improvement in their health compared with those who stayed put. However, these movers also report reduced use of GP services compared with when they occupied tower-block flats. Consultation with a GP in the previous two weeks remained at 30 per cent for those who stayed put – twice the national average – but fell from 37 per cent to 24 per cent for movers into new property.

11. Influences on the health of residents

Though there is no general improvement in the health of residents moving into new homes, those experiencing the biggest improvements in energy efficiency do report significant improvements in both emotional well-being and vitality. There is also a consistent pattern of improved health for residents reporting increases in their overall comfort. But for many, the stress of the redevelopment process is associated with lower levels of health, whether experienced by tower-block residents awaiting a move, or those who have moved.

12. Independence

HAT has enhanced the independence of a majority of disabled residents by applying the concept of 'Lifetime Homes' in its redevelopment programme and employing occupational therapists to assess residents' needs prior to their move to new homes.

Conclusion

The HAT redevelopment programme has delivered energy efficient and warm and comfortable homes. Over 95 per cent of residents are happy with this outcome. The picture of health is complicated by varying degrees of improvements in warmth and comfort and by the stress of the redevelopment process.

Part 1
Methodology

1

Introduction

Our holistic study provides robust evidence for the policy community, especially regional and local partnerships with cross-cutting programmes beyond the scope of any single agency. Health is both a consequence and determinant of sustainable development; a cornerstone of the 'Investment for Health' approach developed by the public health team of the North West Region of England:

Investment for health recognises that action across all sectors is required to improve health, which in turn, produces economic and social benefits…Health is largely determined by social, economic and environmental factors which are beyond the influence of medicine and health and social care services. The greatest improvements in people's health have arisen from social and economic improvements which also promote health. [1]

For the public health team, and their partners at the regional and local level, housing is a major determinant of health and a priority for action. There is now a great opportunity to insert a health dimension into the costs and benefits of programmes involving every sector and many partners. For the first time in a generation, the UK government has initiated a programme of comprehensive redevelopment in areas of low housing demand in the Midlands and North of England. 'NewHeartlands' is one of nine market renewal pathfinders, covering deprived neighbourhoods in the city of Liverpool and nearby. Its vision is to:

stabilise the NewHeartlands areas with a diverse range of tenures, house values and household income groups. Every household will have access to a home of a high standard, in neighbourhoods with high-quality physical environments which are provided with a range of employment opportunities and good-quality health, education and other services.[2]

Comprehensive redevelopment programmes of a previous era often went badly awry. The process of renewal could be distressing and the outcomes unsustainable. To avoid making these mistakes again, it is important to draw on the successful experience of recent housing renewal programmes. Our study focuses on one of the biggest. Over a 12-year period Liverpool Housing Action Trust (HAT) invested over £260m in housing renewal. We examine both the process and outcome with a focus on health and quality of life. Fortunately, Liverpool HAT had the foresight and, with partners from the Housing Corporation and Department of Health, provided funds to conduct a relatively robust longitudinal study. Otherwise, there is only limited scientific evidence that investing in the housing stock of deprived communities will independently contribute to improving the health of residents and break the vicious circle of low income, poor housing and poor health. A systematic review concludes there is a 'notable lack of good research evidence of the health gains that result from investment in housing'.[3] Our study of residential tower blocks in Liverpool is a response to this challenge.

Liverpool Housing Action Trust's capital investment in a new-build programme provided an excellent opportunity to investigate and isolate the 'housing' effect on health from the influence of other general deprivation factors. Over the redevelopment programme, many low-income tenants have transferred from poor-quality tower blocks to high-quality low-rise accommodation. Our study followed a group of residents living in the districts of Everton and Childwall who moved to new properties between 1997 and 2000, comparing changes in their health and quality of life with residents of the Sefton Park and Riverview tower blocks who were not scheduled to move during the study period (Figure 1).

Figure 1 The redevelopment programme

The *purpose* of the study was to investigate the hypothesis that a move to better housing, with high levels of energy efficiency and security, would be followed by an improvement in residents' standard of living (controlled for income), an improvement in perceived health status and a reduction in the use of a range of health services. It is hoped that evidence from the research will also assist the evaluation of HAT's development strategy, the wider 'housing plus' strategy for social landlords promoted by the Housing Corporation and the Market Renewal initiative promoted by the UK Government.

1 North West Public Health Team (2003) Investment for Health: a Plan for the North West of England. Department of Health.
2 Office of the Deputy Prime Minister, Housing Signpost. 18 (March 2004).
3 Thomson H, Petticrew M, Morrison D (2002) Housing Improvement and Health Gain: A Summary and Systematic Review. Occasional Paper No 5. MRC Social and Public Health Sciences Unit.

Housing plus

From the beginning of the study two key concepts shaped the policy context – *housing plus* and *health gain*. The first was summarised by Hilary Armstrong, Housing Minister, in a speech to the National Housing Federation's 1997 annual conference:

Housing on its own cannot create a society, and it cannot turn an area around. People need houses but they also need jobs, transport to get jobs, access to schools and shops and much more. The concept of what I would like to call housing plus is a glimpse of the blindingly obvious. But it is amazing how often the obvious has been overlooked.

The Minister's speech set the seal of approval on the concept of housing plus developed over the previous five years by the policy and academic communities working hand in hand. Key milestones along the way were *Building for Communities: A Study of New Housing Association Estates* by David Page[4]; the keynote speech of Chief Executive Christine Laird to the Chartered Institute of Housing 1995 Annual Conference, supported with evidence from the Centre for Regional Economic and Social Research on the impact of housing investment on health and quality of life; and *Housing Plus, An Agenda for Social Landlords* by Ann Power with Liz Richardson, which was commissioned by the National Tenants Resource Centre with a grant from the Housing Corporation.[5]

Within the policy community, housing plus has evolved as a 'blindingly obvious' and inclusive concept – social landlords wish to rebuild whole communities and involve the myriad service providers who help sustain them.[6] In a sense this is no more than a welcome return to the broader political vision behind the best post-war municipal housing in many cities. But in the fiscally tougher 1990s there were limits to simply adding more public services into the cost equation. At the very least HM Treasury[7] wished to see synergy from regeneration, by which they mean 'the process by which programmes interact with each other and give *added value*, achieving something more than individual programmes would'.[8]

During the early years of the 21st century, housing plus has merged with an ambitious government programme of renewal for the most disadvantaged neighbourhoods in England. In earlier versions of the strategy housing investment was regarded as one of the key inputs, contributing *inter alia,* to health as one of four core outcome targets. In the New Deal for Communities programme, launched by the Prime Minister early in 2001, improving housing and the physical environment is designated the fifth core outcome target.

Health gain

The concept of health gain is a form of *added value* and provides much of the rationale behind our study. *The Health of the Nation,* published by the UK government in 1992, held out the possibility of comparing the costs of investment in 'upstream' determinants with the 'downstream' benefits to health. In practice, however, the NHS soon focused on the costs and benefits within its internal market rather than across sector boundaries. At the beginning of our study, early in 1997, we therefore drew on the intersectoral framework provided by the Word Health Organisation's (WHO) broad vision of a Global Strategy for Health for All by the Year 2000 and the Health for All Targets first published by WHO in 1984.[9]

The election of a Labour Government in May 1997 sharpened the debate about housing and health without diminishing the requirement for evidence to prove the links. Housing and the environment were (and are) key elements of *Our Healthier Nation* (1999), which encompassed a wider range of determinants in the new government's strategy to improve health and reduce health inequalities. The *UK Fuel Poverty Strategy*[10] is one of many 'joined-up' initiatives underlining an interdepartmental commitment to health gain. In their forward, the Ministers of State for Industry and Energy and for the Environment refer to those living in fuel poverty:

They suffer an increased chance of ill health, and find it more difficult to recover if they do fall ill. Fuel poverty imposes higher health costs and is a factor in the thousands of excess winter deaths each year, particularly amongst pensioners.

The Acheson Report,[11] commissioned within weeks of the government taking office, reported on the evidence of determinants of health and health inequalities. Housing and the environment are one of 11 areas identified for future policy development; and the quality of the housing stock and the fear of crime and violence in the immediate neighbourhood are considered as two key determinants of health requiring policy interventions. Again, the evidence is that these determinants nest within wider structural inequalities in our society.

4 David Page (1993) Building for Communities: A Study of New Housing Association Estates. Joseph Rowntree Foundation.
5 Power A (1966) Housing Plus: An Agenda for Social Landlords. London School of Economics.
6 The Housing Corporation (1997) A Housing Plus Approach to Achieving Sustainable Communities.
7 HM Treasury (January 1995) A Framework for Evaluation of Regeneration Projects and Programmes.
8 DoE (now DETR) (March 1996) Bidding Guidance: A Guide to Bidding for Resources from the Government's Single Regeneration Budget Challenge Fund.
9 Later updated by Health 21 (1999) as Health for All in the 21st Century. Copenhagen: WHO Regional Office for Europe.
10 DEFRA/DTI (November 2001) The UK Fuel Poverty Strategy .
11 Acheson D (1998) Independent Inquiry into Inequalities in Health. London: HMSO.

The challenge for the research community is to measure the *independent* effect of different investments in the housing stock on the health and quality of life of its residents. Here the second Wanless report on the economics of public health is generally critical of the lack of depth and expertise in the core research disciplines:

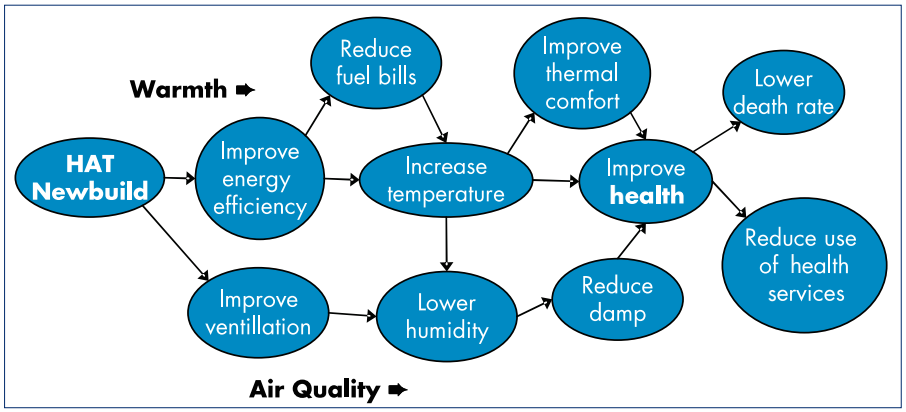
This [lack of expertise] coupled with a lack of funding of public health intervention research and slower acceptance of economic perspectives within public health all contribute to the dearth of evidence on cost-effectiveness. … It is evident that a great deal more discipline is needed to ensure problems are clearly identified and tackled, that the multiple solutions frequently needed are sensibly co-ordinated and that lessons are learnt which can be fed directly into policy.[12]

12 Wanless D (2004) Securing Good Health for the Whole Population. HM Treasury, HMSO.

Energy efficiency

The impact of energy efficiency measures on health is at the heart of this study. We have hypothesised that there will be a sequence of beneficial effects flowing from investment in the housing stock. Figure 3.1 shows two main pathways to health gain – first the principal route via increased warmth and comfort and then a secondary route via a reduction in damp and mould.

Figure 3.1 Pathways to health gain



Our previous study in Sheffield[13 14] demonstrated that a reduction in unit energy costs (consequent upon an improvement in energy efficiency) was more likely to lead residents to increase temperatures rather than cut fuel bills. However, where it is possible to do both, fuel savings may be used to buy other basic essentials of life and improve general living standards, possibly resulting in a health gain. This may result in an increase in temperature. The Sheffield study indicated that initial investment in the housing stock is associated with the proximate dependent variables of energy efficiency and temperature but has a weaker association with 'downstream' variables of poverty, health status and the use of health care services, because these are subject to stronger confounding variables.

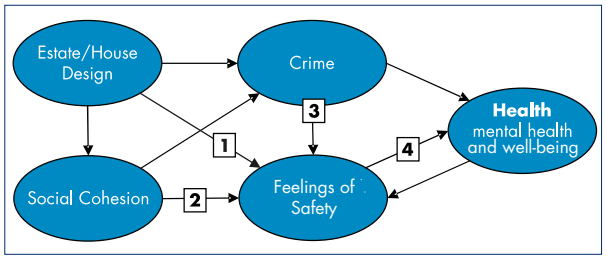
Security and safety

Following discussions with the Housing Corporation, with HAT officials and with tenants, we enlarged the scope of the study to cover two dimensions in addition to energy efficiency. The first was security and safety. Reflecting pioneering studies by Alice Coleman and Oscar Newman (summarised in David Page's 1993 work *Building for Communities: A Study of New Housing Association Estates*), the Liverpool HAT is committed both to designing security features into its development programme and to sustaining the community networks which, according to residents' focus groups, contribute to their security. The focus groups reported feelings of great security within their high-rise blocks and we set out to establish whether this positive picture is representative of residents as a whole and the extent to which it changes after residents move. We recognise it may be difficult to link the level of mental ill health, including stress and depression to the fear or effect of crime to the person or property. However, we aim to measure the association between the elements in Figure 3.2 (especially 1,2 and 4) both before and after the move.

The renewal process

The second additional dimension we examined is the health effect of the process of renewal – for good or ill. The MRC[15] review of housing improvement and health gain indicated that 'moving house is considered to be a stressful, health damaging life-event'.[16] In the field of social housing, Allen[17] attributes much of this stress to lack of opportunity to negotiate with the housing authority regarding the move. This fits into Easterlow's model of housing and health inequality in which lack of desired control is a significant source of stress.

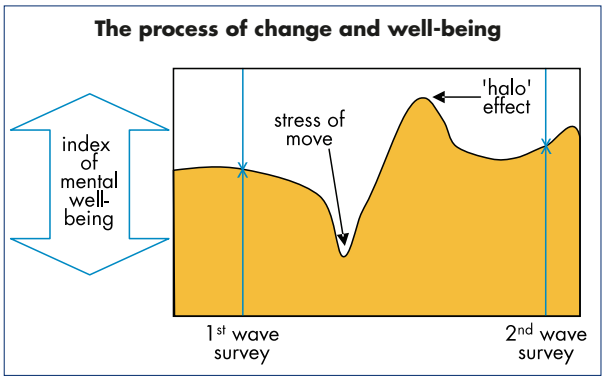
Figure 3.2 Fear of crime and health



According to the resident focus groups in our study, the management of change is indeed a big issue – because of (a) uncertainty in the period prior to a decision about the future and because (b) vulnerability associated with the decanting process appears to contribute to stress and insecurity. Relief immediately after the move may contribute to a temporary 'halo' effect. It is important therefore to distinguish the short-term 'roller coaster' effect on health of the renewal process (shown schematically in Figure 3.3) from any underlying health gain. For elderly residents, of course, the short-term is vitally important since it may equate with the rest of their lives.

13 Green G and Gilbertson JM (1999) Housing, poverty and health: the impact of housing investment on the health and quality of life of low income residents. Open House International. 24(1):41-53.
14 Green G, Ormandy D, Brazier J and Gilbertson J (2000) Tolerant building: the impact of energy efficiency measures on living conditions and health status. In Nicol F and Rudge J (eds) Cutting the Cost of Cold: Affordable Warmth for Healthier Homes. London: Spon Press: 87-103.
15 Thomson H, Petticrew M and Morrison D (2002) Housing Improvement and Health Gain: Summary and Systematic Review. Occasional Paper 5. MRC Social and Public Health Sciences Group.
16 Hooper D and Ineichen B (1979) Adjustment to moving: a follow-through study of the mental health of young families in new housing. Social Science and Medicine. 13(d):163-168.
17 Allen T (2000) Housing renewal – doesn't it make you sick. Housing Studies. 15(3):443-461.

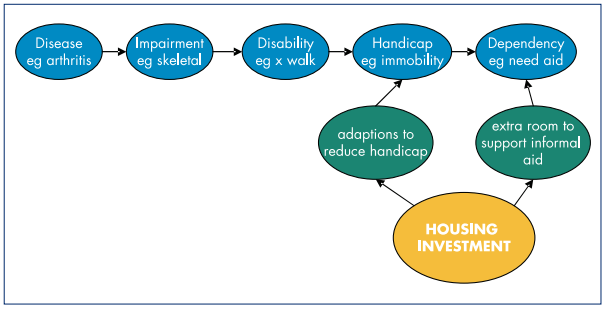
Figure 3.3 The possible effect of the process of renewal



Dependency

We also examined the 'Lifetime Homes' concept developed by the Joseph Rowntree Foundation and adopted by Liverpool HAT. The aim of Lifetime Homes is to improve the mobility and accessibility of those residents with irreversible disabilities and to anticipate the needs of those not yet afflicted. Figure 3.4 illustrates a causal sequence from disease to dependency and hypothesises (a) how adaptations may reduce handicap and (b) how the provision of an extra bedroom may facilitate informal care from relatives and reduce demand for formal health and community care.

Figure 3.4 Dependency



HAT deployed a special community support team (CST) both to assist with the process of moving house and to ensure residents' new homes were equipped to deal with relatively high levels of functional disability. As a key member of the CST, an occupational therapist was deployed to make individual assessments prior to the move and ensure that each new living environment was tailored to promote independence. We hypothesised that for any given level of physical disability, the move to a new home would improve independent living and might reduce dependency on health and social services.

Use of health and social services

Finally, compared with the earlier cross-sectional study in Sheffield, we proposed a more thorough investigation of the use of health and social care capacity. The nature and size of any impact on health care use by residents who have moved to better properties was unknown. It was possible that, if the positive changes in health status perceived in the cross-sectional study by residents of the upgraded properties were confirmed by the longitudinal study, then these changes might be accompanied by a reduction in use of primary and/or secondary care facilities. On the other hand, a general increase in well-being, feelings of worth and self-confidence, together with improvements in access to service sectors, and in public security arrangements which are included in the upgrading of the immediate environment of the properties, might allow residents to express previously unmet needs for health care, in which case usage rates might *increase* relative to those among residents of unimproved properties.

Aims and objectives

Our aim was to establish the strength and significance of any co-variation between housing conditions (including energy efficiency and security) and health status. Six specific objectives were:

1. To establish whether there is an association between improvements in the housing stock and changes in the health status and quality of life of residents.

2. To differentiate low income levels from 'basic essentials' poverty and establish whether improvements in the housing stock, especially energy efficiency measures, raise standards of living independently of income.

3. To measure the extent to which health gain and improved standards of living are associated with specific levels of investment in the housing stock.

4. To quantify the relationship between health status and varying levels of energy efficiency and security.

5. To gauge the impact of the process of renewal on residents' health.

6. To establish any variation in demand for health and community services following the transfer of residents to better quality accommodation and to estimate changes in costs for those commissioning these services.

Focusing on intervention and outcomes

The study covers interventions to improve housing conditions and reduce *inequitable* health variations.[18] When conceived in 1996, it differed from many other studies in the field which elaborated the *negative* impact of *poor* housing. Typically, in the series of 'Unhealthy Housing' conferences at The University of Warwick from 1987 to 1991[19] most academic contributors concentrated on 'the quest for explaining the nexus between inadequate housing and the ill health of its occupiers'.[20] By the year 2000, the academic and policy emphasis had shifted to assessing the value of measures to reduce cold conditions.[21] The MRC identifies our study as one of a small number seeking to measure health gain resulting from housing investment.[22] In seeking to advance our knowledge by measuring *positive* outcomes, our work uses a series of outcome measures with origins in separate academic disciplines. A second innovative feature of our approach is the integration of established methodologies of epidemiology, social science and the physical sciences.

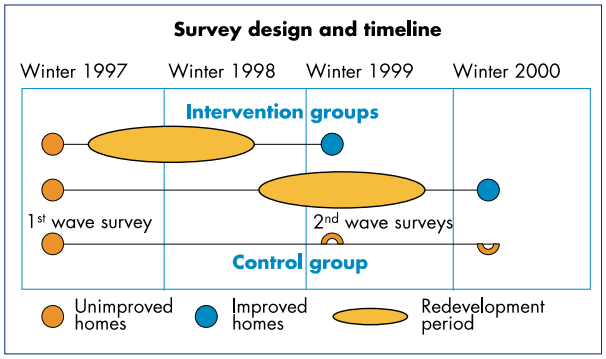
Building upon a cross-sectional study

Early in 1995 this outcome-oriented approach was piloted in the city of Sheffield. A team led by CRESR of Sheffield Hallam University undertook a preliminary research study to gauge the independent effect of housing improvements on the health status of low-income families. A largely locally-funded, cross-sectional survey compared the situations of broadly matching households in improved and unimproved blocks of similar construction. (These instruments are further developed in this study.) Income levels and lifestyles in the improved and unimproved blocks were similar. However, improvement was associated with an increase in satisfaction with housing, the eradication of dampness and of fuel poverty, and a halving of the proportion of households falling below the poverty line. About half the residents reported their health had improved following improvements to their property.[23]

Developing a longitudinal approach

The earlier Sheffield study highlighted a weakness in cross-sectional designs – the difficulty of isolating confounding factors. Although residents living in the improved property ranked higher on all eight dimensions of a multi-dimensional measure of health status (SF-36), on only two dimensions (physical role, energy/vitality) were these differences significant at the 5 per cent level when employment was controlled for. These weaknesses were anticipated by the present research team, who have deployed proven survey instruments in a more robust longitudinal study. Such a study design is more effective in isolating confounding variables and can attach more significance to small changes in the key variables of health and quality of life. It can also better account for changes in health and poverty which are not the result of housing improvement. Finally, it significantly develops the methodology for calculating changes in the use of heath services. The basic features of the longitudinal study are summarised in Figure 4.1.

Figure 4.1 Design features of the study



The Liverpool study was originally structured around two waves of residents' interviews and house conditions surveys – the first in the winter of 1997, before those subject to the redevelopment moved, and the second in the winter of 1999, some time after the group was established in their new homes. An essential design feature for the project was the inclusion of a group of residents who were not moving during the study period. The residents scheduled to move are described collectively as the intervention group and are drawn from tower blocks in the Everton and Childwall districts of Liverpool. The control group was drawn from tower blocks in Riverview and Sefton Park. The two groups were monitored and compared over time.

In practice, although the first wave surveys were undertaken as planned in the winter of 1997, the timeline was extended because of slippage in the phased redevelopment programme. Instead of moving at the same time as the other half of the intervention group in Everton, residents of the Childwall tower blocks moved a year to eighteen months afterwards. The follow-up surveys for Childwall residents were therefore postponed and resulted in the second wave of interviews being undertaken in two separate stages.

18 Whitehead M (1990) The Concepts and Principles of Equity in Health. Copenhagen: WHO Regional Office for Europe.
19 Burridge R and Ormandy D (1993) Unhealthy Housing: Research, Remedies and Reform. London, Spon Press.
20 ibid. preface p.xii.
21 Rudge J and Nicol F (2000) Cutting the Cost of Cold: Affordable Warmth for Healthier Homes. London: Spon Press.
22 Thomson et al. op cit. See note 3.
23 See Green G (1996) Housing, energy, health and poverty. In Price C and Tsouros A (eds) Our Cities, Our Future: Policies and Health Plans for Health and Sustainable Development. Copenhagen: World Health Organisation, Regional Office for Europe; and Green G (1996) Housing plus: improving domestic energy efficiency and the health of residents. In Price C (ed) Case Studies in Sustainable Development and Health (2). Copenhagen: WHO Regional Office for Europe.

In February and March 1999, Everton residents in the intervention group were re-surveyed along with a matched control group of residents from Sefton Park. Between February and June 2000, Childwall residents were resurveyed[24] together with a matched control group from Riverview and Sefton Park. House condition surveys were undertaken at the same time. Such delays were outside the control of the research team. Statistical allowances have been made (where appropriate) to take into account the enforced staging of follow-up interviews.

24 It should be noted that some interviews were conducted relatively late on in the year as residents in the extra care block had not completed their moves until May and final temperature monitoring for this small group of residents was undertaken in the winter of 2001.

The elements constituting the pathways from housing investment to health are tracked using eight instruments and a number of measures shown in Figure 5.

Health

Our principal health outcome measure is the Medical Outcomes Survey Short Form 36 (SF-36) questionnaire which is an instrument for measuring health outcomes extensively reported by the Department of Health in its *Outcomes Briefing*.[25] It encompasses a broader range of health consequences than would be encompassed by measuring specific medical conditions. Its application and the results of the survey were comprehensively reviewed in an associated (unpublished) preliminary report on our baseline HAT study written by Russell Slack and John Brazier.

The SF-36 health survey originated in the USA[26] but has been anglicised for use in the UK[27]. It measures health perceptions via 35 items measuring health across eight dimensions, and one item measuring health change. It asks about people's own view of their health, and it is usually self-completed, though it can be interviewer-administered (as in this study). Responses to each item within a dimension are combined to generate a score from 0 to 100, where 100 indicates 'good' health on each of the eight dimensions. The eight dimensions are (1) physical functioning (2) role functioning - physical (3) role functioning - emotional (4) social functioning (5) mental health (6) vitality (7) bodily pain and (8) general health.

The SF-36 health survey instrument has been shown to be the most sensitive[28] of the general health measures (e.g. Brazier *et al.* 1992; Brazier *et al.* 1993) and hence the most suitable for detecting changes in the health of the population being examined here. However, we are also concerned that it should address the specific changes in mental health linked to issues of safety and security and to the process of development on the HAT estates. The SF-36 has five items tapping into aspects of mental health which combine to form the MHI-5. This measure has been found to perform as well or better than other self-completed mental health questionnaires. Firstly it is more accurate than the 30-item General Health Questionnaire and the 28-item Somatic Symptom Inventory in screening members of the general population diagnosed with major depression and anxiety disorders.[29] This result has recently been replicated in a study undertaken by Professor Philip at the NHG (personal communication). In terms of psychometric performance, a postal survey found the MHI-5 to be comparable to the 12-item General Health Questionnaire as a measure of mental health in two general populations in the North of England.[30] On the basis of this evidence and the desire to minimise respondent burden, we decided not to include other longer measures of mental health.

The SF-36 was embedded in our household questionnaire together with questions about use of primary and secondary health services drawn from the General Household Survey. A special study of a subgroup of movers assessed functional dependency before and after the move, using a modified Rivermead Activities of Daily Living (ADL) scale.[31]

Figure 5 Instruments and measures

SF36 wave 2	Change in state between wave 1 and wave 2: feelings of safety out after dark		
	Safe at w1 and w2	Unsafe w1 and safe w2	Safe w1 and unsafe w2
Physical function	1.69 (0.69)	1.954 (0.69)	-5.94 (0.21)
Role physical	15.90 (0.03)	12.43 (0.06)	-1.04 (0.90)
Role emotional	8.03 (0.16)	3.12 (0.59)	4.20 (0.53)
Social function	8.23 (0.07)	9.09 (0.04)	-4.18 (0.43)
Mental health	6.70 (0.03)	3.33 (0.27)	1.28 (0.72)
Energy and vitality	3.85 (0.27)	4.40 (0.19)	0.55 (0.89)
Pain	4.09 (0.36)	3.25 (0.46)	-3.33 (0.53)
General health	4.47 (0.17)	2.85 (0.37)	-1.45 (0.70)
	Base: unsafe at w1 and w2	Base: unsafe at w1 and w2	Base: unsafe at w1 and w2

25 Brazier J et al. (1992) Validating the SF-36: a new health outcome measure for primary care. British Medical Journal. 305:160-164.

26 Ware JE and Sherbourne CD (1992) The MOS 36 item Short- Form Health Survey (SF-36): 1. conceptual framework and item selection. Medical Care. 30:473-83.

27 Brazier JE, Harper R, Jones NMB, O'Cathain A, Thomas KJ, Usherwood T and Westlake L (1992) Validating the SF-36 health survey questionnaire: new outcome measure for primary care. British Medical Journal 305:160-4.

28 Evidence of the sensitivity of the SF-36 to small changes in health has been confirmed in a recently published study of Whitehall Civil Servants. See Hemingway H, Stafford M, Stansfield S, Shipley M, Marmot M . Is the SF-36 a valid measure of change in population health: Results from the Whitehall II study. British Medical Journal 315:1273-1279. This study found that the dimension scores of the SF-36 were sensitive enough to reflect differences in health by age group and employment grade, and to reflect differences within these groups in their decline in health over a 36 month period.

29 Berwick DM, Murphy JM, Goldman PA et al. (1991) Performance of the five-item mental health screening test. Medical Care. 29(2):169-176).

30 Mcabe CJ, Thomas KJ, Brazier JE (1996) Measuring the mental health status of a population: a comparison of the GHQ-12 and the SF-36 (MHI-5). British Journal of Psychiatry. 169:517-521.

31 Whiting S and Lincoln M (1980) An ADL assessment for stroke patients. British Journal of Occupational Therapy. 43:44-6.

Physiological route

Our primary focus was initially on the physiological pathway to health via improved energy efficiency shown in Figure 3.1 (page 00). Here a number of research instruments were used with varying degrees of success to measure the intermediary stages 2, 4, 6, 7 in the complex pathway from physical intervention to health gain. As the study progressed, it became apparent that the conditions in the dwellings that constituted the baseline varied quite significantly and had been improved by catch-up repairs undertaken by HAT between 1994 and 1997. In particular, the energy efficiency ratings in some Everton blocks were unexpectedly high when compared to the other three areas in the study. Along with the failure adequately to collect temperature data from sufficient numbers of households, there was a need to try and strengthen the house condition and temperature data collected. A supplementary temperature monitoring survey was agreed. This part of the research concentrated on low energy rated households in Childwall (before and after the move), with matched households in Riverview and Sefton Park. The survey was not undertaken in low efficiency Everton flats as residents had already moved by January 1999.

Energy efficiency

There are a range of energy audit programmes for the housing stock. For this study we calculated the Standard Assessment Procedure (SAP) Rating[32] for each home and the National Home Energy Rating (NHER) for most of the homes. The government SAP has an important role within the building regulations and is widely used as a comparative indicator to measure energy efficiency in the UK's housing. The SAP rating[33] is designed to reflect the energy efficiency of any dwelling, irrespective of its size, geographic location or the living pattern of its occupants.

The SAP rating provides the space and water heating costs per square metre. This is calculated under standard occupancy conditions e.g. the number of occupants is estimated from the dwelling floor area, and a standard heating pattern is also assumed. It calculates from the floor area how many people can be expected to live in any particular home. The scale runs from 1 (highly inefficient) to 100 (very efficient). The SAP rating takes no account of cooking, lighting or domestic appliances. The fact that the SAP rating is independent of location is important since the SAP rating does not take into account the fact that a home in Liverpool is more expensive to heat than a home in Plymouth, due to the generally colder weather in the north.

The NHER is also based on the energy costs per square metre of the dwelling. This results in a rating on a 0 to 10 scale. 0 represents a very energy inefficient dwelling whilst 10 represents a very high degree of energy efficiency. The NHER takes into account the same factors as the SAP but includes other items such as the cost of cooking, lights and appliances and also allows for the higher cost of heating homes in colder locations. It also takes into account further miscellaneous factors which increase its sensitivity to different types of dwelling. Most importantly, the NHER can be used to model different heating regimes and occupancy patterns which more accurately reflect actual use of any dwelling.

It is important to remember that both NHERs and SAP ratings are a measure of energy efficiency based on £ per square metre. Consequently, there can be two dwellings of similar energy efficiency both having a SAP rating of, say, 30. One might have a floor area of 100 m^2 and the second a floor area of 50m^2. The larger dwelling would have substantially increased running costs despite its identical SAP.

Temperature and thermal comfort

At first the study deployed temperature strips and asked residents to record daily temperatures in a diary over a two week period. This combination had worked in our Sheffield study but failed to work in Liverpool. Unlike the other survey instruments, they were fairly intrusive of residents' lives and there was some reluctance to complete them freely. As they were the first survey instrument deployed, they were sometimes delivered before the survey team could explain the context. Furthermore, we elected to deliver them via area caretakers who often lacked sufficient briefing to explain the purpose and relevance of the diaries to residents. The result was a very low response rate, which was coupled with a failure to collect useful data on household temperatures and fuel consumption.

Consequently, a supplementary temperature monitoring survey was agreed. Electronic data loggers were purchased to record temperatures in the winter of 1999 (in both the control and half the intervention group still awaiting measures) and again in 2000 when the interventions were almost completed. The diaries were refocused on thermal comfort[34] [35] and on daily patterns of life which might be linked to temperature variation. The diaries used the Bedford Scale (used in the English House Condition Survey 1991) to measure comfort and asked residents to report the clothes they were wearing in order to calculate insulation values developed in ASHRAE research.[36]

32 Based on the Building Research Establishment's Domestic Energy Model: see Shorrock LD and Anderson BR (1995).

33 SAP is based on (a) the thermal insulation of the home (b) efficiency and control of the heating system (c) the ventilation systems provided (d) solar gain and (e) price of fuels used for space and water heating. It is not affected by (f) household size and composition (g) the ownership and efficiency of particular electrical appliances (h) individual heating patterns and temperatures or (i) the geographical location of the home.

34 Fanger E (1982) Thermal comfort, analysis and applications. In Kreiger Robert E, Environmental Engineering. Florida.

35 Fenger defines thermal comfort as 'that condition of mind which expresses satisfaction with a thermal environment'.

36 McCullough EA, Jones BW and Huck J (1985) A Comprehensive Database for Estimating Clothing insulation. ASHRAE Transactions. 91(2):29-47.

Humidity and damp

Relative humidity was not designed into the study because of cost constraints, but for background information the bedrooms in 13 flats were subject to humidity monitoring by using data loggers. The extent of damp was measured by a house condition survey supervised by a qualified surveyor. The proportion of damp and mould in each room was assessed using protocols derived from the English House Conditions Survey.

The psychosocial route

The psychosocial route to health gain was added to the scope of the study, initially as a subsidiary route to health gain. The measures were imported from a range of sources. The renewal process (Figure 3.3) was tracked using new questions and questions drawn from an earlier study of housing plus.[37] The household questionnaire also elicited contextual data on socio-economic status (reproducing the relevant Census question), standard of living (using a set of 'Breadline Britain' questions on affordability of 'basic essentials') and vital statistics of age, sex and household composition.

Security was measured and tracked by embedding validated questions from the British Crime Survey within our household questionnaire. These subjective feelings of safety were complemented by an assessment of security measures obtained from a house condition survey.

'Fear of crime' can be a misnomer. Professor Michael Hough in his specialist study *Anxiety about Crime*[38] distinguishes *perceptions of risk* from fear, and *fear itself* from more commonplace *anxiety*. For the Liverpool study we would expect stomach churning fear or corrosive anxiety to have more influence on mental well-being than a resident's cool assessment of risk. Ideally, our household survey should encourage residents to differentiate between the three. It doesn't because it is based on validated questions from the British Crime Survey (BCS) which Hough admits is 'undeniably a blunt instrument'. So we established *fear of crime* (as an 'all-encompassing shorthand' for worry, anxiety and risk) by asking residents 'How safe do you feel (a) in your home alone at night or (b) walking alone in this area after dark**?**' Social cohesion, hypothesised in Figure 3.2 as an influence on fear of crime, was elicited a by a British Crime Survey question on whether residents perceived the neighbourhood as one in which people help each other.

37 Evans R (1998) Housing Plus and Urban Regeneration: What Works, How, Why and Where? Liverpool John Moores University.

38 Michael Hough (1995) Anxiety about Crime: Findings from the 1994 British Crime Survey. Research Study 147. Home Office Research and Statistics Department.

Household survey

In 1997, we achieved 407 main interviews – 207 in the control group and 200 in the experimental group. Overall the response rate was 58 per cent. This response was slightly lower than expected – we had originally hoped to secure 225 interviews in each group. There were two main technical reasons for this lower response rate. First, we imposed a cut-off date for completing the survey in order not to extend it into the warmer month of April. Second, it was important to match the size of the samples taken from the control and experimental populations since any surplus interviews in either group would add limited statistical significance to the findings. Yet from the third week of the survey it became clear that the Sefton Park tower blocks had maintained high occupancy levels and their residents (and therefore the control group) would be over-represented if interviews continued at the current rate. The focus therefore switched to raising the numbers in the experimental group so that they were matched to those in the control.

Figure 6.1 1997 household questionnaire response rates in all areas

All Areas	Response
Number of properties on original list 14.2.97	611
Vacant properties	5
Number of occupied properties	606
Residents in hospital/prison/ permanently away with relatives	5
Advised not to visit by caretaker/manager	9
Too ill to be interviewed *	13
Deceased	3
No of properties residents eligible for interviews	576
Number of interviews	407
Number of properties where residents interviewed	333
Refusals	48
No contact **	195
Response Rate	57.81%

* Too ill includes: alcoholic, deaf, mental health problems, learning difficulties etc

** No contact includes: away, moved, work all day, giro drop, holiday, works nights etc

In total, 268 follow-up household interviews were completed in 1999/2000. Although this only amounts to 66 per cent of the 407, there was considerable attrition to the samples in each of the areas, particularly in Childwall. Indeed, the sample in Childwall suffered so badly that an additional 10 interviews were completed in 1999 in an attempt to boost sample size. Those interviewed were either residents who had been missed in 1997 and who were scheduled to move in Phase 1 of the redevelopment or those who had chosen to be included in Phase 1 after the initial interviews. Response rates for each area are detailed in Figure 6.2 below. The overall response rate was 84 per cent of the baseline sample available for interview at the beginning of the Wave 2 survey period.

Figure 6.2 Sample position for each area in 1999/2000

	Stayers (control group)		Movers (experimental group)	
	Riverview	Sefton Park	Everton	Childwall
Interviews 1997	63	144	92	108
Deaths	6	6	5	16
Moves	10	9	1	*29
Refused follow up interview	0	4	3	2
Too ill to contact	0	0	1	0
Moving Phase 2	n/a	n/a	0	11
Remaining sample	47	125	82	**64
1999/2000 Surveys				
Refusals	4	10	3	3
Too ill/hospital	2	2	2	3
No contact	1	10	1	1
Deaths	0	0	1	1
Other	0	3	1	2
Final Response	40	100	74	54
Response Rate	85%	80%	90%	84%

* Includes 20 Homefinders, two moves to Nursing Homes, six permanent decants to HAT new build on other estates and one 'other'

** Includes 10 additional interviews undertaken in 1999 to boost sample, plus four decants eligible to be re-interviewed

House conditions survey and temperature monitoring

During the three days immediately after completion of the household survey in 1997, a team of building surveyors from the School of Construction at Sheffield Hallam University completed inspections of 213 of the 333 properties where interviews had been obtained. The overlap between interviews and inspections is summarised in Figure 6.3.

Figure 6.3 Overlap between household questionnaires and house condition surveys

	Sefton	Everton	Childwall	Riverview	Total
H/Holds Interviewed	110	72	96	55	333
H Condition	66	38	64	45	213*

* In addition property surveys were undertaken in three properties for which there was no household survey

Of the original 216 dwellings inspected in 1997, 178 were re-surveyed in 1999 or 2000. 91 of these properties were selected for the special temperature monitoring exercise in 1999, split between 40 households in the control group and 51 in Childwall still waiting to move. In the year 2000, 34 properties in the control group were monitored again and compared with temperatures maintained by 24 of the 51 intervention households who had finally moved to new properties. This latter response rate is disappointing and is explained by the significant number of Childwall residents who had not moved by the end of March 2000. To increase the low numbers monitored in Childwall, an additional temperature monitoring exercise was undertaken in early 2001. This group was made up of residents who were living in sheltered accommodation and who had not moved until early summer 2000.

Figure 6.4 Temperature monitoring survey in each area

	Movers (experimental group)	Stayers (control group)	
	Childwall	Sefton Park	Riverview
Temperature Survey 1999	51	11	29
Temperature Survey 2000	33*	9	25

* Includes nine extra care cases which were surveyed in 2001. These residents did not move to their new homes in time to be surveyed in 2000

Sample attrition

Attrition rates were comparatively high, particularly for the intervention group in Childwall. It was originally anticipated that even with attrition rates of 15 per cent a year, the final sample size would be around 300 (with 150 in each group). Although, this calculation was based on 450 interviews, attrition rates of this magnitude should have resulted in a final sample just short of 300 for the 407 interviews that were completed. However, the final sample achieved was only 268 (140 in the control group and 128 in the experimental).

There were a number of reasons for the shortfall. Firstly, delays in the redevelopment programme in Childwall meant that the project timescale had to be extended by a year, thus increasing the period for 'natural' loss to occur. Secondly, these delays in the early stages of the redevelopment process in Childwall caused uncertainty amongst residents. A sizeable proportion of those interviewed in 1997, decided not to move into the new property which constituted Phase 1 of the redevelopment, but instead to opt out and take the 'Homefinder' option. A number also permanently decanted to other HAT new-build estates. Some residents decided to move in Phase 2 of the redevelopment, outside the research timeframe. Finally, many of the residents in the study were elderly and in poor health: illness, hospitalisation or death contributed to the level of attrition.

Strenuous efforts were employed to maximise the overall achieved sample, including: boosting the Childwall sample; interviewing some residents who had decanted from Childwall to HAT new-build on other nearby estates; persuading a small number of refusals in Everton to take part in the follow up survey; maximising the number of interviewer call-backs; and re-interviewing in Childwall until June 2000 to maximise numbers.

Part 2
Results

7

The people at the heart of our study are a remarkable group of survivors. Two thirds are over 60 and a third have already lived beyond the life span of an average Liverpool resident. This chapter describes their vital statistics in the baseline year of 1997 when our first wave of surveys was undertaken. Clearly, when they were re-surveyed in 1999/2000, residents were that much older, but in all other socio-economic respects they were similar.

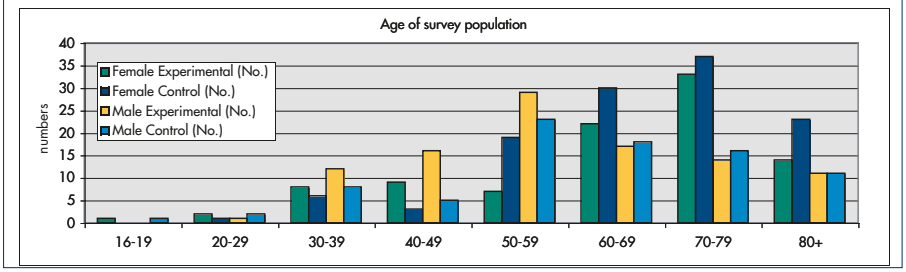
Age profile

As Figure 7.1 shows, there was a difference between the age profile of the 'experimental' group of residents who were scheduled to move to new accommodation in 1998 and the 'control' group who stayed put throughout our study period. However, in the Everton tower blocks in a district of north Liverpool where the standardised mortality ratio is one of the highest in Liverpool[39], we found relatively few residents aged over 80.

Figure 7.1 Age structure of residents

Number of residents by age

		16-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Female	Experimental (No.)	1	2	8	9	7	22	33	14
	Control (No.)	0	1	6	3	19	30	37	23
Male	Experimental (No.)	0	1	12	16	29	17	14	11
	Control (No.)	1	2	8	5	23	18	16	11
TOTAL		**2**	**6**	**34**	**33**	**78**	**87**	**100**	**59**



Source: CRESR Baseline Household Survey, n = 399: 8 missing observations

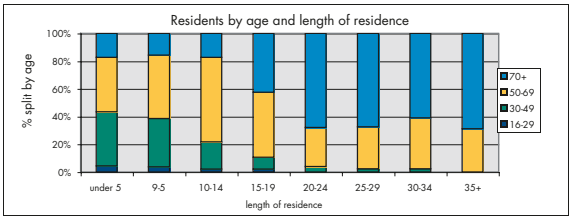
Many of the older residents moved to the tower blocks when they were first built in the 1960s and more followed over the next 10 years. They generally transferred from private rented terraced property which was being swept away in the comprehensive redevelopment programmes undertaken by the city council. Fewer than 2 per cent of our survey population came to live in their flat from outside Liverpool. Often they came from across a religious divide to live together on municipal estates in the relatively prosperous wards of Childwall, Grassendale and Aigburth in the south of the city.

In those days a council flat was considered superior accommodation for the two thirds of the population who were not owner-occupiers[40]. They attracted a broad cross-section of the population both in terms of socio-economic class and household structure. Focus group representatives said they had originally moved in with young families but our survey shows just under 70 per cent of all residents now live alone. Figure 7.2 shows a strong association between length of residence and age – not a forgone conclusion given the evidence from seaside resorts. Sociologists call those older residents who remain the 'charter' community – the backbone of sustainable community life.

Figure 7.2 Age and length of residence

Numbers by length of residence

Age Group	under 5	9-5	10-14	15-19	20-24	25-29	30-34	35+
16-29	2	3	1	1	0	0	0	0
30-49	18	29	9	4	1	1	2	0
50-69	18	38	28	22	7	13	32	5
70+	8	13	8	20	17	29	53	11
Total	46	83	46	47	25	43	87	16



Source: CRESR Baseline Household Survey, 1997, n = 399

The younger group of residents – the 16 per cent between the ages of 30 and 49 and the (only) 2 per cent below the age of 30 – have generally lived in the tower blocks for less than 10 years, arriving in a period (before HAT took over) when local authority accommodation had become a residual form of tenure, 'social housing' for the poorest members of the community. Finally, a freeze on new tenancies by HAT has led, by natural attrition, to depopulation of many of the tower blocks. The average length of occupation of those who remain is that much longer than those surveyed by MORI in 1993. In theory, no tenant we interviewed should have lived in any of the tower blocks for less than four years; in practice 88 per cent of residents had lived there for more than five years.

Socio-economic status

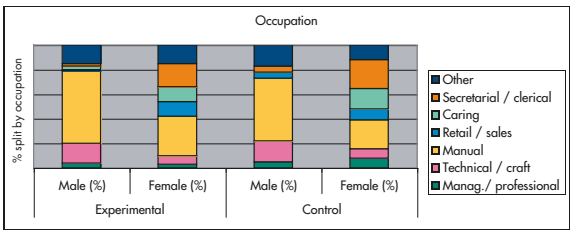
The study covers the health and lives of predominantly working class people. Occupation and class are important long term influences on health status and the survey is strengthened if the 'experimental' group of residents scheduled for an early move have a similar economic status to the 'control' group who remain in their homes throughout the study period. Most residents were elderly and difficult to classify with precision, but during their working lives the

39 Ruth Hussey (1997) Liverpool Public Health Annual Report 1996. Liverpool Health Authority.
40 Central Policy Unit (1993) Census: Key Ward Statistics 1971/81/91. Liverpool City Council.

men in both groups (see Figure 7.3) were employed mainly in manual occupations – in factories, outdoors and in construction – and the women in manual, clerical, caring and cleaning jobs. Many of these jobs were physically demanding and would have had an effect on health.

Figure 7.3 Current or previous occupation

	Experimental		Control	
	Male (%)	Female (%)	Male (%)	Female (%)
Manag./ professional	4	3	5	8
Technical / craft	16	7	17	8
Manual	59	32	51	24
Retail / sales	1	12	5	9
Caring	3	12	0	17
Secretarial / clerical	2	19	5	24
Other	15	15	17	12
Total	**100**	**100**	**100**	**100**

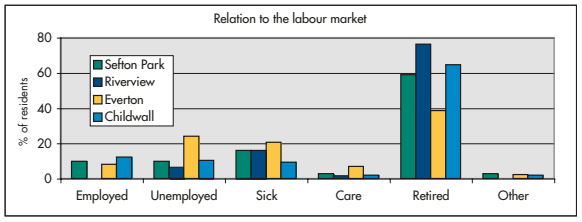


Source: CRESR Household Baseline Survey, 1997. n = 396 (experimental = male 97 + female 94: control = male 86 + female 119).

The majority of residents were retired by the time of our first baseline survey – 103 of 195 of the people in the experimental group who responded to this question and 133 of 207 in the control group. Those who could not work through illness were the second largest group – 28 in the experimental group and 33 in the control group. The next largest group were unemployed people (33 in the experimental group and 18 in the control group). Overall then, there are no great differences between the profiles of the experimental and control groups in relation to the labour market. However, at an estate level (Figure 7.4) Everton may be significantly different from the other three with 24 per cent of the sample unemployed (compared with an average of 9 per cent for Childwall, Sefton and Riverview) and only 39 per cent retired (compared with an average of 66 per cent on the other 3 estates).

Figure 7.4 Labour market status

	Employed	Unemployed	Sick	Care	Retired	Other	Total
Sefton Park	9.7	9.7	16.0	2.8	59.0	2.8	100.0
Riverview	0.0	6.3	15.9	1.6	76.2	0.0	100.0
Everton	8.0	23.9	20.5	6.8	38.6	2.3	100.0
Childwall	12.1	10.3	9.3	1.9	64.5	1.9	100.0



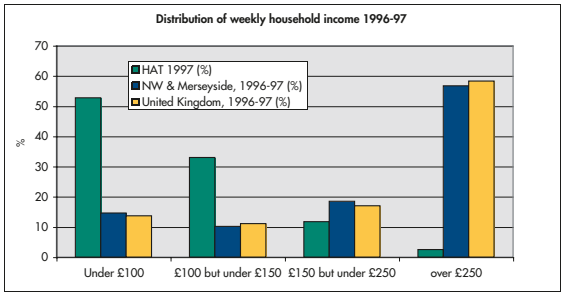
Source: CRESR Household Baseline Survey, 1997, n=402 'Sick / care' = unable to work because of sickness or caring responsibilities

Income

These circumstances have a bearing on the level and source of household income. With over 90 per cent of the survey population removed from the labour market there was a great reliance on various state benefits and the state retirement pension. The distribution of these benefits in our sample population is almost identical to their distribution in the larger population surveyed by MORI in 1993. The outcome for income is summarized in Figure 7.5.

Figure 7.5 Household income distribution of HAT residents[41] compared with regional and national[42] profiles

Distribution of weekly household income	Under £100	£100 but under £150	£150 but under £250	over £250
HAT 1997 (%)	52.7	33	11.7	2.5
NW & Merseyside, 1996-97 (%)	14.6	10.2	18.5	56.7
United Kingdom, 1996-97 (%)	13.7	11.1	17	58.3



Source: CRESR Household Baseline Survey, 1997. n = 396 (experimental = male 97 + female 94: control = male 86 + female 119).

Figure 7.5 compares income for households rather than individuals and therefore tends to depress the relative income profile of HAT residents because many live alone. It is clear, however, that their average equivalent income is much lower than either the regional or national average.

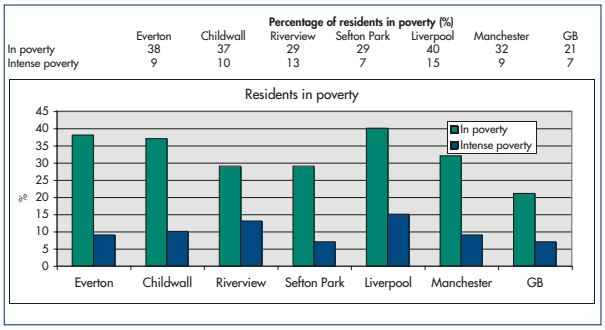
The critical question is the degree to which all these sources of income are linked to residents' standard of living and ultimately to their health. So for this study we constructed a 'quality of life' baseline derived from a series of 19 questions included in the Breadline Britain study. The origins of the protocol in Peter Townsend's work on relative deprivation are outlined in Part I of this report and Liverpool City Council used it in 1989 to establish a baseline for the City as a whole.[43] All residents were asked whether they had what a majority of the British population considered to be 19 basic essentials of life and those in households with young children were asked about another three. Our survey was limited to 19 since we were aware from HAT records and focus group meetings that there were very few children in the tower blocks.

The Liverpool study followed the Breadline Britain protocol and defined those households who could not afford three or more of the basic essentials as living in poverty. Those

41 Of the 407 residents interviewed, 83 refused to answer this question on income and 10 are missing.
42 For the North West (GRO) Region and Merseyside plus the UK. Source: Regional Trends 33. 1998 Edition, Table 8.2, page 107.
43 Central Policy Unit (1991) The Liverpool Quality of Life Survey. Liverpool City Council.

who could not afford seven or more basic essentials were considered to be in intense poverty. The headline results of our study show both Everton and Childwall residents close to City average levels of poverty and residents of Riverview and Sefton Park below it. The numbers in acute poverty are small and should be treated with caution, but they are below the city average. Figure 7.6 also compares the position with Manchester and Great Britain.

Figure 7.6 Levels of poverty

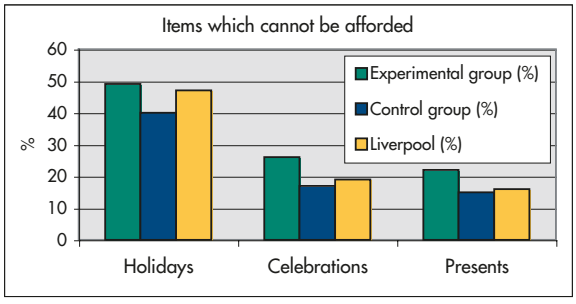


Source: CRESR Household Baseline Survey, 1997, n=407, Liverpool 1989, Manchester 1987, Great Britain 1990.

Beneath these headlines is a picture complicated by the modest lives of a retired population. Elderly people on relatively low incomes tend to have accumulated a stock of basic clothes and capital goods but may struggle to find the resources for presents, holidays and celebrations – the less important basics. Figure 7.7 compares the control and experimental groups with the Liverpool average and confirms the pattern of Everton and Childwall residents as marginally less well off.

Figure 7.7 Basic items not afforded

	Holidays	Celebrations	Presents
Experimental group (%)	49	26	22
Control group (%)	40	17	15
Liverpool (%)	47	19	16



Source: CRESR Baseline Household Survey, 1997, n = 403
Source: Liverpool City Council 1989

A final complication is that affordable warmth and a damp-free house are two of the 19 basic essentials. Many HAT households therefore fell within the definition of poverty simply because their homes were damp and costly to heat. New or refurbished homes with high levels of energy efficiency would remove a large proportion of households from poverty even if their income remained the same.

Summary

HAT residents in our baseline sample survey reflected the characteristics of HAT tenants in general. They came from predominantly manual backgrounds; the majority were retired and depended on state pensions and other health related benefits.

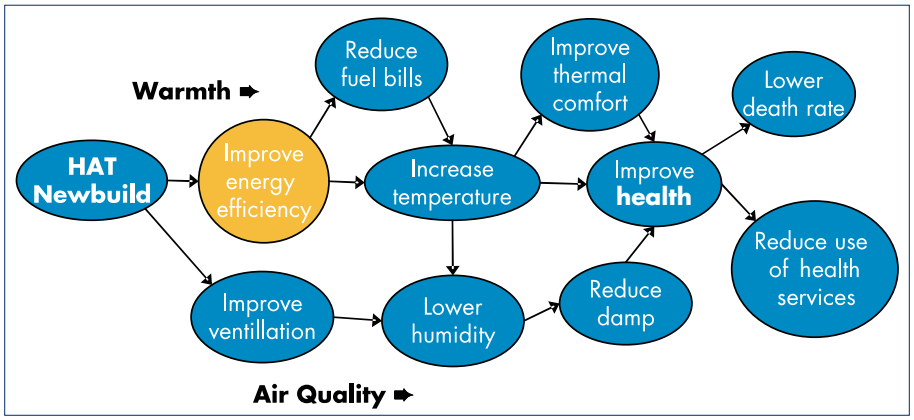
Though household incomes were low relative to the regional and national average, the frugal lives of many residents, past and present, meant they could afford the basic essentials of life. Levels of poverty were higher than the national average, though lower than for the city of Liverpool as a whole.

The key messages of this chapter are first that *the HAT redevelopment programme has improved the energy efficiency of tenants' homes dramatically in most cases.* Second *starting way below average in 1997, the energy efficiency rating of all tenants' new homes was the top 5 per cent of the English housing stock in 2001.*

After an extended period of consultation, Liverpool Housing Action Trust embarked on their major redevelopment programme in 1997. Though a few of their better tower blocks would be refurbished over the next five years, most would be demolished and tenants would move out into energy efficient houses or bungalows. This chapter reports on the increase in energy efficiency experienced by residents in the earlier phases of this redevelopment process in the districts of Everton and Childwall.

In Part 1 we hypothesised that improving energy efficiency could initiate the principal pathway to health gain. This was shown schematically in Figure 3.1 and is reproduced in Figure 8.1 below.

Figure 8.1 The role of energy efficiency improvements hypothesised



Energy calculation

Residents of the Everton and Childwall tower blocks moved out into their new accommodation between 1998 and 2001. An assessment of energy efficiency both before and after the move was undertaken by First Report working as part of the research team. Using the Standard Assessment Procedures (SAPs) described in Part 1 of this report, a calculation was made for all the properties occupied by the sample of residents in our study. These include the relevant Everton and Childwall tower blocks, the new accommodation in Everton and Childwall and the tower blocks in Riverview and Sefton Park occupied by the control group of residents who did not move during the study period. The investigation is described more fully in the First Report study *Energy Efficiency, Temperature and Health: Housing Investment and Health,*1998. The final calculated SAPs are considered robust despite four caveats:

- **Construction data.** As supplied this was not entirely accurate, especially with regard to heating systems which had been adapted and changed over the years.
- **Insulation data.** Some tower blocks had received repairs to external panels with foam material as an insulant. It was difficult to detect its exact location and extent. The difference in SAP ratings resulting from a fully insulated cavity of 75mm and the same cavity remaining uninsulated was modelled in typical flats. It ranged from 3 to 12 SAP points.
- **Empty properties**. A large number of flats became empty during the redevelopment process, affecting the SAP rating. A typical flat in the fully occupied Riverview tower block of control group households had a rating of 24. An empty flat next door would reduce the SAP to 18 with a 6 per cent increase in fuel costs. Additional adjacent empty flats would decrease the SAP and increase running costs even further.
- **Inspections**. Only a sample of flats were fully inspected for the energy audits and although scale construction plans and heating system details from CRESR surveys were available, a limited set of assumptions were made for less important data.

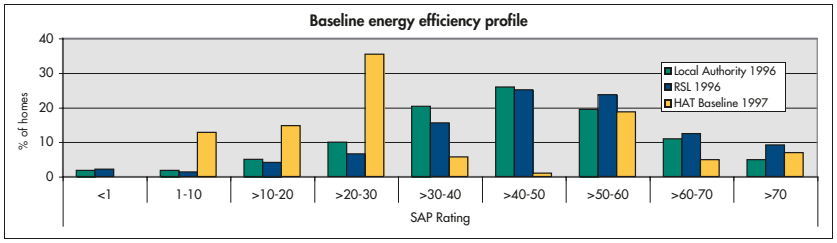
Baseline position

The baseline energy efficiency ratings of the 333 tower block flats surveyed in 1997 are compared in Figure 8.2 with the profile of the social housing stock reported in the 1996 English House Conditions Survey. On average the SAP rating is way below the average for the national stock of houses owned by local authorities and registered social landlords (RSLs). Our findings confirm that the basic challenge for HAT was to improve the domestic physical environment of residents.

However, beneath these headline average scores, Figure 8.2 reveals a more complex picture. There is great variation in energy efficiency of the tower blocks. They were not clustered at the lower end of the energy efficiency scale as might have been expected. Instead there was a bi-modal distribution, with a SAP rating higher than the English average in a significant number of properties.

Figure 8.2 Energy efficiency of HAT tower blocks compared with the national profile

	SAP Rating									
	<1	1-10	>10-20	>20-30	>30-40	>40-50	>50-60	>60-70	>70	Total
Local Authority 1996	1.8	1.8	5.0	9.9	20.3	25.9	19.4	10.9	4.9	100.0
RSL 1996	2.1	1.3	4.1	6.6	15.5	25.1	23.7	12.4	9.1	100.0
HAT Baseline 1997	0.0	12.8	14.7	35.4	5.7	1.0	18.7	4.9	6.9	100.0



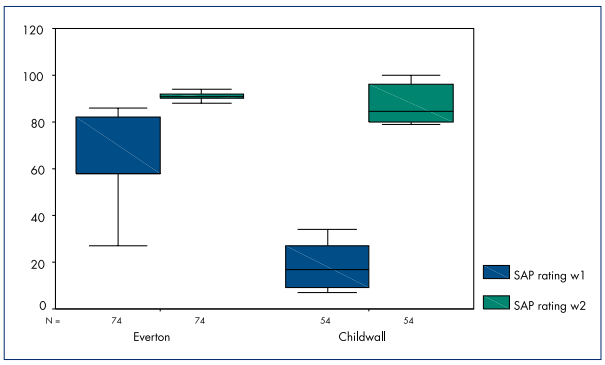
Source: CRESR House Conditions Baseline Survey 1997, First Report Calculations, n=333, 1996 EHCS Table A5.1

In particular, there is great variation in the SAP ratings of the eight Everton tower blocks included in the study. There was an average SAP of 28 for the two JFK blocks with a T concrete frame and gas fire heating. For the four blocks with a square concrete frame and gas warm air (or gas wet) heating the average block SAP was between 53 and 58; for the St. Georges and Corinth towers of Camus construction with double glazing and gas central heating, the average SAPs were 79 and 75 respectively. There was little variation between the four Childwall tower blocks which formed the other half of the 'intervention' group. Most the SAPs were below 30. Similarly both the Riverview tower blocks which formed part of the control group had SAPs below 30. But SAPs varied between 16 and 59 in the five tower Sefton Park blocks which formed the other part of the control group.

Changes in energy ratings

The headline changes in energy efficiency shown in Figure 8.3 reveal significant improvements (P=0.00) in the average living conditions of residents in Everton and Childwall who had moved to new accommodation.

Figure 8.3 Improvement in energy efficiency (SAP scale 0-120)



Note: w1 represents the baseline SAP ratings in Wave 1 and w2 represents the SAP ratings of residents in the new properties. The range of values is shown within the 'whiskers' with half of all the properties concentrated in the 'box'. Source: First Report 1997, 2001, n = 128

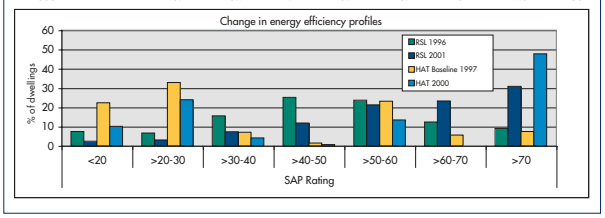
Mean SAP ratings for Everton homes improved from 62 to 91 with a more dramatic improvement in Childwall from 19 to 87. In contrast SAPs in the control group tower blocks remained the same, averaging 24 in Riverview and 36 in Sefton Park. The research design was supported by these headline figures. Increases in 'downstream' temperature and thermal comfort in Everton and Childwall could be compared to any 'downstream' changes in the control group and significant differences attributed to the move into new homes.

National comparisons

These substantial improvements in the energy efficiency of HAT properties are part of a national trend. Between the English House Condition Surveys of 1996 and 2001, registered social landlords led all other tenures in the drive for energy efficiency. Figure 8.4 shows an increase in highly rated properties (with a SAP of more than 70) from 9.1 per cent to 30.9 per cent of the RSL stock.

Figure 8.4 Changes in energy efficiency compared

	SAP Rating							
	<20	>20-30	>30-40	>40-50	>50-60	>60-70	>70	Total
RSL 1996	7.5	6.6	15.5	25.1	23.7	12.4	9.1	100.0
RSL 2001	2.4	3.1	7.3	11.8	21.3	23.3	30.9	100
HAT Baseline 1997	22.4	32.8	7.1	1.5	23.1	5.6	7.5	100.0
HAT 2000	10.1	23.9	4.1	0.7	13.4	0	47.8	100



Source: First Report Calculations HAT, 1997 & 2000, n = 219 properties (268 residents)
Source: English House Conditions Survey, 1996 Table A5.1, 2001 Table A8.27

Changes in the energy efficiency of HAT properties are more dramatic. Figure 8.4 compares the 219 properties occupied by households (containing 268 residents in total) surveyed in both 1997 and 1999/2000. In 1997 their SAP ratings were on average very much worse than RSL properties and this remained so in 2000 for residents who had stayed in their old homes. All households in new homes had SAP ratings of over 70 and 95 per cent of these had SAP ratings over 80.

Significance for the study

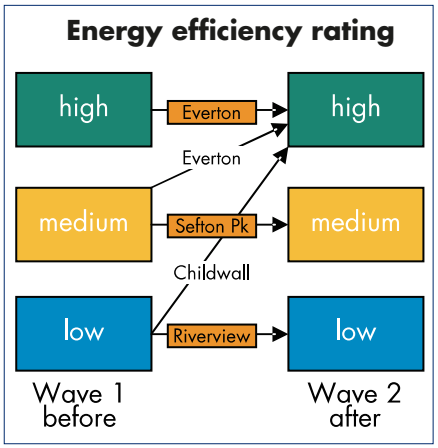
These variations in energy efficiency have significance for the study. Clearly Childwall residents experienced a very big improvement in the energy efficiency, from an average SAP rating in their six tower-block flats of 19, to an average SAP rating of 87 in their new homes. For many residents of Everton the improvement is less dramatic. For

those residents of Corinth and St Georges towers with a SAP averaging 77, a move to new accommodation raised SAP by only 14 points, to 91. Based on the SAPs alone we would therefore expect the impact on room temperatures and ultimately on the health of Everton residents, would be less significant than in Childwall.

This view is reinforced by spot temperatures taken in Corinth Towers in 1997. This block was subject to a district heating system with tenants paying a fixed charge of £7.25 for unlimited use of hot water and heating. In 10 flats monitored, the average temperature at 8 am was 22.6°C in the living room and the average hall temperature was almost identical at 22.5°C. By 7pm the living room temperature had risen to 23.2°C. Clearly such high temperatures at a fixed price were unlikely to be bettered in new accommodation where costs were determined by normal fuel meters.

When this great variation in energy efficiency was discovered in flats constituting the baseline of our study, we were obliged to modify our approach. In a classic model we would expect to compare changes in the health and quality of life of residents moving into new homes with any changes in those who stayed put. In the event, as we will show in the following chapters, we modified our analysis to distinguish residents experiencing big improvements in energy efficiency from those experiencing relatively small changes. These different experiences are summarised in Figure 8.5.

Figure 8.5 Changes in energy efficiency



Properties with SAPs above 60 are classified as high, between 30 and 60 medium, below 30, low. All the new property is classified as having high energy efficiency. Childwall residents (and a few Everton residents) of the tower blocks moved there from flats with low energy efficiency. Most Everton residents moved from tower-block flats with high or medium energy efficiency.

The key comparison may not then be between movers and stayers, but between those experiencing big changes in energy efficiency and those experiencing little change. Downstream, the impact on health and quality of life of a resident moving from St Georges tower block in Everton, with an energy efficiency rating of 79, to a bungalow with an energy efficiency of 91, (high to high) is likely to be less than a resident of a Childwall tower block with an energy efficiency rating of 19 moving to a bungalow with an energy efficiency rating of 95 (low to high).

Key points

- Following their move from tower-block flats to new houses or bungalows, there were dramatic headline improvements in the average energy efficiency of the homes of Childwall and Everton residents taking part in the study.

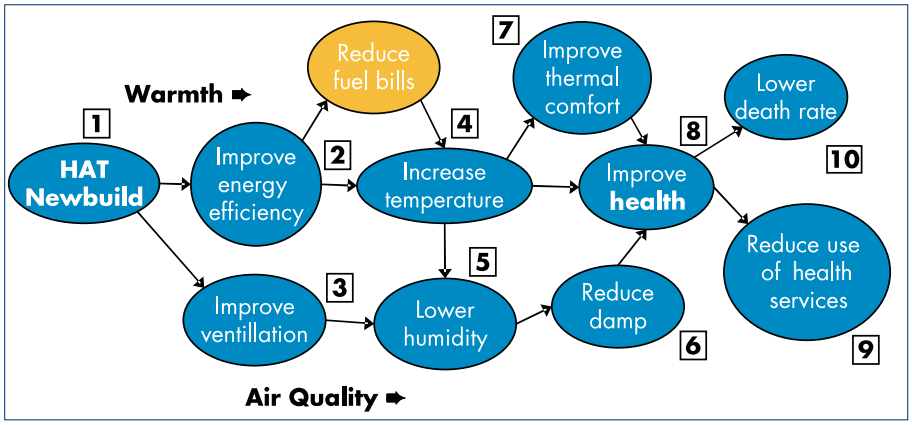
- The research design is challenged by the great variation in energy efficiency of the tower blocks in Everton and in the tower blocks occupied throughout the study period by our control group of residents.

The research study therefore had to be modified to take account of the very different experiences of residents experiencing great or little improvement in the energy efficiency of their homes.

9

The main message of this chapter is that *high levels of energy efficiency have eliminated fuel poverty in all the new homes built for the HAT redevelopment programme.* The UK Fuel Poverty Strategy defines a fuel poor household as 'one that cannot afford to keep adequately warm at reasonable cost'.[44] Many residents of the HAT tower blocks were in fuel poverty, caused, as the Strategy indicates, by a combination of (a) low energy efficiency (b) low household incomes and (c) high fuel costs. Chapter 7 of this report reviewed one point in this triangular relationship, concluding that most residents were retired and likely to be on low incomes. Chapter 8 indicated that most tower-block flats had low energy efficiency. This chapter reviews fuel costs as the third element in the triangular relationship, showing the positive impact of the move to new accommodation and signalling (Figure 9.1) increased room temperatures.

Figure 9.1 Fuel costs on the pathway to health



Defining fuel poverty

The most widely accepted definition of a fuel poor household is based on pioneering work by Brenda Boardman[45] and is a household which needs to spend more than 10 per cent of its income on all fuel use and to heat the home to an adequate standard of warmth. The required level of warmth is relatively uncontroversial. According to the Fuel Poverty Strategy, 'This is generally defined as 21ºC in the living-room and 18ºC in other occupied rooms – the temperatures recommended by the World Health Organisation. The definition of income is subject to continuing debate and varies between the four countries of the UK'. The *First Annual Progress Report*[46] on The UK Fuel Poverty Strategy offers two basic definitions:

- income includes all benefits received
- income includes all benefits received apart from Housing Benefit or Income Support on Mortgage Tax Relief (ISMI).

The first defines fewer households in fuel poverty than the second since benefits convert into nominally higher income levels. Higher nominal income means absolutely more can be spent on fuel without breaching the 10 per cent threshold.

Estimated fuel expenditure

Low-income households in low-energy-efficiency homes can either spend more than 10 per cent of their income on fuel, or spend less and attain room temperatures below the national benchmark. Either way, they are probably in fuel poverty. The common method of determining fuel poverty, covering both cases, is to use an energy audit of any particular dwelling to provide the estimated annual running costs necessary to achieve benchmark temperatures. This hypothetical figure can then be expressed as a percentage of income. Real or planned improvements to the dwelling can then be modelled to provide a reduced running cost figure. Providing and manipulating energy audit data for all homes in this study was beyond our original remit. However, it is possible to compare typical dwellings for those in our temperature survey using the BREDEM 12 model developed by the Building Research Establishment.[47]

Figure 9.2 estimates typical fuel costs for two-person households in a sample of mid-floor flats in the baseline tower block study. For the purposes of the government definition of fuel poverty, fuel costs include non-heating costs. Given the variety of building structures and heating systems, there is considerable disparity in typical heating costs. In the best case, district heating in the Corinth block costs only £489 annually, compared with the worst case (not shown) of a top-floor flat in the Belem tower block, where heating costs an estimated £1,146 annually.

A key component of each energy rating is the overall efficiency and cost of the heating system. For example, if a two-bedroom flat had a single gas fire and no other means of heating, then the flat was treated as having a primary heating system of electric fires. If, however there were two gas fires, using a room index to weight the different uses of each room, then the flat's primary heating system became a gas fire system. Figure 9.2 shows how this changes a SAP rating of 17 to a SAP of 34 for Childwall flats.

44 DEFRA/DTI (November 2001) The UK Fuel Poverty Strategy. Chapter 1:6.9
45 Boardman B (1991) Fuel poverty: From Cold Homes to Affordable Warmth. Bellhaven Press.
46 DTI (February 2003) The UK Fuel Poverty Strategy: The First Annual Progress Report.
47 Anderson BR, Chapman PF, Cutland NG, Dickson CM and Shorrock LD (1996) REDEM-12 Model Description. BRE Laboratory Report.

Figure 9.2 Typical fuel costs for tower block flats

Block	Dwelling size	Primary means of heating	NHER	SAP	Estimated annual running costs 1999
Riverview	2 bed	Electric storage	2.8	26	£865
Childwall	2 bed	1 gas fire	2.2	17	£738
Childwall	2 bed	2 gas fires	3.7	34	£662
Childwall	1 bed	2 gas fires	2.9	24	£595
Sydenham	3 bed	Gas warm air	6.2	58	£531
Belem Tower	Bed-sit	1 gas fire	2.5	17	£525
Corinth	2 bed	Community heating	8.2	84	£489

Notes : (1) the annual figures are based on 16-hour seven-day comfort temperatures. Manweb and British Gas fuel prices in Feb 1999
(2) Corinth is based on actual 1998 fixed charge per week plus allowance for electrical use

The running costs of the new energy efficient dwellings are considerably below those of residents' previous tower-block flats. Figure 9.3 below illustrates the cost for typical units.

Figure 9.3 Typical fuel costs for new homes

Area	Dwelling size	Primary means of heating	NHER	SAP	Estimates annual running costs 1999
Childwall	2 bed 60 m^2 bungalow with two adults	Gas central heating	9.0	86	£347
Childwall	2 bed 60 m^2 bungalow with one adult	Gas central heating	9.0	86	£319
Childwall	2 bed house 75 m^2	Gas central heating	9.1	92	£377
Everton	2 bed house 107 m^2	Gas central heating	8.9	92	£446

Note: (1) All estimates based on 16-hour seven-day comfort temperatures. Manweb and British Gas fuel prices at Feb 1999

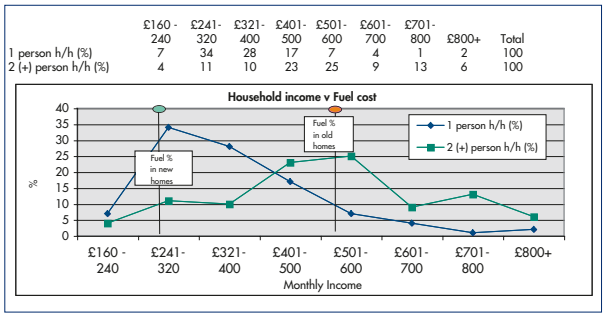
Three of the four calculations are for two-person households and can be compared directly with Figure 9.2 for the tower-block flats. We estimate that annual running costs for a two-person household moving from a Childwall tower-block flat (with two bedrooms and two gas fires) to a bungalow nearby (also with two bedrooms) will have almost halved from £662 to £347. A single person's costs will have reduced from £610 to £319.

Fuel poverty

It was clear from our baseline survey of HAT residents in 1997 that incomes were so low, and required fuel expenditure so high, that most households were in fuel poverty, using either of the government's two benchmark calculations. In the follow-through survey in 1999/2000, the amount of fuel required to heat new homes to comfortable temperatures was much lower. But incomes, though marginally improved by reforms introduced by a new Labour government, were still so low compared to UK averages that many single-person households remained on the borderline of fuel poverty.

Most HAT residents surveyed in 1999/2000 were retired on a state pension topped up by varying levels of supplementary income from occupational pensions or state benefits. Income levels are difficult to ascertain with accuracy. A fifth of residents declined to answer the question and others were encouraged to answer by presenting banded options on a show card. Figure 9.4 records the monthly income profile (net of housing benefit) of 80 per cent of residents who answered this question in the follow-through survey. The income profile of movers and stayers is similar and not distinguished, but single-person households are separated from other, generally two-person, households. The monthly income of most single-person households was in the range £241 to £400, whilst other households concentrated in the range £401 to £600 a month. The state retirement pension in March 1999 was £280 a month for a single person and £448 for a couple.

Figure 9.4 Household Income1999/2000



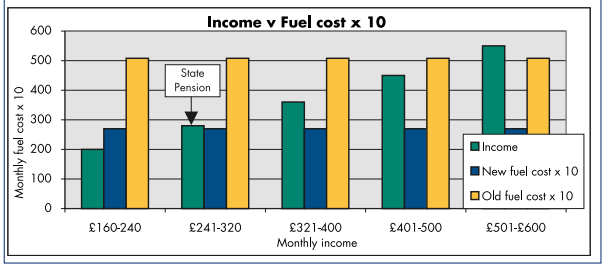
Source: CRESR Household Survey 1999: 2+ households, N = 94, 1 person households, N = 111

Superimposed on this figure are approximate thresholds for fuel poverty before and after the move to new property. Headlines are that in 1999, a single person living a typical tower block would need to spend £51 a month (£610 a year) to heat their flat adequately, whereas one person would only have to spend £26.50 a month (£319 a year) to heat their new bungalow. Since fuel poverty obtains when required fuel expenditure is 10 per cent or more of income, then, conversely, both sets of residents would require an income ten times required for their fuel expenditure to avoid fuel poverty. A tower block resident living alone would require a monthly income of £510 or more (10 x required fuel expenditure of £51.50) whereas a resident moving into a new bungalow would only require an income of £266 a month (10 x required fuel expenditure) to escape fuel poverty.

Figures 9.4 and 9.5 taken together indicate the approximate proportions of households in fuel poverty before and after the move to new homes. Figure 9.5 compares a range of mid-point incomes of single person households in Childwall with required expenditure on fuel multiplied by 10. Fuel estimates for new two-bedroom 60m^2 bungalows are derived from Figure 9.3 and use Figure 9.2 for a typical two-bedroomed tower-block flat.

Figure 9.5 Ratio of income to fuel costs for one person households in Childwall

	£160-240	£241-320	£321-400	£401-500	£501-£600
Income	200	280	360	450	550
New fuel cost x 10	270	270	270	270	270
Old fuel cost x 10	508	508	508	508	508



Source: CRESR Household Resurvey, 1999/00 + First Report Fuel Estimates

The small proportion of one-person households with a low monthly income of between £160 and £240 a month (mid-point £200) must spend about 25 per cent of their income (£50.80 a month) to keep their tower-block flat warm. The greatest number of one-person households (34 per cent of the total) with an income between £241 and £320 a month (mid-point £280 a month, equivalent to basic state pension) must spend 18 per cent of their income to keep their tower-block flat warm. Only the small proportion (14 per cent) of one-person households with an income of more than £501 a month need spend 10 per cent or less of their income on fuel.

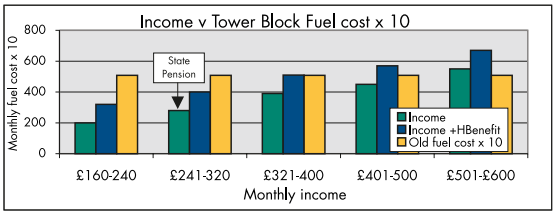
The position is greatly improved in the new homes. A one-person household on a basic state pension (£280 a month) needs to spend just under 10 per cent of their income (£26.50) on fuel to heat their homes adequately. The impact of the move to new homes can best be ascribed by comparing how all our 1999/2000 sample of one-person households would have fared in Childwall tower-block flats compared with Childwall bungalows. In the Childwall tower blocks 86 per cent would be defined as in fuel poverty and 14 per cent not. In the bungalows the position is exactly reversed, 14 per cent would have been defined as in fuel poverty and 86 per cent not. The improvement in the position of two- or more person households is less dramatic because two can keep warm nearly as cheaply as one. If all our 1999/2000 sample of two-person households were still living in tower-block flats, just under half (48 per cent) would be in fuel poverty, and this proportion falls to 8 per cent in the new bungalows.

Applying both definitions of fuel poverty

So far we have applied the more inclusive of the government's two definitions of fuel poverty, when reckonable income excludes housing benefit. Applying the narrower definition, which includes housing benefit in reckonable income, significantly reduces the proportion of tower-block residents in fuel poverty. Figure 9.6 shows the ratio of income to fuel costs for single-person households, using both definitions of reckonable income.

Figure 9.6 Ratio of income to fuel costs for one-person households in Childwall tower block

	£160-240	£241-320	£321-400	£401-500	£501-£600
Income	200	280	390	450	550
Income +HBenefit	320	400	510	570	670
Old fuel cost x 10	508	508	508	508	508



Source: CRESR Baseline Household Survey, 1997 and Resurvey, 1999/00 + First Report Fuel Estimates

All households are assumed to receive housing benefit to fully cover their rent of £120 a month.[48] Households on a basic state pension of £280 a month would remain in fuel poverty even on the narrower definition, since required fuel expenditure is 12.7 per cent (£50.80) of reckonable income of £400 (£280 pension + £120 housing benefit). The threshold taking one-person households out of fuel poverty is reached when incomes rise to £388 a month and reckonable incomes (including housing benefit) rise to £508 a month. Application of the narrower definition of reckonable income therefore has the effect of reducing fuel poverty in one-person households from 84 per cent to 70 per cent. For two- or more person households, the proportion living in fuel poverty falls from 48 per cent on the wider definition to 19 per cent where housing benefit is included in reckonable income.

Comparing the practical effects of the two definitions of fuel poverty reveals some perverse effects of rent determination. Rents were frozen when ownership of the tower blocks was transferred to HAT in 1993. Gradually, these frozen rents fell below public sector rents prevailing in other parts of the city. The freeze would have the effect of excluding certain higher income tenants from eligibility for housing benefit, thereby increasing the number of households for which reckonable income was the same using either definition. More critically, for those at the lower end of the income range, the rent freeze had the effect of

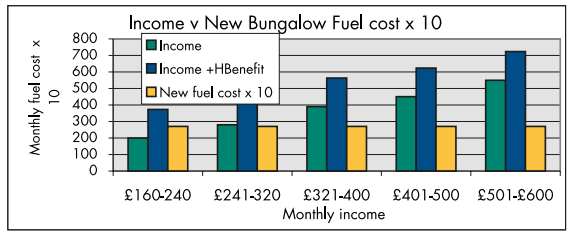
48 When surveyed, 69 per cent of our sample of tower-block residents, including 88 percent of those on state pensions or below, claimed to be on housing benefit. There will be some under-recording by those on low incomes. For the heuristic purposes, all households are assumed to receive full housing benefit.

reducing the amount of housing benefit they received, and in turn lowered their level of reckonable income on the government's narrow definition of fuel poverty. A £40 increase in rents taking rents levels closer to those prevalent in other public sector stock would have had the effect of increasing reckonable incomes and taking approximately 9 per cent more one-person households out of fuel poverty.

For residents of the new property in Childwall, applying the narrow definition of reckonable income effectively removes every household from fuel poverty. Figure 9.7 calculates the ratio of fuel expenditure to reckonable income for a typical bungalow with a rent of £173 a month in 1999. A mid-point income of £200 a month in the lowest range, translates into a reckonable income of £373. Required fuel expenditure is £27 a month, only 7.2 per cent of income.

Figure 9.7 Ratio of income to fuel costs for one person households in Childwall bungalows

	£160-240	£241-320	£321-400	£401-500	£501-£600
Income	*200*	*280*	*390*	*450*	*550*
Income +HBenefit	*373*	*453*	*563*	*623*	*723*
New fuel cost x 10	*270*	*270*	*270*	*270*	*270*



Source: CRESR Household Resurvey 1999/00 + First Report Fuel Estimates

Even households on the very lowest incomes are excluded from fuel poverty. A household with a single person under pensionable age and in receipt of state benefits of only £120 a month would have a reckonable income of £293 (£120 + £173 housing benefit) if they lived in a typical bungalow. They need only spend 9.2 per cent of their income on fuel.

Living conditions

In previous sections the BREDEM model is used to derive the level of fuel expenditure required to keep warm. In order to test out realities, fuel meter readings were obtained from a small sample of households at the start and end of the temperature monitoring period. These covered a period of two to three weeks of similarly cold external temperatures and give a very accurate picture of each household's actual expenditure.[49] Figure 9.8 shows empirically derived fuel expenditure by households of similar size before and after the move to new homes.

Figure 9.8 Actual fuel costs for a typical week[50] in winter

	Weekly Fuel Cost for 60m2 flat	
	1999	2000
Stayers (control)	£11.00 n=29	£11.42 n=29
Movers (exp)	£11.28 n=24	£11.74 n=23

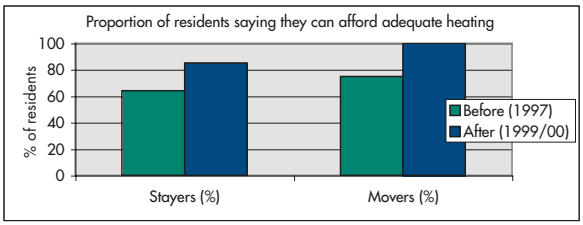
Source: CRESR/First Report monitoring. Based on 1999 ManWeb and British Gas prices
Excludes any dwellings in Extra Care block where fixed weekly charge paid

Average fuel expenditure for stayers *and* movers is similar, both before and after the move: a double paradox. Detailed calculations reveal that the marginal rise in stayers' expenditure is *not* because they had to compensate for a reduction in the energy efficiency of their homes caused by an increase in empty flats nearby. On the other hand, for movers the marginal rise in expenditure occurred *despite* the significant improvement energy efficiency.

Residents' responses to questions on affordability throw some light on these unchanging patterns of expenditure. Residents were asked if they could afford 19 basic essentials of life using the Breadline Britain protocol. Whereas in the baseline study only 75 per cent of movers said they could *afford to heat their homes* adequately, after the move 100 per cent of these same households could do so (Figure 9.9). As the following chapter will show, similar fuel expenditure brought about a significant improvement in warmth and comfort in the new properties compared with the tower-block flats. These findings confirm those of our previous study in Sheffield; residents take the benefits of greater energy efficiency primarily in the form of warmth and comfort rather than in a reduction of fuel expenditure.

Figure 9.9 Affordability of adequate heating

	Stayers (%)	Movers (%)
Before (1997)	64	75
After (1999/00)	85	100



Source: CRESR Baseline Household Survey, 1997 and Resurvey, 1999/00, n = 268

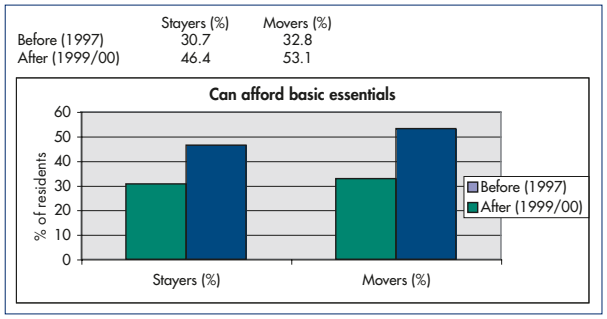
49 Those moving obtained, on average, a larger dwelling than they had before and each monitoring period had slightly different external weather conditions. Consequently, it was necessary to normalise this fuel data to a standard external temperature and for a standard dwelling of 60m2. In order to calculate a heating cost per m2 of dwelling, it was necessary to make the assumption that heating cost constituted 40 per cent of energy costs based on BRE Domestic Energy Factfile 2000. This is an approximation since the full data for every dwelling and household were not available to make more detailed calculations.

50 Although permission forms were signed by many tenants to allow us to obtain fuel bill data, one utility company refused access to this data and it was not possible to obtain details on annual fuel expenditure.

Note, however, that the proportion of stayers able to afford adequate heating also increased significantly. This may have been because of minor improvement works undertaken by HAT between the baseline and follow-through studies. It may also have been a result of the marginal increases in real income during this intervening period, including the onset of winter fuel payments of £100 annually in the winter of 1997/8.

This all-round improvement in the financial position of low income residents appears to have had a knock-on effect on their quality of life. As figure 9.10 shows, there was a significant increase in the proportion residents who could afford all 19 basic essentials of life.

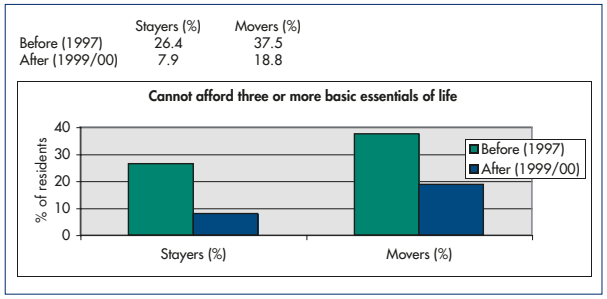
Figure 9.10 Quality of life – ability to afford essentials



Source: CRESR Baseline Household Survey, 1997 and Resurvey,1999/00, n = 268

There was also a reduction in the proportion of both stayers and movers who could not afford at least three essentials of life, and were therefore defined as in general poverty. Following through the sample of 268 residents who responded to both waves of our survey, the final Figure 9.11 shows a similar reduction in the proportion of stayers and movers in poverty.

Figure 9.11 Residents in poverty: percentage unable to afford basic essentials



Source: CRESR Baseline Household Survey, 1997 and Resurvey, 1999/00, n = 268

Adequate heating and a damp-free home are two of the 19 basic essentials of life. So a reduction in the proportion of movers in poverty is partly explained by everyone being able to afford these items after the move compared with only three quarters before. In addition, marginally more movers can afford other basic essentials of life such as new clothes and hot meals.

The proportion of stayers in poverty also falls, to only 7.9 per cent. Again this is partly explained by the greater affordability of heating at the time of the follow-through survey, though this would be less significant than for movers. A possible explanation of the commensurate reduction in poverty is that the general (though marginal) rise in incomes as a result of increases in state benefits, had a greater impact on residents' revenue expenditure, and thus on the affordability of basic essentials such as hot meals and new clothes. Movers, on the other hand, reported informally some major expenditure on capital items such as furniture, carpets and household equipment. Though HAT provided a dislocation grant to cover some of these capital costs, they may have finished up with not much more to spend on day-to-day items.

Impact on health

In theory, the move to energy-efficient homes has made warmth affordable for even the poorest households, taking them potentially along the principal pathway to health shown schematically in Figure 9.1. However, as the later sections of this chapter indicate, there also appears to be a reduction in general poverty as measured by the basket of life's essentials, as distinct from a reduction in fuel poverty. Such a general improvement in quality of life should also contribute to health.

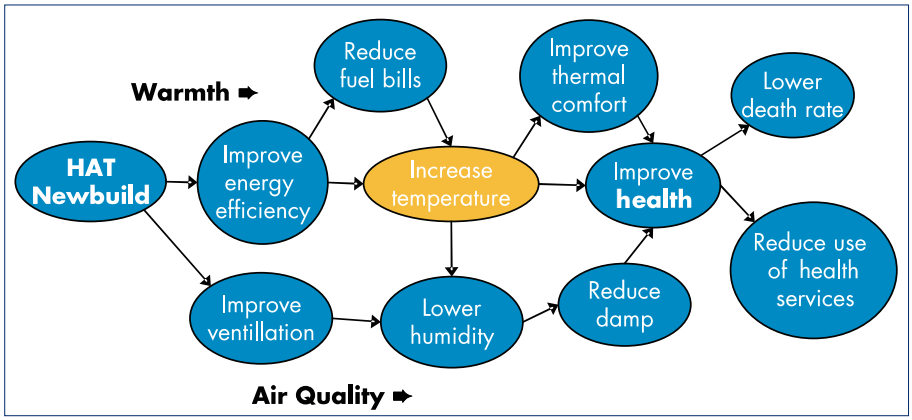
Conclusions

- Improvements in energy efficiency have taken many households out of fuel poverty, but the total fuel costs for a single household, even in an energy efficient home, are at or near the 10 per cent benchmark on the broader of the government's two definitions.
- On average, residents did not take the benefits of improved energy efficiency in decreased expenditure but chose to live in greater warmth and comfort. Every household moving to a new home said they could afford adequate heating.
- Residents who stayed put in their tower-block flats also reported better living conditions, possibly as a result of marginal increases in real incomes.
- There was a reduction in the proportion of both staying and moving households living in general poverty, partly because of a reduction in fuel poverty and possibly because of uplift in state pensions and benefits.

Most flats in the tower blocks owned by HAT remained difficult to heat despite an extensive programme of catch-up repairs and minor improvements. Feedback from tenant representatives suggested that poor energy efficiency combined with small household budgets meant that many residents experienced living-room and bedroom temperatures way below national benchmark levels for comfort.[51] There are two main messages of this chapter. First, *the elimination of fuel poverty in all new homes built for HAT has led to significant increases in living-room and bedroom temperatures*. Second, *the construction of new property, coupled with increases in temperature, has eliminated the condensation, damp and mould which was so prevalent in the tower-block flats*.

We hypothesised that raised temperatures would be achieved by making heating affordable even to those on basic state benefits. Temperatures would be raised above benchmark comfort levels by reducing energy requirements. Here the role of HAT was critical. Though ultimately it could neither determine tenant incomes nor the price of fuel, HAT could build new homes requiring less fuel to secure satisfactory temperatures. These pathways to an increase in temperature were hypothesised in Part 1 of this report and shown schematically in Figure 3.1. This Figure is reproduced as Figure 10.1 below, and shows raised temperature as a possible route to improvement in health via increased comfort and a general improvement in residents' quality of life.

Figure 10.1 Hypothesised role of raised room temperatures

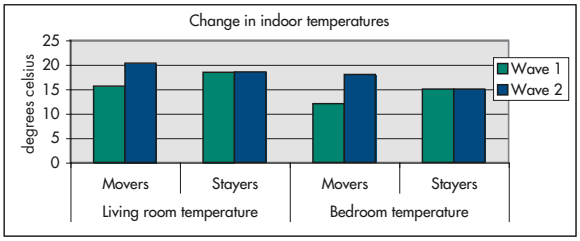


Special temperature study

Temperature measurements are an essential element of the study. Yet, as reported in Part 1, we failed to secure residents' involvement in a programme of temperature monitoring in most of the households agreeing to take part in the larger study. An alternative approach was devised, focused on a smaller number of properties. Even from the limited empirical evidence of the few households who had responded initially, it was clear there were significant variations in temperature within similar property types, possibly reflecting the level of disposable household income and also a wide range of personal preferences. The decision was therefore taken to link very precise electronic monitoring of temperature variations over a 10-day period with possible explanatory variables of thermal comfort, clothing and fuel expenditure. Fifty-one properties in Childwall were selected for our special temperature study, with 40 properties in Riverview and Sefton Park monitored as a control group.

Figure 10.2 Average room temperatures for stayers and movers compared

	Living-room temperature		Bedroom temperature	
	Movers	Stayers	Movers	Stayers
Wave 1	15.6	18.4	12.0	15.0
Wave 2	20.3	18.5	18.0	15.0



Source: CRESR Temperature Survey, 1999 and 2000/1 Stayers; wave 1, n=40, wave 2, n=34: Movers; wave 1, n=51, wave 2, n=33

The headline temperature changes following Childwall residents' move from tower blocks are shown on the first row in Figure 10.2. In the new houses, bungalows or sheltered flats, residents' living-room temperatures were 4.7°C higher and bedroom temperatures were 6.0°C higher in the winter of 2000 (Wave 2) than they were in the tower-block flats in 1999 (Wave 1). These are significant rises from a low base.

Three survey design features make us confident that these increases in temperature were a result of the move to more energy efficiency property.

First we discounted the influence of external factors – such as an across-the-board reduction in fuel prices or an increase in the government's Winter Fuel Allowance – by comparing movers with residents who stayed put in their tower-block properties. The second row of Figure 10.2 shows that, although room temperatures were initially warmer in the comparative group of properties in Riverview and Sefton Park tower blocks, they did not increase in the Wave 2 period. It is probable therefore that movers experienced increases in temperature linked to their changed accommodation.

Second, by extracting a single day from each monitoring phase when the average external temperature was 5°C

51 English Housing Condition Survey 1996: Energy Report. DETR (2000)

we discounted the possibility of bias caused by different external temperatures. This benchmark external temperature is generally considered typical of winter conditions. Internal temperatures are then examined on this 'selected day'. A 16-hour average (usually from 7.00 am to 11.00pm) is a standard period used for calculating heat demand, whilst a 24-hour average better reflects any fall in temperature overnight. Temperatures in Figure 10.2 are 16-hour averages for 'selected days' and Figure 10.3 compares these selected day temperatures with the averages for the normal 10-day monitoring period.

Third, in Figure 10.3 below, we have adjusted the comparative temperatures to exclude the small group of nine residents of flats in the Childwall Extra Care Block. Though these represent a significant minority of movers within Childwall, they are not typical of the great majority of moves to fully independent living in houses or bungalows. Residents of the Extra Care Block paid a fixed heating charge for unlimited energy and they experienced much bigger increases in room temperature, up 6.9°C in living-rooms and up 8.4°C in bedrooms. Stripping out these sharp increases has the effect of reducing the average increase in temperature for the sample of more typical properties. Figure 10.3 gives temperatures in these typical properties for both the selected day and for the 10-day monitoring period.

Figure 10.3 Temperatures in 1999 and 2000 compared

	1999 Stayers		1999 Movers		2000 Stayers		2000 Movers	
16 hours	Select day	10 days	Select day	10 days	Select day	10 days	Select day	10 days
Bedroom mean	15.0	15.4	**12.0**	12.3	15.0	15.6	**17.0**	17.7
Living-room mean	18.4	18.3	**15.6**	16.0	18.5	19.1	**19.4**	20.0
External	5.7	5.5	**5.7**	5.5	5.6	6.9	**5.6**	6.9
N	40		51		34		24	

Source: CRESR Temperature Survey, 1999 and 2000

Profile B

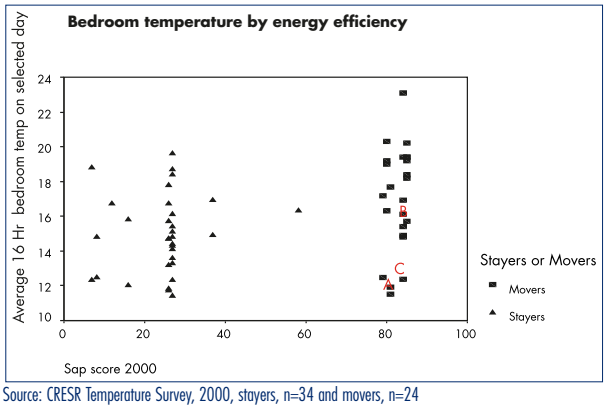
A mother with a young baby kept her living-room at 11.9°C and the bedroom at 7.1°C. She could not afford to heat the bedroom and despite spending over £2.50 a day on fuel, mainly on an electric heater to the living-room, found her 'clothes freezing all day' and wore her coat most of the time, putting extra clothes on her baby. Once she had moved, temperatures in her home increased to 15.7°C and 17.5°C.

There is still a significant rise in temperatures for residents (as highlighted in profile A) moving to typical new property – bedrooms up 5.0°C to 17.0°C on a 'selected day' and living-room temperatures up 3.8°C to 19.4°C. Though numbers included in this survey are modest, we can infer with some confidence that similar average temperature increases have been experienced by the larger group of Childwall households included in our survey of health and quality of life.

Variation in temperatures

Average temperature changes demonstrate the overall trend, but they hide a wide variation between individual flats in the tower blocks, and even between individual houses and bungalows on the new-build estates. Figures 10.4 and 10.5 show the wide scatter of average living and bedroom temperatures in 2000 for both moving and staying households, despite the bi-modal concentration of SAP values. Though the bedroom mean is 17.0°C in the new properties, the range is 11.5°C to 23.3°C.

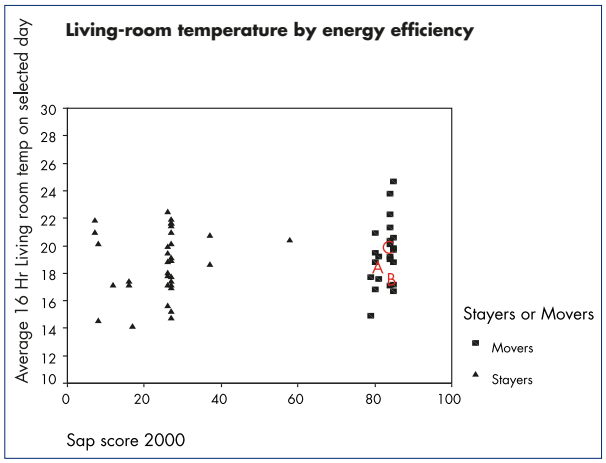
Figure 10.4 Variation in bedroom temperatures



Source: CRESR Temperature Survey, 2000, stayers, n=34 and movers, n=24

Figure 10.5 shows a slightly smaller variation of living-room temperatures for both stayers and movers. Though the mean living-room temperature in the new properties is 19.4°C, the range is a high of 25.0 °C and a low of 14.0 °C.

Figure 10.5 Variation in living-room temperatures



Source: CRESR Temperature Survey 2000, stayers, n=34 and movers, n=24

Very significantly, despite the very high energy ratings of the new properties, most households were not achieving national benchmark temperatures of comfort. One expla-

nation is that residents had become acclimatised to colder conditions. Though comfort temperatures of 21°C in the living-room and 18.0°C in the bedroom are the official norm, some residents specifically stated they preferred a cooler environment. The man profiled in A is a case in point and the next chapter explores self-assessed thermal comfort in more depth.

Profile A

Some of the lowest temperatures of the survey were faced by a single man who left his flat only for one to two hours a day. His living-room temperature was 10.7°C and his bedroom temperature 6.3°C, which he described as too cool. These very low temperatures are partially explained by adjacent empty flats.

When he moved, the living-room temperature rose to 17.6°C by using the gas radiant fire and very limited use of the central heating, but the bedroom temperature still stayed low at 11.5°C – the lowest shown in Figure 10.4. Despite arthritis, he called temperatures in this bedroom comfortable or comfortably cool.

Second, since our temperature monitoring was conducted during a settling-in period, some residents had not mastered the new heating system. No formal survey questions were asked by our surveyors, but it became clear that many residents were either not fully briefed on how to operate their new heating systems to best advantage and/or confused about the best method of operation. We fed back these problems to the local HAT office after our survey was completed, and residents were subsequently more fully briefed.

Temperature and fuel expenditure

A *third* compelling explanation of variations in the room temperatures in the new properties was residents' continuing concern about high fuel bills. Theoretically, as the previous chapter indicates, the cost of maintaining benchmark comfort temperatures in their new homes (compared with their previous homes) should have been cut in half. Theoretically then, no resident should be in fuel poverty. Two-person households should easily manage to maintain comfort temperatures by spending less than 10 per cent of their weekly income on fuel, though one-person households would need to spend almost 10 per cent of their state pension.

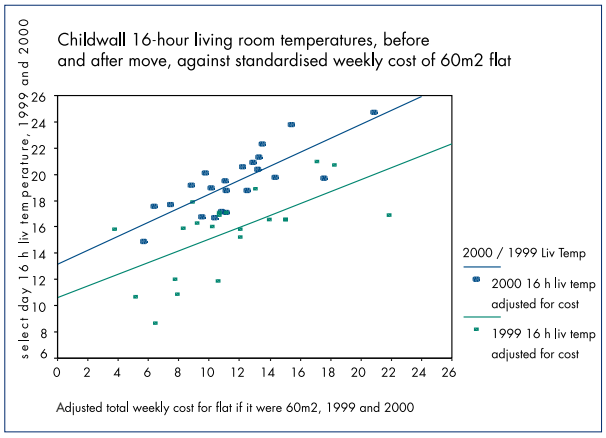
In practice, as the family profile C shows, residents were still fearful of high fuel bills. For months after they had moved to their new properties, tenants in both Everton and Childwall found it difficult to establish who their fuel supplier was and in the absence of an early bill, were fearful of using too much energy.

Profile C

On moving, one mother and her son had a living-room temperature of 19°C and a bedroom temperature of 12.4°C whereas previously they had temperatures of 17.1°C and 13.4°C respectively (a decrease in the new bedroom temperature). They used the central heating for three to five hours only and the gas fire for one to two hours only. They used bedroom heating only for one short period yet said the bedroom was comfortable. They were clearly worried about fuel bills, which despite requests to the fuel utility companies had failed to arrive.

Even without these immediate and common uncertainties about fuel supply in the new property, residents would still have responded in different ways, some confident that higher levels of energy efficiency would deliver lower fuel bills, others not so sure. Longer term, many residents living alone would be cautious about taking their fuel expenditure above 10 per cent of their income, whereas others would regard warmth as a priority. This helps explain the scatter of their actual[52] expenditure on fuel shown in Figure 10.6.

Figure 10.6 Living-room temperature and fuel expenditure

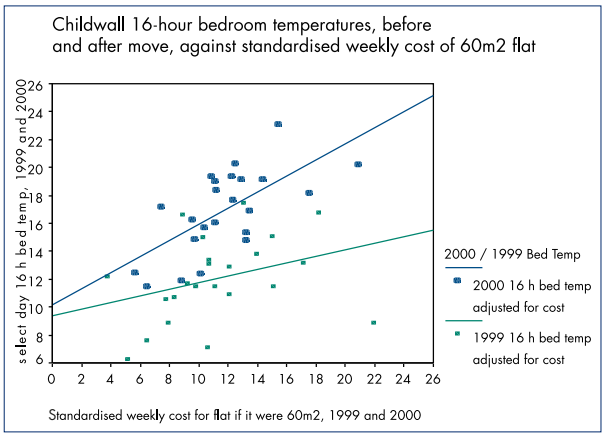


Source: CRESR Temperature Survey, 1999 and 2000, 1999, n=24 and 2000, n=23

Clearly, as is evident from previous Figures 10.3 and 10.5, living-room temperatures of Childwall residents were generally much higher after the move than before. This can be attributed to better energy efficiency in the new properties. However, within each cluster of readings (those before and those after the move) there is a strong correlation between average temperature and the amount of adjusted expenditure on fuel. Statistical computation of the relative weights of these two factors indicates that 40 per cent of the variation in temperatures is associated with changes in energy efficiency and a further 30 per cent with the amount expended on fuel.

52 The size of dwellings varies a little. As indicated in the previous chapter on fuel consumption, actual recorded expenditure is standardised for a typical dwelling of 60m^2.

Figure 10.7 Bedroom temperature and fuel expenditure



Source: CRESR Temperature Survey, 1999 and 2000, 1999, n=24 and 2000, n=23

As with living-rooms, average bedroom temperatures of Childwall residents were generally much higher after the move to more energy efficient properties. Variation in fuel expenditure is reflected by variation in bedroom temperatures larger (up to 12°C) than those in the living-room. Some residents create warmth in their living-rooms and leave their bedrooms unheated or heated very little for most of the day. Statistical computation of the relative weights of these two factors indicates that 35 per cent of the variation in temperatures is associated with changes in energy efficiency and a further 25 per cent with the amount expended on fuel.

Health implications

The Government's benchmark temperatures of 21ºC in living-rooms and 18ºC in bedrooms are based on medical evidence on the physiological health effects of cold homes. Some studies[53] [54] have focused on damp and mould which, as Figure 10.1 shows, are caused in large part by low temperatures. Others describe the more complex psychosocial effects which are explored in later chapters of this report. Yet others have focused on the direct effect of cold conditions.[55] [56] These main effects are summarised in Figure 10.8 below, reproduced from *Fuel Poverty and Health*, published by the National Heart Forum.[57]

Figure 10.8 The effect on comfort and health of exposure to various living-room temperatures

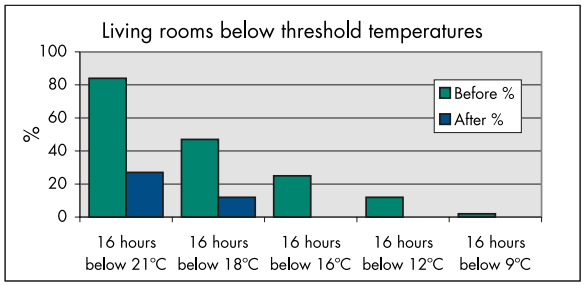
Indoor temperature	Effect
21°C	Comfortable temperature for all, including older people
18°C	Minimum temperature with no health risk, although older and sedentary people may feel cold
Under 16°C	Resistance to respiratory diseases may be diminished.
9-12°C	Exposure to temperatures between 9°C and 12°C for more than two hours causes core body temperature to drop, blood pressure to rise and increased risk of cardio-vascular disease
5°C	Significant increase in the risk of hypothermia

For HAT residents, the low temperature averages, summarised in charts and tables earlier in this chapter, signal potential health problems. However, averages have limited explanatory power. The critical influence on poor health is more likely to be temperatures *consistently* failing to reach benchmark values. This is the picture uncovered by our detailed diurnal temperature monitoring on a selected day.

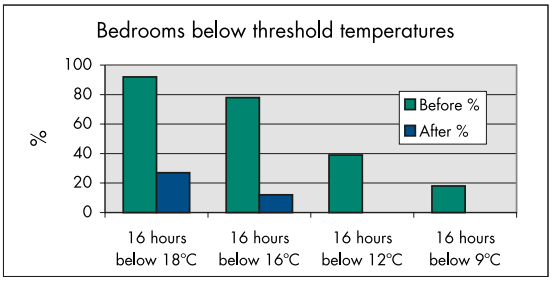
There are a few cases where average room temperatures mask a relatively comfortable lifestyle, with residents switching up the heat when in occupation and switching off when they go out. They are a minority. As Figure 10.9 shows, before their move, the great majority (84 per cent) of Childwall residents maintained temperatures over a 16-hour period consistently below the 21ºC threshold for living-rooms. For half (47 per cent), temperatures never reached the critical 18ºC threshold for avoiding health risks. Bedroom temperatures were even lower, consistently failing to reach the 18ºC threshold.

Figure 10.9 Childwall room threshold temperatures before and after residents moved

	16 hours below 21°C	16 hours below 18°C	16 hours below 16°C	16 hours below 12°C	16 hours below 9°C
Before %	84	47	25	12	2
After %	27	12	0	0	0



	16 hours below 18°C	16 hours below 16°C	16 hours below 12°C	16 hours below 9°C
Before %	92	78	39	18
After %	27	12	0	0



Source: CRESR Temperature Surveys 1999 & 2000/1 N=51 & 33

53 Williamson IJ et al (1997) Damp housing and asthma: a case control study. Thorax. 5:229-34.
54 Collins K (2000) Cold housing and respiratory disease. In Rudge J and Nicol F (eds) Cutting the Cost of Cold. London: Spon Press.
55 Wilkinson P, Landon M and Stevenson S (200) Housing and winter death: epidemiological evidence. In Rudge J and Nicol F op cit.
56 Khaw KT and Woodhouse P (1995) Temperature and Cardiovascular mortality. The Lancet. 345: 337-38.
57 Press V (2003) Fuel Poverty and Health: A Guide for Primary Care Organisations and Public Health and Primary Care Professionals. The National Heart Forum.

We have shown already how average room temperatures improved significantly after Childwall residents moved. Critically, the proportion of residents consistently failing to meet both the 21ºC living-room and 18ºC bedroom thresholds fell to 27 per cent. Moreover, the move had the effect of removing the significant minority of residents (25 per cent) who consistently failed to reach even lower threshold temperatures of 16ºC in the living-room.

Not all the 73 per cent of residents who reached the 21ºC temperature threshold in their new living-rooms will have consistently maintained this temperature throughout the day. Indeed, the scatter plot (Figure 10.5) of average temperatures shows only four of the 23 with an average above 21ºC. In practice the great majority of households started and ended the day with relatively low living-room temperatures, raising them above 21ºC to suit their need for warmth. In summary, the move to energy efficient homes appears to have led to a dramatic improvement in living conditions and reduced exposure to health risks. Though our survey numbers are small, we are confident that these benefits extend to most Childwall residents who have moved into new energy efficient homes.

Mould and damp

The presence of mould and damp is also a health risk. Once mould growth has started, large concentrations of mould spores are released into the air. The level of risk will depend on the type of mould, its extent, its location and the susceptibility of the occupant to reaction. The Liverpool tower blocks presented a major challenge to HAT. Figure 10.10 shows that most of the 216 properties included in the baseline survey of tower blocks exhibited either damp or mould growth. Only 18 per cent were free from both. At the other extreme, 5 per cent of properties had over 15 square metres of damp walls or ceilings and 4 per cent had over 15 square metres of mould growth. Most properties were in the in the middle range, exhibiting damp (40 per cent) or mould (41 per cent) in the range 0.01 to 5.0 square metres.

Figure 10.10 Damp and mould in the tower blocks

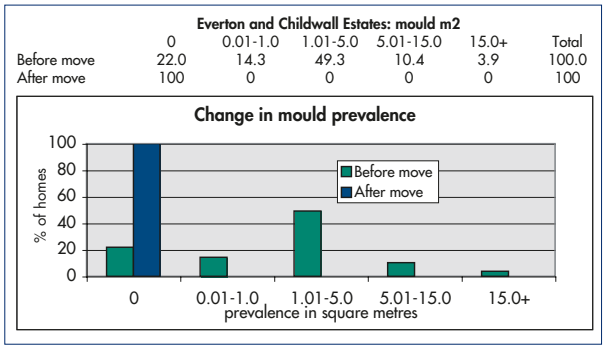
		Mould		
		No	Yes	Total
Damp	No	18% (39)	24% (52)	42% (91)
	Yes	7% (16)	50% (109)	58% (125)
	Total	25% (55)	74% (161)	100% (216)

Source: CRESER Baseline House Conditions Survey 1997, n=216

Mould arises from damp and cold conditions. In the Liverpool flats it was caused almost exclusively by condensation dampness. However, counter intuitively, more properties suffered from mould (161) than damp (125) conditions. This is explained as 'legacy mould'. Surveyors were not asked to assess whether the mould they detected indicated an ongoing condensation problem or were 'historic'. In some cases there may have been condensation problems in the past resulting in blackened surfaces, but improvements in heating or ventilation (through HAT 'catch-up' repairs) may have alleviated or cured the problem.

Whatever the complex causes of widespread damp and mould in the tower blocks, HAT's renewal programme has removed the problem. Figure 10.11 shows the change in living conditions for a sample of 77 households who had moved into new property.

Figure 10.11 Changed living conditions



Source: CRESR House Conditions Surveys, 1997, 1999, 2000, n = 77

Whereas, when they lived in the tower-block flats, this sample of 77 households experienced varying degrees of mould (and damp) conditions, in their new homes not one resident experienced this problem. Similarly, no resident experienced a condensation damp problem in their new home.

Conclusions

- The average temperature rise for Childwall homes was 3.8ºC in the living-room and 5ºC rise in the bedroom. These represent very substantial improvements.
- Before moving 85 per cent of Childwall residents had living-room temperatures which were consistently below 21ºC for 16 hours, whilst after moving only 25 per cent fell into this category.
- The average temperatures hide a wide disparity in temperature change; examples include four bedroom temperatures below 14ºC after moving.
- A principal correlate of temperature is amount expended on fuel. In the new properties, unfamiliarity with heating controls and residual fear of high fuel costs probably led to depressed expenditure. But the exact reason for some households not obtaining reasonable temperatures needs further investigation.

- The improved construction standards of the new homes, coupled with higher temperatures, have dramatically improved residents' living conditions, completely eliminating condensation damp and mould growth.

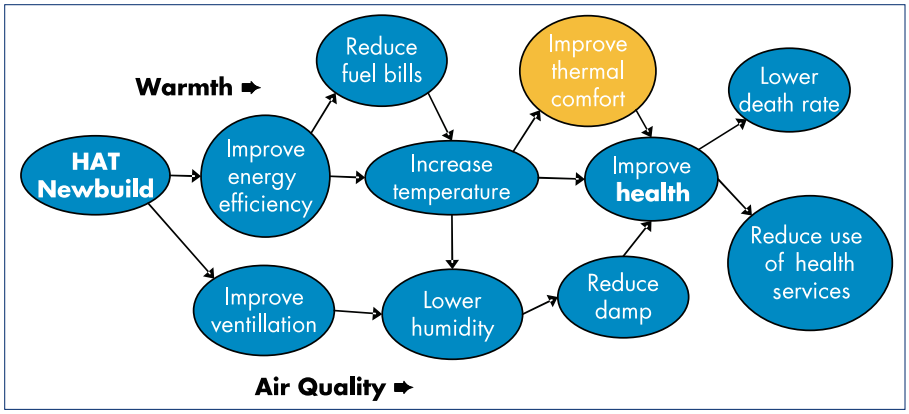
11

Thermal comfort

Our main message is that *HAT's new-build programme has led to tenants reporting a significant increase in thermal comfort.* We asked residents whether they found their new homes 'too warm' or 'too cool' or 'comfortable'. Most said they were comfortably warm. Thermal comfort improved most dramatically for those moving from tower blocks with the lowest energy efficiency.

The concept of 'thermal comfort' deployed here differs from the definition used in the 'Decent Homes Standard' set by the UK government.[58] Theirs is a physical assessment of energy efficiency. Ours is further downstream (Figure 11.1) based on residents' own perceptions of well-being. For us the proof of the pudding is in the eating. It is important to know how residents feel, as distinct from predictions based on 'objective' living conditions. Evidence from elsewhere suggests that perceived comfort exerts an independent influence on health. The subjective sensation of warmth, or thermal comfort of a subject has traditionally been measured using a seven point descriptive scale such as the Bedford scale.[59]

Figure 11.1 Thermal comfort



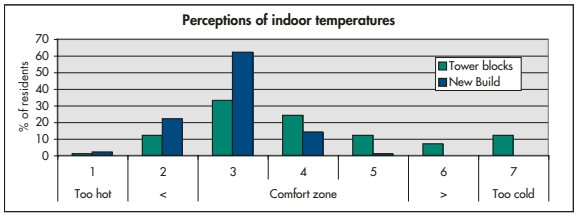
This chapter reviews (a) the changes in thermal comfort reported before and after the intervention group of residents moved to new property, then (b) the relationship of thermal comfort to temperature and (c) lifestyle.

Changes in thermal comfort

Figure 11.2 shows perceptions of increased temperature (in the home during winter) among the group of residents who moved from tower blocks to newly built houses and bungalows. All our sample of residents were asked to rate their perception of temperature in their homes from 'too hot' to 'too cold' on a seven point scale,60 both in the baseline year of 1997 and later in 1999/2000. Figure 11.2 reports only the perception of the 128 movers we surveyed and resurveyed. The proportion of these residents in the thermal comfort zone (points 3, 4 and 5 on the scale) increases from 66 per cent in the tower blocks to 77 per cent after the move, with a further 22 per cent implying they are a little too hot now.

Figure 11.2 Change in perception of temperature

	Too hot <			Comfort zone			> Too cold	
	1	2	3	4	5	6	7	total
Tower blocks	1	12	33	24	12	7	12	100
New Build	2	22	62	14	1	0	0	100



Source: CRESR Household Resurvey, 1999/00, n = 128.

Childwall households reported the biggest change in thermal comfort. Here the improvement in energy efficiency ratings was much bigger than for their counterpart movers within Everton. Overall, these results are statistically significant when compared with the largely unchanging perceptions of the group of residents staying put, suggesting the change is attributable to HAT rather than to changes in the broader socio-economic context.

There is further support for this attribution to HAT intervention from the 'special' smaller but more intensive survey of residents. As part of the temperature monitoring exercise, a sample of residents in Childwall, Riverview and Sefton Park tower blocks were asked to keep diaries for a 10-day period in the winter of 1999. They recorded their perceptions of temperature comfort on a Bedford[61] scale twice a day for two weeks for both their living-room and main bedroom. A year later, when the Childwall tenants had moved out to new houses or bungalows, the exercise was repeated for both groups.[62] Figure 11.3 records the changed perception of movers only, highlighting why they were now more disposed to use the whole of their accommodation.

58 'The thermal comfort criteria of a decent homes standard defines a minimum standard in terms of minimum levels of applied insulation (loft and cavity) and presence of an efficient space heating system'. Office of the Deputy Prime Minister (2003) English House Condition Survey 2001: Building the Picture.

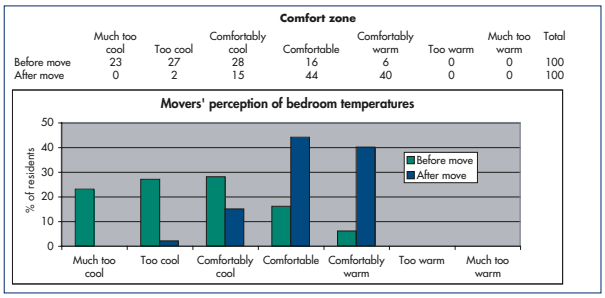
59 The Bedford scale: 1. much too cool, 2. too cool, 3. comfortably cool, 4. comfortable, 5 comfortably warm, 6. too warm, 7. much too warm. See Bedford T (1948) Basic Principles of Ventilation and Heating. Lewis and Co.

60 The scale ranged from 'too hot' to 'too cold' but the five intermediate points had no descriptive label. The scale originated in a trial undertaken in association with the Building Research Establishment.

61 This is also a seven-point scale: 1. much too cool, 2. too cool, 3. comfortably cool, 4. comfortable, 5 comfortably warm, 6. Too warm, 7. much too warm. There are seven points but only four labels are shown in Figure 11:3.

62 As with the main study, stayers' perception of temperature was similar in both waves of the study.

Figure 11.3 Expanded comfort



Source: CRESR Temperature Survey, 1999 and 2000, n = 33

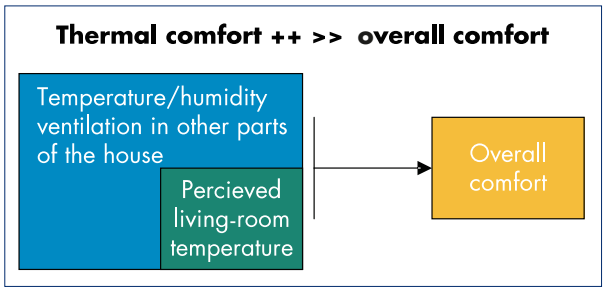
Prior to their move, exactly half the movers reported bedroom temperatures as either 'too cool' or 'much too cool'. A typical response from one tower-block resident was '*The bedroom and hall areas are perishing at night*'. '*I'm paying a high price to keep warm*', said another, who kept the living-room at 19.4°C on average, but could not afford to heat the bedroom, which had an average temperature of 10.9°C. His weekly fuel costs during the survey were £17.46. These residents tend to 'shrink' their daily lives into one room, usually the living-room. This may be maintained at a relatively high temperature, but the other parts of the home (such as a bedroom or bathroom) may be too cold for comfort. This 'spatial shrinkage' may lead to a reduction in well-being and may have an impact on health. For instance, moving from a warm room into a cold part of the home may result in a shock to the body.

The special study reveals a more dramatic improvement in perceived bedroom temperature than indicated by the larger study of generalised temperature. Over 98 per cent of the 475 diary entries from the 33 movers perceive temperatures in their new homes within the comfort zone ranging from comfortably cool to comfortably warm. This expansion of the comfort zone may lead to greater well-being. Evidence from the national evaluation of the Warm Front Scheme[63] indicates people may start to use areas of their home that had previously been out of bounds for things like hobbies. Benefits of extra warmth may also have dietary consequences: a warmer home can lead to more cooking because the previously cold kitchen has become more comfortable to work in.

The relationship between the narrower perception of temperature recorded in Figure 11.2 (dominated by the living-room) and the wider comfort zone is shown schematically in Figure 11.4. Here we assume that in assessing overall comfort, residents' perception of living-room temperature is only one important element in a more complex cognitive map which includes thermal comfort in other parts of the home, both actual temperatures and the ease with which these temperatures can be raised if required.

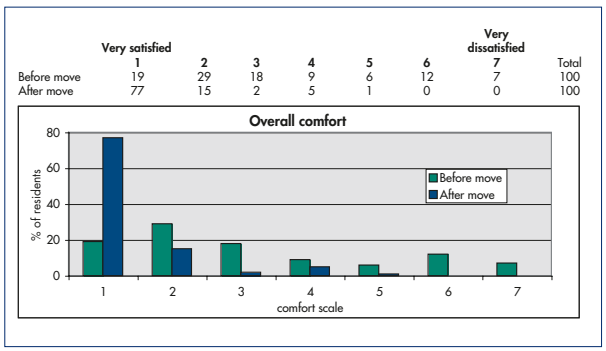
63 Undertaken by the authors and partners at the London School of Hygiene and Tropical Medicine and University College, London.

Figure 11.4 Comfort zones



In order to capture this wider comfort zone, our survey asked residents to express their satisfaction or otherwise with 'overall comfort'. The changing perceptions of movers are shown in Figure 11.5. Again, the comparator group, who stayed put, reported little change.

Figure 11.5 Overall comfort



Source: CRESR Household Resurvey, 1999/00, n = 128

The increase in overall comfort (Figure 11.5) is much greater than the increase in thermal comfort (Figure 11.2), a finding which fits the 'spatial shrink/expansion' theory above, though excess temperatures are also part of the explanation. The proportion of those within the thermal comfort zone (points 3, 4 and 5 on Figure 11.2) increases from 69 per cent to 77 per cent, whereas overall comfort (points 1, 2 and 3 on Figure 11.5) increases from 66 per cent to 94 per cent, with a dramatic increase from 19 per cent to 77 per cent of those who are very satisfied. These improvements are clearly attributable to the HAT new build programme.

Thermal comfort and temperature

In our special study of a small group of properties and households, we have compared every diary entry of thermal comfort with the temperature recorded at the same point in time by our electronic data loggers. Taken together, nearly 1000 diary entries over a ten-day period suggest broadly matching gradients for thermal comfort and measured temperature both for movers and stayers. Figure 11.6 shows the link between thermal comfort and temperature only for the Wave 2 follow-through surveys and only for living-rooms. The gradient is also evident both in bedrooms and living-rooms over both waves of the survey.

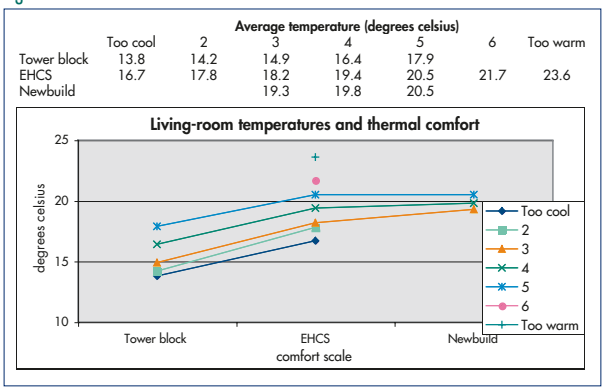
Figure 11.6 Temperature and thermal comfort

Thermal comfort scores for selected day living-rooms in 2000						
Thermal Comfort Rating	Stayers			Movers		
	Mean Temp	Standard Deviation	N	Mean Temp	Standard Deviation	N
1 Much too cool	18.5	1.1	26			
2 Too cool	18.2	2.7	56			
3 Comfortably cool	18.6	2.2	123	19.3	2.6	29
4 Comfortable	19.6	2.3	192	19.8	2.6	106
5 Comfortably warm	19.7	2.5	173	20.5	2.9	234
6 Too warm	22.4	-	1	18.6	1.5	6
7 Much too warm						

Source: CRESR Temperature Survey 1999 and2000/1: Stayers n = 34, Movers n = 33. Each respondent had the opportunity to record 20 scores (10 evening and 10 morning) during the survey period

However, our special study reveals what might be called the phenomenon of 'thermal creep'. The relationship between temperature and thermal comfort is not straightforward. For each of the main reported categories of 'comfortably cool' 'comfortable' and 'comfortably warm,' measured indoor temperatures varied considerably between properties. This is reflected in the large standard deviation measuring the scatter of temperatures around the mean. Part of the explanation is personal preference. Some residents 'feel' the cold more than others. But acclimatisation also appears to exert a big influence.

Figure 11.7 Acclimatization



Source: CRESR Temperature Survey, 1999 and 2000/1 and English House Condition Survey, 1991.

Figure 11.7 compares ratings reported in the 1991 English House Conditions Survey with ratings given by our experimental group before and after the move to new homes. Living in an energy-inefficient tower block for a long time appears to have dampened resident's perception of comfort. A 'comfortable' temperature for these residents averaged 15.4ºC in their living-room prior to their move compared with the average of 19.4ºC regarded as comfortable by those participating in the English House Conditions Survey ten years earlier. After their move, these same Liverpool residents described an average temperature of 19.8ºC as comfortable, close to the EHCS score and a full 3ºC higher than before. Indeed, a temperature of 19.3ºC was now considered as 'comfortably cool'.

Personal adjustment strategies

It seems probable from our informal discussions with residents that their previous adjustment to lower temperatures stemmed in part from their general resilience described in Chapter 7. Even in the most difficult circumstances many people do not wish to regard themselves as victims, seeking some nominal control over their lives. There are implications for health, since being reconciled to poor conditions may mean less stress than constantly challenging the system with little prospect of success.

Some residents, acutely aware of their poor living conditions, used coping strategies to alleviate the problem. Sometimes this meant consciously getting out of the flat as much as possible and into warm public spaces. Others maximised the effect of Option 14 (off-peak) tariff: '*I tend to do my ironing or washing in the morning before 8am'*, said one tenant of a tower block. But the principle remedy was to wear more clothes.

There is an emerging scientific method of putting a value on the value of clothes in achieving certain levels of thermal comfort. Humphreys (1976)[64] and Raw (1988)[65] have developed a scale of what are described as 'Clo values'. According to Humphreys, a man's suit with normal underwear would be equivalent to approximately one Clo unit. Outdoor clothes are in the 1.5 to 2.0 Clo range and arctic clothing would be 4 or more Clo. Figure 11.8 shows the Clo values required to ensure thermal comfort at given temperatures for different levels of activity.

Figure 11.8 Thermal comfort relating to clothing and activity levels

ACTIVITY	18 °c	16 °c	14 °c	12 °c	10 °c
Sitting tasks	1.8 clo	2.2 clo	2.5 clo	2.8 clo	3.2 clo
Daily average activity	1.2 clo	1.5 clo	1.8 clo	2.1 clo	2.4 clo
Light housework	0.9 clo	1.2 clo	1.4 clo	1.6 clo	1.9 clo

Source: Raw 1988 and Humphreys 1976

Undertaking light housework at Clo level 0.9 would result in thermal comfort at a temperature of 18°C. Sitting down at a temperature of 10°C would necessitate long underwear, heavy shirt, two thick sweaters, knee length woollen socks, heavy trousers, shoes, a thick overcoat and a hat in order to maintain thermal comfort.

64 Humphreys M (1976) Desirable temperatures in dwellings (1976). Building Services Engineer 44:176-180.

65 Raw G W (1988) Health and Hydrothermal Conditions in Homes. Discussion Paper. DIV Healthy Buildings Conference. Stockholm, September 1988.

In our special study, residents were asked to keep a daily record of their clothing and this was computed into a Clo value for the morning and afternoon periods of the day. The reporting procedure was demanding and intrusive and we could not be sure of the precise pattern of daily activity and of the interplay with temperature. So results reported in Figure 11.9 should be treated with some caution. The table below shows Clo values for clothing worn by the small number of residents who were surveyed in both 1999 and 2000. The Figures are for the selected day in both years and so external temperature is controlled for.

Figure11.9 Change in Clo values

	Mean Clo value			
	Stayers		Movers	
	am	pm	am	pm
1999	1.14 (n=31)	1.17 (n=30)	1.14 (n=34)	1.14 (n=33)
2000	1.03 (n=17)	1.06 (n=16)	0.94 (n=22)	0.96 (n=22)

Source: CRESR Temperature Survey,1999 and 2000
(NB. Some residents did not record what clothing they were wearing on the selected day so numbers vary)

Nevertheless, there does appear to have been an important reduction in clothing insulation in the group of movers which signals wider benefits of HAT investment. We cannot reach firm conclusions for several reasons. The sample size was small to begin with and there was attrition between the two waves of survey. The group of stayers also reported a reduction in Clo values.

The case is more convincing anecdotally. One tenant who wore thermal underwear and two pullovers said he felt comfortable in his bedroom when the temperature was below 6°C. One tenant with a young child had a bedroom 10-day average temperature of 7.1°C and living-room average of 11.9 °C. She wore her coat most of the time and only used the living-room. She had empty flats above, below and to both sides.

Conclusions

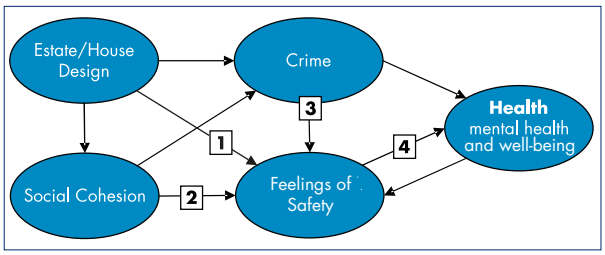
- HAT's new build programme has led to tenants reporting a significant increase in thermal comfort.
- Overall comfort has increased significantly, because tenants can now use the whole house rather than 'shrink' their daily pattern of life into one heated room.
- There is evidence of 'thermal comfort creep'. Tenants have acclimatized to higher temperatures. The average temperature associated with thermal comfort rose from 15.4°C in previous tower-block accommodation to 19.4°C in their new homes, close to the 1991 English House Condition benchmark.
- An important adjustment strategy for cold homes is to wear more clothes.

Many residents living high up in tower blocks were worried about moving. In meetings and informal discussions they expressed fears for their future safety in moving home down to ground level. They envisaged their new homes would be more vulnerable to intruders. In the event their fears proved to be unfounded. And there was a bonus too. Not only did residents feel just as safe in their homes, they felt safer walking alone on their new estate. The message is clear: *by carefully designing the new housing estates, HAT has ensured residents report very high levels of safety in their homes and increased levels of safety in their immediate environment.*

In this chapter we first take a look at residents' feelings of safety when living in the tower blocks – the baseline position. Then we review changes in residents' feelings after moving to their new homes. The impact of these changes on residents' health is summarized in Chapter 13. The baseline study had already revealed a connection between feelings of safety and health.[66] The new challenge for the follow-through study was to discover whether, with the move, perceptions had changed enough to make a significant impact on health.

Security features were a key element of the Liverpool HAT redevelopment programme. New houses were constructed to reduce the risk of burglary and the new estates were laid out to maximise defensible space. We hypothesised (Figure 3.2 and reproduced here as Figure 12.1) how these physical design features of house and estate (Pathway 1) may engender feelings of safety.

Figure 12.1 Schematic links to feelings of safety



However, resident focus groups revealed a more complex picture. They reported that strong community networks enhanced feelings of safety (Pathway 2) whereas crimes to person or property tended to erode such feelings (Pathway 3). It is also probable that these social determinants interact with the physical features of a housing estate to create either a vicious cycle of decline or virtuous circle of sustainability. By introducing security features into the physical design of the new estates *and* by keeping communities together in their transfer to new estates, HAT aimed to promote a virtuous circle of neighbourhood sustainability.

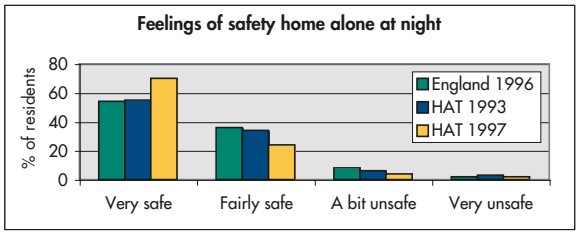
66 Green G, Gilbertson JM and Grimsley MFK (2002) Fear of crime and health in residential tower blocks: a case study of Liverpool, UK. European Journal of Public Health 2.

Feelings of safety in tower blocks

Feelings of safety were measured using the British Crime Survey questions reported in Chapter 5. In our baseline survey of tower blocks, the majority of residents said they felt safe alone in their homes at night, more than the national benchmark (Figure 12.2).

Figure 12.2 Feelings of safety at home

	Very safe	Fairly safe	A bit unsafe	Very unsafe	Total
England 1996	54	36	8	2	100
HAT 1993	55	34	6	3	100
HAT 1997	70	24	4	2	100



Source: MORI 1993, n = 2032; British Crime Survey 1996, n = 22,170.

However, our 1997 survey is not a true baseline of feelings of safety because a number of security measures were introduced into the tower blocks after they were transferred to HAT ownership. A more realistic starting point is a resident survey in 1993, commissioned from MORI by HAT soon after it took over. Then residents had perceptions very similar to the national profile, with 55% feeling very safe in their home alone at night and another 34% fairly safe.

Between 1993 and 1997, HAT introduced a number of security measures into most tower blocks as part of a programme of 'catch up' repairs. *First,* doors were strengthened and locks replaced at the common entrance to the tower blocks and for individual flats inside the blocks. *Second*, entry phones and CCTV cameras were installed at the main entrance. Visitors would buzz the relevant flat on the entry phone and residents could see their visitors on a TV channel linked to the CCTV camera. *Third,* the perimeter of each tower block was put under surveillance with lighting and CCTV. *Fourth*, caretakers, who had been primarily responsible for maintenance, were given additional duties for site security.

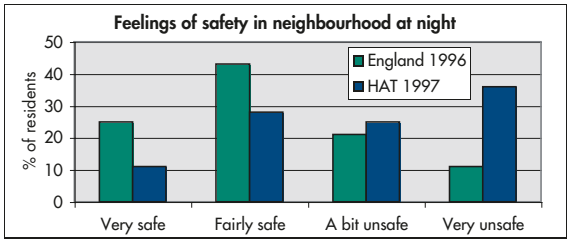
The impact of these measures appears to have been an increase in feelings of safety, with 94% of tower-block residents feeling safe in their homes and 70% of these feeling very safe. This is an exceptional success story, compared with the average national benchmark; even more so compared with feelings of safety in other deprived areas.

However, there is a possible downside in turning the tower blocks into fortresses. Discussion in focus groups revealed a siege mentality. The tower blocks were perceived as defensible space, maybe heightening fears about the surrounding environment of largely indefensible space acces-

sible to the general public. However, feeling safer within their block may have contributed to residents feeling less safe outside in the neighbourhood. A comparison of our 1997 survey with the earlier MORI survey would have given us an insight into this dynamic, but responses to the MORI survey were not strictly comparable. However, a comparison with the national benchmark is revealing. Whereas HAT tenants felt safer in their home alone at night, they felt much less safe 'walking alone in their neighbourhood at night'. Figure 12.3 records that nearly two-thirds of HAT tenants felt unsafe, whereas in the nation as a whole, more than two-thirds felt safe.

Figure 12.3 Feelings of safety in the neighbourhood at night

	Very safe	Fairly safe	A bit unsafe	Very unsafe	Total
England 1996	25	43	21	11	100
HAT 1997	11	28	25	36	100



Source: MORI 1993, n = 2032; British Crime Survey 1996, n = 22,170.

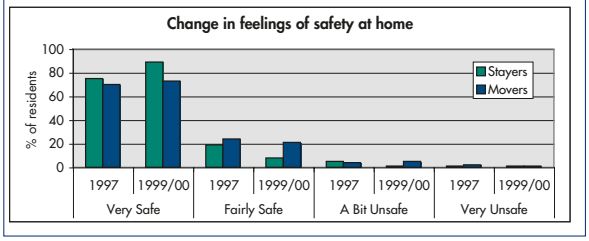
Feelings of safety after the move

Residents were apprehensive about the move for security reasons. They felt safe in their 'fortress' flats and were worried about living at ground level where they would be more vulnerable to intruders. So security was high on the agenda of the HAT development team, who viewed estate design (Pathway 1, Figure 12.1) as one of two levers they could deploy to reduce fear of crime and crime itself. The team worked closely with tenants and the architectural liaison officer from the Secured by Design programme promoted by the Association of Chief Police Officers. This Programme is a police initiative to 'encourage the building industry to adopt crime prevention measures in development design to assist in reducing the opportunity for crime and the fear of crime, creating a safer, more secure environment'.[67]

Part 2 of the Secured by Design guidance covers physical security measures, including the 'target hardening'[68] of properties with stronger doors and better windows, window and door locks, alarm systems and fencing. The impact of these measures was to maintain residents' sense of security in their new homes. Figure 12.4 shows the proportion feeling safe remained at 94% with a slight increase (from 70% to 73%) feeling very safe. Note, however, that in the tower blocks there was also an increase in residents' perceptions of safety in the home. Other factors, summarized in later sections, help explain this more complex pattern, but there is no doubt that house design has played a significant part in giving residents of the new houses a much greater sense of security than is prevalent in other inner-city areas.

Figure 12.4 Changes in feelings of safety at home

	Very Safe		Fairly Safe		A Bit Unsafe		Very Unsafe	
	1997	1999/00	1997	1999/00	1997	1999/00	1997	1999/00
Stayers	75	89	19	8	5	1	1	1
Movers	70	73	24	21	4	5	2	1

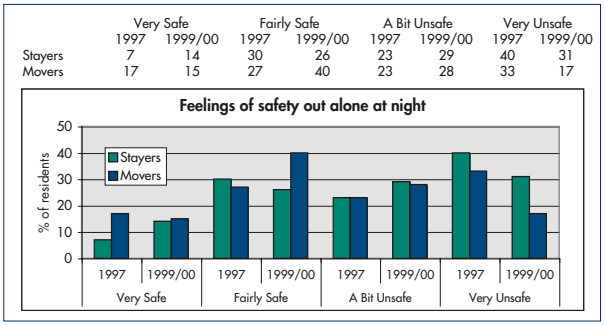


Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=268

Residents' new homes were clustered on small estates near their old tower blocks. 'Secured by Design' principles were applied to the layout of roads and gardens, 'in order to deter criminal and anti-social behaviour within the curtilage or grounds of an estate, to introduce appropriate design features that enable natural surveillance and create a sense of ownership and responsibility for every part of the development'. In effect, residents moved from tower blocks surrounded by little or no defensible space to an estate designed to maximise defensible space. This appears to have had a modest impact on resident's feelings of safety out alone in the neighbourhood. Figure 12.5 shows an increase in the percentage of movers feeling very or fairly safe (from 44% to 55%) out alone in the neighbourhood at night, with a reduction in those feeling unsafe (from 56% to 45%). This is still higher than the average national benchmark but similar to the national proportion of older people who feel unsafe – (two thirds of our local residents were also older people.)

Figure 12.5 Changes in feelings of safety out in the neighbourhood

	Very Safe		Fairly Safe		A Bit Unsafe		Very Unsafe	
	1997	1999/00	1997	1999/00	1997	1999/00	1997	1999/00
Stayers	7	14	30	26	23	29	40	31
Movers	17	15	27	40	23	28	33	17



Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n = 268

In summary, the move initiated diverging trends. Though feelings of safety in the home are broadly as before, more residents feel safer outside. Our other survey evidence

67 Secured by Design Principles http:/www.securedbydesign.com/guides/principles/asp Accessed 18/08/04.

68 For definitions, see Office of the Deputy Prime Minister (2004) Safer Places: The Planning System and Crime Prevention, Annex 5. London: HMSO.

reinforces this split. Whereas the proportion of movers worried about their homes being broken into remained fairly constant (up from 28% to 30%), the proportion worried about being mugged outside almost halved (down from 44% to 24%).

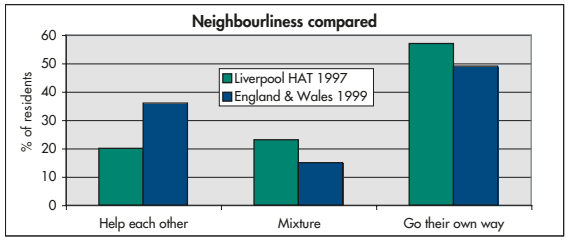
Social cohesion

We suggested in Figure 12.1 that social cohesion might influence feelings of safety and fear of crime (Pathway 2). One of Liverpool HAT's objectives was to promote social cohesion, both by careful estate design and by relocating whole communities together. Specifically, the HAT Community Support Team assisted each resident's move to a property with neighbours they knew and trusted.

Our initial impression from focus groups and tenant organizations was of relatively high degree of solidarity between tenants, implying strong social foundations upon which to engineer a high level of neighbourliness on the new estates. However, evidence from our baseline survey in 1997 shows in fact (Figure 12.6) that residents were much less likely than the national average to say that their neighbourhood was one in which people helped each other (25% compared with an average of 36% for England and Wales). Neighbourliness (as a proxy for social cohesion) was higher *within* each tower block. Over half the residents (55%) either thought people in their block generally helped each other or were a mixture of helping or going their own way, a little higher than the national benchmark (51%).

Figure 12.6 Social cohesion

	Help each other	Mixture	Go their own way	Total
Liverpool HAT 1997	20	23	57	100
England & Wales 1999	36	15	49	100

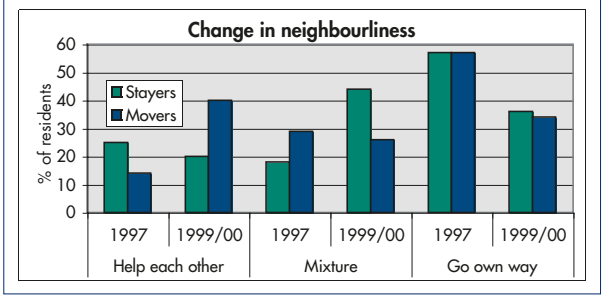


Source: CRESR Baseline Household Survey 1997, n = 268. British Crime Survey 2000, n = 19285

The redevelopment process described in Chapter 13 seems to have brought significant changes in both groups of stayers and movers. Residents who had stayed put when re-interviewed in 1999/2000, would nevertheless have experienced an extensive consultation process about their future homes. This will have increased contact between neighbours and may explain why they are marginally less likely (Figure 12.7, down from 25% to 20%) to say their neighbours help each other and significantly more likely (up from 18% to 44%) to say their neighbourhood is mixed.

Figure 12.7 Change in social cohesion

	Help each other		Mixture		Go own way	
	1997	1999/00	1997	1999/00	1997	1999/00
Stayers	25	20	18	44	57	36
Movers	14	40	29	26	57	34



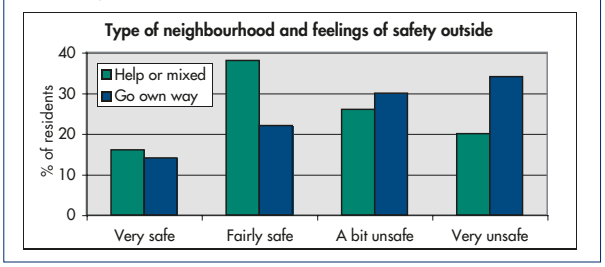
Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=268

Movers show a different trend, nearly three times as many as before said their neighbourhood was one in which people helped each other (up from only 14% to 40%). The move appears to have specially assisted younger tenants in Everton who previously thought their neighbours went their own way.

The evidence supports a link, suggested in Figure 12.1, between social cohesion and feelings of safety. Figure 12.8 shows those who think their neighbours help, or are a mixture of those who do and don't, are more likely to feel safe out alone at night. They are marginally more likely (than those who believe neighbours go their own way) to feel very safe (16% compared with 14%) and significantly more likely to feel fairly safe (38% compared with 22%).

Figure 12.8 Social cohesion and safety.

	Very safe	Fairly safe	A bit unsafe	Very unsafe	Total
Help or mixed	16	38	26	20	100
Go own way	14	22	30	34	100



Source: CRESR Household Resurvey 1999/00, n = 268

The evidence points to the positive sequence summarized in Figure 12.1. Both the physical and social elements of the redevelopment programme have increased social cohesion, and in the group of movers especially, are linked to greater feelings of safety out alone at night. Chapter 14 will report on the positive health benefits.

Crime

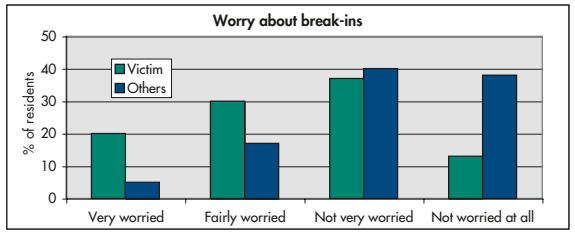
Crime itself influences fear of crime, shown as Pathway 3 in the model (Figure 12.1). Yet on the other side of the coin, there is widespread fear of crime by those who have not been victims. In our baseline survey of tower block residents, only 30 of 394 HAT residents (8%) said they had been a victim of crime in the last 12 months, yet (as Figure 12.3 shows) a majority felt unsafe alone in their neighbourhood at night. This apparent mismatch has led some commentators to suggest a degree of irrationality.

However Michael Hough looks beneath the British Crime Survey headlines and finds clear links between risks and fear. *'Worry about crime is shaped by respondents' relevant experience and by their knowledge of others' relevant experience'*.[69] Police records in Liverpool lend some support to his contention. The annual report of the Liverpool Director of Public Health[70] reports that in Everton, where HAT residents are a significant proportion of the population, the reported burglary rate was the lowest of Liverpool's 33 electoral wards (corresponding with higher than average feelings of security in the home) and the reported violent crime rate was by far the highest in the city (corresponding with high levels of fear of walking alone in the area after dark).

Our survey was not able to investigate this relevant experience in depth. In order to limit the length of the questionnaire we established only whether residents were victims of crime without distinguishing the type of crime. Our two headline measures suggest that the 30 HAT residents who were victims were no more likely to be fearful of crime than the other 368. This is probably because two thirds of the victims are relatively young men (as in the British Crime Survey) who tend to be less fearful of crime anyway. However, as Figure 12.9 shows, they were significantly more worried about their home being broken into, although the small numbers mean that this should be treated with caution.

Figure 12.9 Crime and fear of crime

	Very worried	Fairly worried	Not very worried	Not worried at all	Total
Victim	20	30	37	13	100
Others	5	17	40	38	100



Source: CRESR Baseline Household Survey 1997, n = 407

Though Liverpool HAT's 'Secure by Design' initiative appears to have had an impact by reducing fear of crime, we cannot identify a similar impact on crime itself because there are so few victims in our samples. Of 268 residents surveyed in 1997 and again in 1999/2000, a smaller percentage reported being a victim of crime over the past 12 months. However, these strictly comparable numbers were small, only 19 residents compared with 24 in the first wave, and no significance can be attached to the reduction.

Conclusions

- In poor urban neighbourhoods residents generally feel much less safe than their counterparts at a national level, both in their homes and immediate neighbourhood. Substantial HAT investment in security measures has greatly enhanced residents' feelings of safety in the home, taking it above the national benchmark.

- However, turning tower blocks into 'fortresses' may increase residents' alienation from the typically bleak landscape which surrounds them. Almost two-thirds of tower-block residents in our study felt unsafe walking out alone after dark in neighbouring streets.

- Despite their initial reservations, residents moving into new one- and two-storey houses, carefully designed by HAT, maintained very positive feelings of safety in their new homes. There was a significant improvement in feelings of safety about their neighbourhood.

- After moving to their new home there was a significant increase in the proportion of residents who said their neighbourhood was one in which people helped each other. Those who took this view were much more likely to feel safe in their neighbourhood.

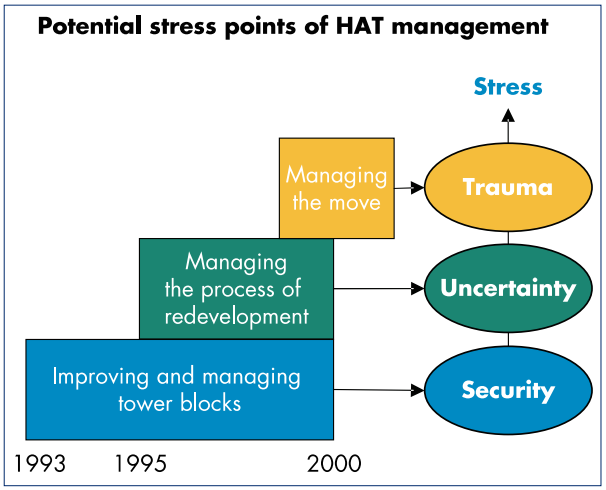
69 op cit.

70 Merseyside Police Crime Figures for 1995/6. Cited by Hussey R (1997) Liverpool Public Health Annual Report 1996. Liverpool Health Authority.

The key messages of this chapter (for Pathfinder teams and others) derive from the HAT model of managing the renewal process. They are that *(a) good management of the pre-existing stock provides a solid foundation for managing the process of renewal (b) transparent processes can mitigate the stress associated with the renewal process and (c) special support teams can help reduce the stress of moving house.*

Moving house and the uncertainty preceding a move can be stressful, especially for older people[71] and when the move is forced.[72] Other studies have shown that stress associated with housing renewal can erode health and well-being.[73] The challenge for HAT was therefore to manage the redevelopment process so as to limit this downside. HAT management had a potential impact on well-being on three levels. These are shown schematically in Figure 13.1 and structure the content of this chapter.

Figure 13.1 Stress points

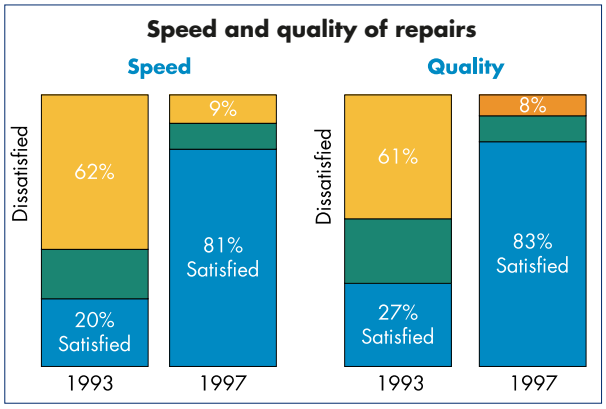


First are the management reforms and catch-up repairs implemented ever since the HAT take-over in 1993 and continuing up to and beyond the period of our survey. *Second*, superimposed upon this platform, is the four-stage process of consultation about future options, resulting either in substantial refurbishment to residents' accommodation or more probably a move to a new purpose-built house or bungalow. HAT manages the process which determines a specification for residents' new or refurbished accommodation and works with residents to help them choose a successor landlord. *Third*, special teams assist with preparation for the move and the move itself.

Management reforms

The positive impact of the catch-up repairs programme is referred to in previous sections on environmental conditions and security. Figure 13.2 summarises a dramatic improvement in residents' assessment of repairs between 1993, when HAT took over management of the tower blocks from Liverpool City Council, and 1997 when our baseline survey was undertaken.

Figure 13.2 Satisfaction levels



HAT remained a star performer on a range of management issues during the period between our baseline survey and the follow-through in 1999/2000. Figure 13.3 summarises the percentage of residents who were either very satisfied or fairly satisfied with a range of services.

Figure 13.3 Changes in levels of satisfaction with HAT/RSL management services

Area	Location		Speed of Repairs		Quality of Repairs		Rent Levels	
	wave1	wave2	wave1	wave2	wave1	wave2	wave1	wave2
Sefton Park	95	93	91	91	89	87	89	88
Riverview	40	83	60	95	75	93	90	88
Childwall	94	98	83	88	89	90	83	94
Everton	92	95	82	67	78	74	86	88

Note: For strict comparability we have included only the 268 residents interviewed in both the wave 1 baseline (1997) and wave 2 resurvey (1999/2000)

Around 90 per cent of the sample who remained HAT tenants, those on the Sefton Park and Riverview estates, were satisfied with HAT'S performance in providing a range of services. Residents moving to new homes with new registered social landlords (RSLs) in Childwall and Everton also reported favourably. These high levels of satisfaction are all the more remarkable because the second (Wave 2) survey was undertaken in a period of change, with new managing agents for three or the four estates. Some winding down and erosion of efficiency might have been expected. Yet communication remained good.

71 Ekstrom M (1994) Elderly People's experience of housing renewal and forced relocation: social theories and contextual analysis in explanations of emotional experiences. Housing Studies. 9:369-91.
72 Diamond M, McCance K and King K (1987) Forced residential relocation. Its impact on the well-being of older adults. Western Journal of Nursing Research. 9 (4):445-464.
73 Allen T (2000) Housing Renewal – doesn't it make you sick? Housing Studies. 15:443-461.

However, beneath the glowing headlines for HAT there is significant variation in the reported quality of some services. The Riverview estate was the only one of the four without a local office in the baseline survey and this is reflected in the lowest score of all for location. Relocation of the office has brought in train improvements in the speed and quality of repairs. Any disruption caused by the redevelopment process taking place at Everton and Childwall has not in general eroded levels of satisfaction with management services provided by a new landlord. The exception is deterioration in the speed of repairs in Everton, attributable to the 'snagging' process being undertaken by the builder of the new-build properties rather than the new landlord, CDS.

The freeze on rent levels for existing tenants is especially telling when levels of satisfaction with HAT are compared with levels of satisfaction with registered social landlords (RSLs) operating in other districts. Using the convention adopted by Richard Evans[74] in his overview, Figure 13.4 compares levels of *net* satisfaction.[75] Shown in bold at the top of the table are first, stayers in the tower blocks managed by HAT, and second, former HAT tenants moving to new estates managed by a RSL as successor landlord.

Figure 13.4 Net satisfaction with selected HAT/RSL housing services in 1999/2000 compared with other registered social landlords.

Area	Speed of Repairs	Quality of Repairs	Benefit Advice	Rent Levels
	%	%	%	%
Stayers (HAT)	**86**	**83**	**93**	**91**
Movers (RSL)	**59**	**75**	**87**	**70**
Holly Street (RSL)	57	68	63	62
Hyde (RSL)	39	63	30	9
Blackbird Leys (RSL)	35	51	49	5
Norton Grange (RSL)	7	43	66	82

Source: CRESR Baseline Household Survey, 1997 and Resurvey 1999/00, n=268 and Evans, (1998)

The redevelopment process

The highs and lows of this process are posited schematically in Part I (Figure 3.3) of this report for their possible impact on health and well being. However, each wave of our survey is in effect a cross-sectional study of estates at different stages in the consultation process. Figure 13.5 shows the position in our baseline year of 1997. Everton was in the vanguard, with residents having completed all the stages prior to moving. Completion is marked with a *D*. Childwall was about a year behind; Riverview was two years behind and Sefton Park, three years. By the time of our second wave survey in 1999/2000, Everton and Childwall residents had moved into new homes. The schedule for the Riverview and Sefton Park comparator groups had slipped a little, so they were still at stages (a) and (b) in the process.

Figure 13.5 Option appraisal timeline in baseline year 1997

Decision Schedule	Timescale			
	Everton	Childwall	Riverview	Sefton Pk.
a move or not	Ð	Ð	+1	+1
b location	Ð	+0.5	+1	+1
c design	Ð	+0.5	+2	+3
d landlord	Ð	+1	+2	+3
Ð Decision taken, 1 = 1 year before a decision scheduled on this issue				

Our baseline survey concentrated on the views of people living in Everton and Childwall tower blocks, as they were at the forefront of their redevelopment process. They had chosen the option of demolishing the tower blocks. They had been consulted about the location and design of their new houses or bungalows. Everton tenants had also chosen a new landlord. Childwall residents were scheduled to move after those in Everton. At the time of the baseline they were reaching the end of the option appraisal process. This had been an intense period of decision making and although residents had made decisions on their preferred option of new housing, the decision had yet to go to the HAT Board. Residents were still unclear about the exact design and location of their new homes and had yet to go through a detailed design stage and consultation with architects. The decision made by tenants received final approval from central government's Department of Environment Trade and the Regions (DETR) only in June 1997.

All were asked to reflect on this process and assess how much choice they had about their prospective home and whether they were happy with their choice. The results are shown in Figure 13.6.

Clearly, the great majority of residents in both Everton and Childwall felt they were given a lot or at least some choice in their new home and were happy with the outcome.[76] Though design and location were important, the focus groups also stressed the importance of moving with their neighbours. The Childwall focus group said they had insisted to HAT that they remain together. They felt the communal village design would also contribute to safety because the new bungalows would face each other and there would be no through roads.

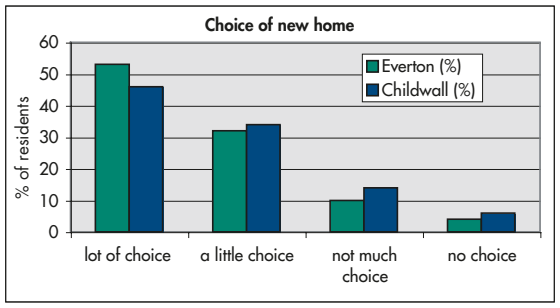
74 Figures for RSLs are taken from Richard Evans (1998) Housing Plus and Urban Regeneration. What Works, How, Why and Where? Liverpool John Moores University.

75 Net satisfaction is calculated as the percentage satisfied or very satisfied minus the percentage dissatisfied or very dissatisfied. The calculation excludes those who are neither satisfied or nor dissatisfied and those with no opinion.

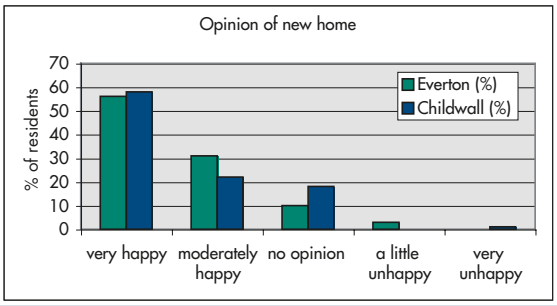
76 Residents said they were informed in three main ways: by newsletter, by letter and at tenants' association meetings. The fourth most frequent way was through public meetings. In Everton, the fifth commonest way was by a personal visit from a member of staff, whereas in Childwall it was through a Project Advisory Group (PAG) member.

Figure 13.6 Opinion about new home

	lot of choice	a little choice	not much choice	no choice
Everton (%)	53	32	10	4
Childwall (%)	46	34	14	6



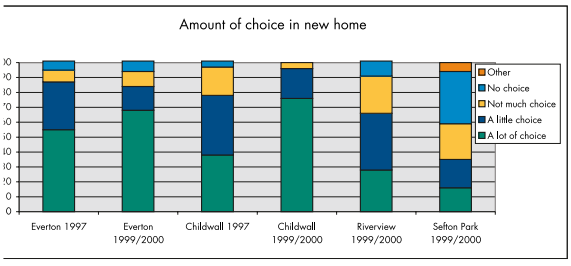
	very happy	moderately happy	no opinion	a little unhappy	very unhappy
Everton (%)	56	31	10	3	0
Childwall (%)	58	22	18	0	1



Source: CRESR Baseline Household Survey 1997, n=196 and CRESR Baseline Household Survey 1997, n=188

In the second wave surveys in 1999 or 2000, residents' assessment of choice very much reflected their position on the redevelopment timeline. Everton residents had settled into their new homes. Childwall tenants had just moved into their new homes after a long period of waiting, and Riverview and Sefton Park tenants were now well into the option appraisal process. Figure 13.7 shows how perceptions of choice varied considerably over time and between estates.

Figure 13.7 Choice in new home



Source: CRESR Baseline Household Survey, 1997 and Resurvey, 1999/00, n =268

Looking back, Everton and Childwall residents now felt they had even more choice than they had reported before the move. The proportion of Everton residents reporting a lot of choice increased from 55 per cent to 68 per cent: in Childwall the increase was sharply up, from 38 per cent to 76 per cent.[77] In contrast, residents in Riverview and Sefton Park were still in the thick of the option appraisal process. Frustrated by planning constraints in the case of Riverview and by the lack of resolution over the viability of refurbishing the Sefton Park tower blocks, tenants on these two estates reported more limited choice. Indeed a majority (59 per cent) of Sefton Park residents reported little or no choice.

With regard to the renewal process itself, over 70 per cent of residents of each estate felt that they had been moderately or well-informed. However the exact proportion tended to vary according to their perception of choice and broadly reflected the assessment of tenants' representatives. During the first wave of surveys in 1997, Everton residents were very engaged in preparations for moving; they could see their new homes being built. Over 80 per cent said they were very well-informed and the remainder said they were moderately well-informed.

Over in Childwall it was a different story. Residents had been drawn into the option appraisal process but were frustrated by various planning delays. A sizeable minority (17 per cent) of Childwall felt that they had not been very-well or even that they had been badly-informed. This corresponds to the lower rating residents gave the area housing office for providing general information and to the modest rating of perceived choice shown in Figure 13.7 above. In contrast, very high scores (over 90 per cent) were reported in Childwall after the move in 1999/2000, corresponding to very high levels of perceived choice. The lowest scores in the second wave of surveys were given by residents of Riverview and Sefton Park, where renewal or redevelopment was some way off and the information flow from HAT was slower.

The impact of the consultation process

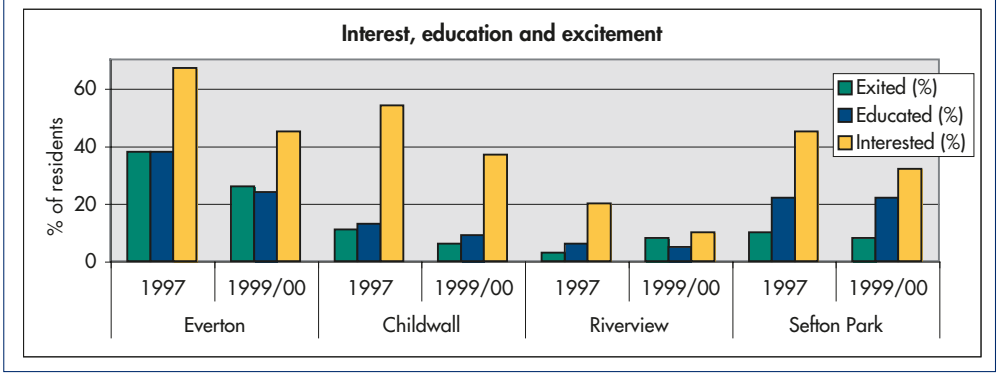
Residents were asked to assess the impact of the consultation process on their lives. Had they found the process positively interesting, educational or exciting. Or did they view it negatively as stressful, worrying, or even frightening. They were asked to rank their responses on a five point scale. Figures 13.8 and 13.9 give a combined percentage of residents who responded either 'all of the time,' 'most of the time' or 'a good bit of the time' to each of the options. Only those 268 residents surveyed and resurveyed are included for strict comparison.

Three patterns emerge. *First*, Figure 13.8 shows an erosion of interest in the consultation process. One explanation, fed back by focus groups and individual residents, was that the process had dragged on too long and they were tired of it. *Second*, positive responses tended to carry over from one period to the next.

77 Only those who were surveyed in 1997 and resurveyed in 1999/2000 are included for strict comparison.

Figure 13.8 Changes in positive perceptions of the consultation process

	Everton		Childwall		Riverview		Sefton Park	
	1997	1999/00	1997	1999/00	1997	1999/00	1997	1999/00
Exited (%)	38	26	11	6	3	8	10	8
Educated (%)	38	24	13	9	6	5	22	22
Interested (%)	67	45	54	37	20	10	45	32

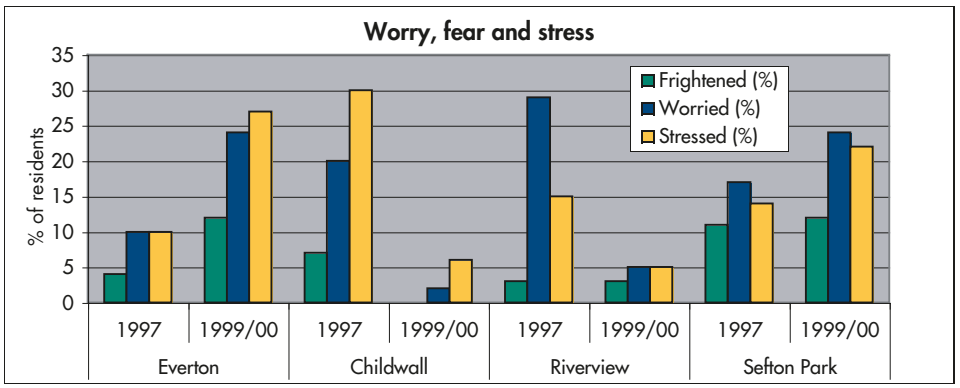


Source: CRESR Baseline Household Survey, 1997 and Resurvey, 1999/00, n = 268

Our interim analysis of baseline responses had suggested that the stage residents had reached in the process explained differences between estates. Residents in Everton and Childwall may have found the process more interesting, educational and exciting because they were more involved in the development programme and anticipated moving into their new homes much sooner than residents in the other areas. For residents living in Riverview and Sefton Park, renewal seemed a long way off.

Figure 13.9 The rollercoaster of worry and stress.

	Everton		Childwall		Riverview		Sefton Park	
	1997	1999/00	1997	1999/00	1997	1999/00	1997	1999/00
Frightened (%)	4	12	7	0	3	3	11	12
Worried (%)	10	24	20	2	29	5	17	24
Stressed (%)	10	27	30	6	15	5	14	22



Source: CRESR Baseline Household Survey, 1997 and Resurvey 1999/00, n = 268

This was our assessment of baseline results. *However*, comparison over the two waves of the survey suggests the predominant pattern is one of consistent differences between estates over time. There was a significant statistical association ($p \leq 0.01$), between the 1997 and 1999/2000 responses for each component – interest, education and excitement – and continuing differences ($p \leq 0.05$) between estates. Everton residents, perhaps because they were younger on average, remained the most interested, educated and exciting by the process, even after they had moved into their new homes.

Third, in contrast, negative perceptions are clearly related to the redevelopment timeline. Figure 13.9 reaffirms the rollercoaster of stresses and strains identified in our interim report on the baseline study.

Everton is a good example of these fluctuating fortunes. In the baseline year, the estate's residents reported the least stress: in the follow-though survey period they reported the most. By the time of our first survey they had been through the option appraisal and design stages of the new development. Interviews with local people had almost been completed and most people knew exactly what was going to happen to them.

A significant number had also opted out of the main option appraisal process and had moved out of their homes ahead of other residents. Their much more certain situation (compared for example to Childwall) may have helped to ease any stress and worry. Indeed, stress and worry levels in Everton were even lower than in Sefton Park and Riverview, where many residents faced a more uncertain future. The HAT social worker explains it in this way:

Though at the time of the survey Everton residents were closest to moving, they could see their houses being built and had a degree of certainty. Riverview and Sefton Park still had some way to go and it wasn't affecting them so much. Childwall residents were in the worst position, knowing they had to move but unsure how and when.

The sharp increase in levels of stress and worry after the move is probably linked to residents' concerns about utility bills, particularly in Everton. During the period of the resurvey, tenants in both Childwall and Everton found it difficult to establish who their fuel supplier was and, in the

absence of an early bill, were (as the temperature chapter mentions) worried about using too much energy. This worry may have coloured their whole perception of the redevelopment process.

Ensuring a good outcome

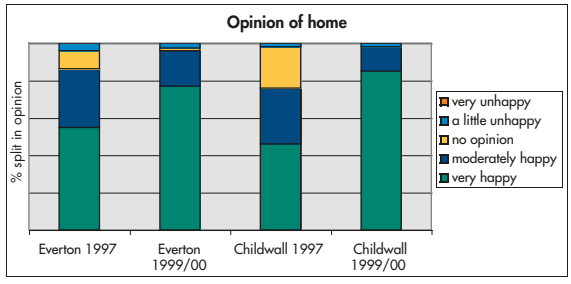
It is especially difficult to limit the stresses and strains on elderly people moving house. Even HAT has found it difficult to keep reported stress levels below 30 per cent, despite a star rating for management of its existing stock, plus transparent processes of option appraisal. However, a dedicated community support team (CST) seems to have positively influenced the final outcome of the process. Established between 1995 and 1997, the CST's function was to support vulnerable, elderly and disabled households through the redevelopment process and into their new homes. Of the 122 (46 per cent) residents who had made contact, 77 per cent found them very helpful and another 17 per cent moderately helpful.

Besides supporting residents through the redevelopment process, the CST sought to ensure that they moved into appropriately designed and adapted housing and sought 'to facilitate access to appropriate support and care services to maintain their optimum physical and mental health and social wellbeing, before during and after moving home'.

The final Figure (13.10) shows residents' opinion of their new homes became much more positive after they had moved in. In the baseline survey residents could only really make a 'bricks and mortar' appraisal of their prospective homes. After they had moved in, their assessment included a social as well as physical dimension.

Figure 13.10 Change in opinion of new home

	very happy	moderately happy	no opinion	a little unhappy	very unhappy	Total
Everton 1997	55	32	10	4	0	100
Everton 1999/00	77	19	1	3	0	100
Childwall 1997	46	30	22	2	0	100
Childwall 1999/00	85	13	0	2	0	100



Source: CRESR Baseline Household Survey, 1997 and Resurvey, 1999/00, n=128

Overall, residents' have an exceptionally positive opinion of their new homes, with 77 per cent of Everton and 85 per cent of Childwall tenants very happy and nearly all the other tenants saying they were moderately happy.

Conclusions

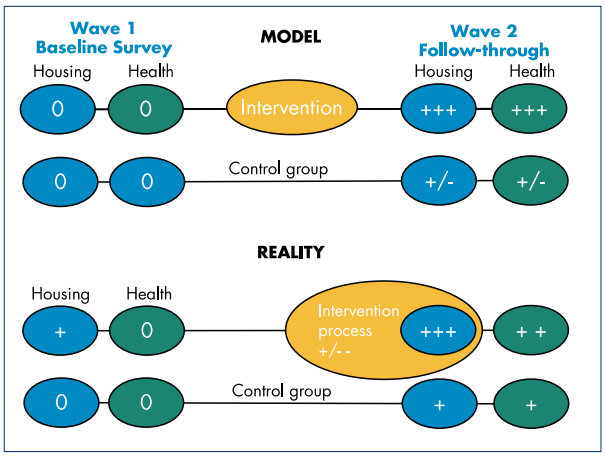
- After HAT assumed responsibility for 67 tower blocks in 1993, tenants reported a dramatic improvement in all aspects of management.
- Tenants' star rating of HAT management was maintained and compares favourably with other registered social landlords.
- Residents were generally positive about the redevelopment process but a minority found it stressful, worrying and even frightening.
- Residents report very positively on the special community support team assigned to assist both with the redevelopment process and the move to a new home.
- The outcome of the process is exceptionally high levels of tenant satisfaction with their new homes.

Health, not illness, is at the heart of our study. And the measurement of change in health status is our primary objective. We have established that a very high proportion of HAT residents are suffering from long-standing and limiting illness or disability. For many this condition is irreversible. We sought therefore to measure health in a way which was holistic and sensitive to any changes associated with HAT's comprehensive development programme. Our main message is that *improvements in residents' living conditions are linked to better health, but these positive changes are muted by the stresses and strains of the redevelopment process*.

The big (and complex) picture

As Figure 14.1 indicates, the whole picture is much more complex than we had envisaged in our initial *model* of change, outlined earlier in the report. We anticipated that from a low (= 0) baseline, HAT investment would substantially improve housing conditions (+++) and benefit residents with better health (+++). The *reality* is that residents' continuing adjustment to the process of intervention still cast a shadow over the follow-through surveys, giving more modest net gains in health (++). So in many respects residents were not describing an outcome, but an interim position soon after their move. There is some evidence that in the longer run, when they have settled in, the stresses of the move will recede and their warm and comfortable homes will have a more tangible impact on their health and well-being.

Figure 14.1 Housing intervention and health: model and reality



The model was further complicated in reality by a significant proportion of tower blocks having a relatively high SAP (over 60) in the baseline year. This limited the scope for substantial improvements. There were also continuing, though modest, improvements in the energy efficiency of control group properties between the two survey periods. A further complication, though controlled for by the research design, were general increases in indoor temperature as a result of government intervention (in the form of the winter fuel payment) to reduce fuel poverty. Some of these complications will be addressed in the section on factoring in 'dampeners' on pages 54 to 55 below.

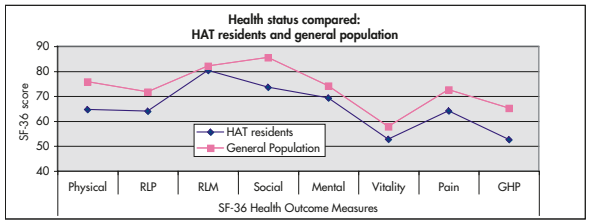
Baseline health status

The headline result of the baseline survey was that the health of HAT residents was poor compared with the general population – even after taking account of differences in age and sex. Across all eight dimensions of the SF-36 (except for role-emotional) there were significant differences between the Liverpool baseline sample and a general population sample. Figure 14.2 shows how HAT residents consistently score below the general population, with a mean difference of between 5 and 13 points across all dimensions.

Figure14.2 SF-36 health outcome compared

SF-36 Health outcome measures

Average SF-36 scores for:	Physical	RLP	RLM	Social	Mental	Vitality	Pain	GHP
HAT residents	64.6	64.0	80.3	73.5	69.2	52.7	64.1	52.6
General Population	75.8	71.7	82.0	85.5	74.1	57.8	72.6	65.2



Source: CRESR Baseline Household Survey, 1997, n=402, SCHAAR General Population Survey Note: Physical = physical functioning, RLP = role functioning-physical; RLM = role functioning-emotional Social = social functioning: Mental = mental health; Vitality = vitality; Pain = bodily pain; GHP = general health

Of HAT residents surveyed, those in the control group had slightly higher mean scores than the experimental group for the dimensions of mental health, vitality, pain and general health. However, differences between the groups were only statistically significant (at a 5 per cent level) for role limitation (physical), and for mental health. For the role limitation (physical) dimension the scores in the experimental group were greater, whilst for the mental health dimension, scores were, on average, greater in the control group.

Across the remaining dimensions there was no clear, observable distinction between the groups and the direction of the difference fluctuated between the two cohorts. Such indifference indicates that the two groups are comparable. Indeed, only two out of the eight dimensions were found to exhibit significant differences, lending further credence to the fact that the two groups are similar. Figure 14.3 compares residents' average health status on each of the four estates, adjusted for age and sex.

Figure 14.3 Health status on the four estates

	Physical	RLP	RLM	Social	Mental	Vitality	Pain	GHP
Sefton Park	56.8	60.3	78	72.7	72.3	51.7	64.1	53.6
Riverview	57.4	62.9	89.4	72.8	73.6	50.8	69	49.3
Everton	61.9	67.4	82.8	78	64.9	50.4	60.3	49.7
Childwall	60	72.9	80.2	75.5	69.5	51.2	69.1	49.7

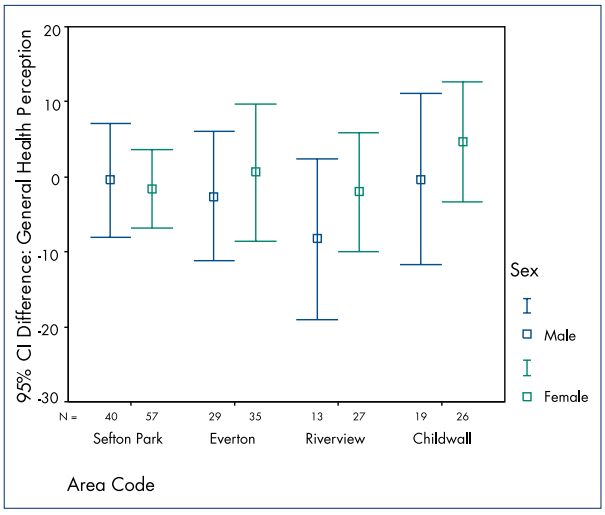
Source: CRESR Baseline Household Survey, 1997, SCHAAR analysis. n = 402

Changes in health status

Measures of health gain or deterioration were obtained by computing the individual differences in the eight SF-36 dimension scores for the 268 residents in the surveys of 1999/2000 and their corresponding scores from 1997. A positive difference on a dimension indicates that a resident reported improved health on that dimension; a negative value indicates worsening health. A zero score means that there has been no change reported. Other things being equal, one would expect a general decline in self-reported health, simply because residents have aged.

The summary result is no significant improvement in any of the dimensions of the SF-36 measure for the groups of residents who moved to warmer, more comfortable properties. Two dimensions are selected to illustrate the point. Figure 14.4 shows the mean difference (and the 95 per cent confidence intervals) in general health perception for males and females in each of the four groups. Zero means no change and a positive value on the y axis signifies health gain.

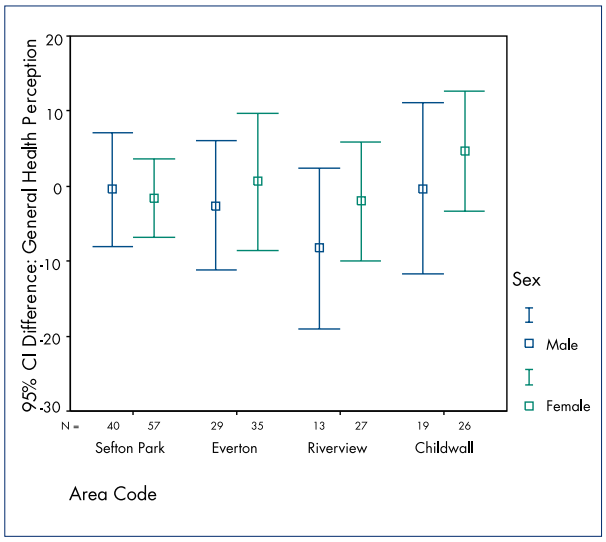
Figure 14.4 Change in general health perception



Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=246

Clearly, there is no systematic difference in general health perception between the control groups of stayers (Sefton Park and Riverview) and the intervention group of movers (Everton and Childwall). The worst performers are men in Everton and Riverview and the best performers are women in Everton and Childwall, but no significance attaches because relatively small numbers (n = 246) remained after sample attrition.

Figure 14.5 Changes in mental health status



Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=253

The change in mental health status is shown in Figure 14.5. Again, there is no systematic difference between the control and intervention groups, and the biggest positive improvements, in Childwall men and Everton women, bear no systematic relation to changes in the status of Childwall women and Everton men.

Factoring in 'dampeners'

Figure 14.6 Factors tending to dampen measured health outcomes.

Factor	Complication	Resolution
Energy Efficiency	• Some movers used to live in tower blocks with high levels of energy efficiency (measured by high SAP ratings)	• Compare households subject to a large increase in SAP rating with those subject to little or no change
Thermal Comfort	• Some movers previously experienced high levels of thermal comfort linked to high SAP ratings • Some movers into new homes were reluctant to turn up the heating	• Compare households reporting a big increase in thermal comfort with those reporting nil or low change
Process	• Process of redevelopment more stressful for movers	• Calculate negative impact of stress by comparing high and low stress groups

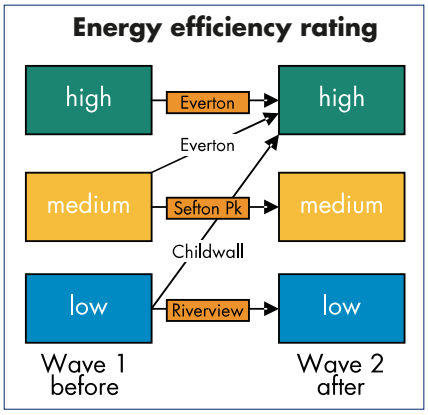
Our initial analysis indicated there was little difference in health outcomes between residents who had moved into new homes and those in the control group who had stayed put. The classic research design had given us a null result, counter-intuitive to our evidence of substantial upstream improvements in living conditions. So we resolved to dig

below the surface, using multivariate statistical techniques to uncover any linkages between improved living conditions and better health. First we identified four factors which may have dampened improved outcomes. They are listed in Figure 14.6.

Energy efficiency and health

The absence of any systematic improvement in the health of residents who moved to new homes may be explained by the variety of conditions they experienced in the tower blocks in the baseline year. Everton residents form the largest group of movers, yet they came from eight half-empty tower-block flats with varying energy ratings, some with a SAP rating above 60. Childwall residents, who came from six tower blocks with consistently poor energy ratings, form only 42 per cent of the movers. Figure 8.5 is reproduced below as Figure 14.7 to summarize the position.

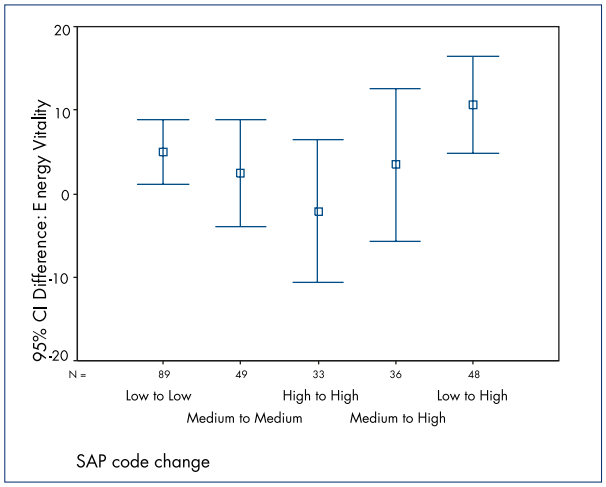
Figure 14.7 Changes in energy efficiency



We therefore undertook general linear modelling using the whole sample of respondents to explore linkages between any of the eight dimensions of health and the upstream variables of energy efficiency, temperature and thermal comfort, controlling for age and gender. *First* we examined a simple bivariate relationship between the change in the SAP energy rating over the first and second wave surveys (1997 and 1999/2000) and differences in self-reported health as measured by the eight dimensions of the SF-36. We expected greater improvement or (lower reduction) in resident's health in the 21 per cent of the properties where the increase in SAP rating was greatest, from below 30 to above 60. Figure 14.8 shows the mean differences compared to changes in SAP with changes in personal energy and vitality.

The results confirm the prediction that the biggest improvement in personal energy and vitality is reported by the 'low to high' group – those in Childwall and Everton who moved from tower blocks with low energy efficiency to homes with a high rating. The 'medium to high' group of Everton movers reported a modest improvement in personal energy and vitality. The 'high to high' group of Everton movers actually reported a reduction in their personal energy and vitality. The gradient is therefore as predicted. Yet the combined scores explain why improvement in health of movers is no higher on average than for the group of stayers. These patterns are repeated more or less for the other seven dimensions of the SF-36 health outcome measure.

Figure 14.8 Changes in energy efficiency compared to changes in the SF-36 dimension energy/vitality



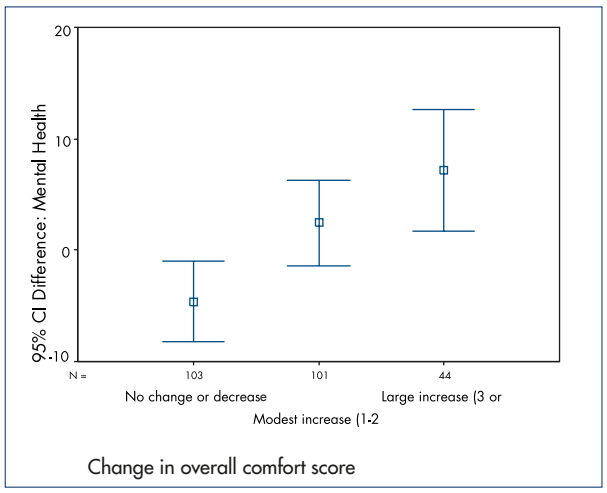
Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, First Report Energy Efficiency calculations, n=255

Comfort and health

Second, we modelled the relationship between overall comfort and the eight dimensions of SF-36. Chapter 11 described how this subjective measure of comfort extended beyond residents' narrow assessment of living-room temperature to include living conditions in their home as a whole. The results are as predicted. For most of the SF-36 dimensions of health there is a clear gradient. Bigger rises in overall comfort are associated with bigger increases in self-reported health. Figure 14.9 illustrates the relationship with the mental health dimension of SF-36.

Differences in comfort scores between 1997 and 1999/2000 were given a threefold classification – 'no change or decrease,' 'modest increase' and 'large increase'. For each of these we computed the mean difference (and the 95 per cent confidence intervals) in health scores over the same period. The results again confirm the prediction. The biggest improvement in mental health is reported by the group of residents reporting a big increase in overall comfort. Those reporting a modest increase in thermal comfort also report a modest improvement in mental health. The group reporting no change or a decrease in thermal comfort report on average a marked deterioration in mental health. These patterns are repeated more or less for the other seven dimensions of the SF-36 health outcome measure.

Figure 14.9 Changes in overall comfort compared to changes in the SF-36 dimension mental health

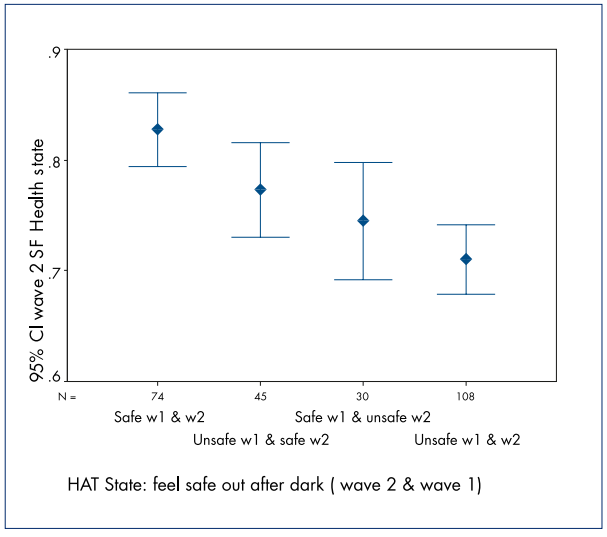


Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=24

Safety and health

Third, we modelled the relationship between residents' health and changes in their feelings of safety out alone in the neighbourhood at night. Of the 257 residents reporting both before and after their move, a relatively small number (45) felt safer, and a few (30) felt less safe. Figure 14.10 shows feelings of safety are clearly linked to a health gradient measured by the SF-Health State index[78] consistent with the statistically significant link between feelings of safety and mental health that we established from our analysis of the baseline results.[79]

Figure 14.10 Changes in feelings of safety and health



Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=257

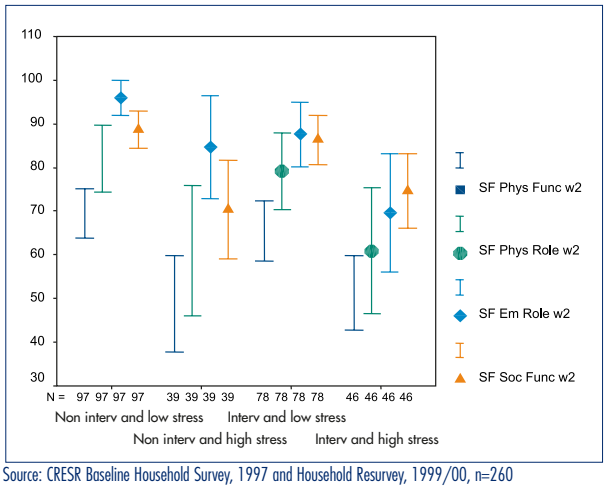
Stress and health

Fourth, we modelled the relationship between each of the eight dimensions of SF-36 and the stress and worry associated with the redevelopment process. The cyclical nature of the stress reported is described in Chapter 14 on the redevelopment process. The links between stress and health are summarized in *Social Determinants of Health: the Solid Facts* published by the World Health Organization.[80]

Social and psychosocial circumstances can cause long term stress. Continuing anxiety, insecurity, low self esteem, social isolation and lack of control over work and home life, have powerful effects on health. Although the stresses of modern urban life rarely demand strenuous or even moderate physical activity, turning on the stress response diverts energy and resources away from many physiological processes important to long-term health maintenance. Both the cardiovascular and immune systems are affected. For brief periods this does not matter; but if people feel tense too often or the tension goes on for too long, they become more vulnerable to a wide range of conditions including infections, diabetes, high blood pressure, heart attack, stroke, depression and aggression.

These physiological and psychosocial links framed our study but we did not seek to explore them in depth. Rather we sought to record the simple association between stress and reported health. From 268 responses to our Wave 2 survey in 1999/2000, individual scores were computed for the eight SF-36 dimensions of health. These were grouped according to their reported level of stress, and further divided between the intervention group and the control group. Figure 14.11 gives the mean score (and the 95 per cent confidence intervals) on four dimensions of health for each of the four sub-categories.

Figure 14.11 Process stress and four dimensions of health



Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/00, n=260

78 Brazier J, Roberts J and Deverill M (2002) The estimation of a preference-based measure of health from the SF-36. Journal of Health Economics. 21:271-292.

79 Green G, Gilbertson JM, Grimsley MFK (2002) Fear of crime and health in residential tower blocks: a case study of Liverpool, UK. European Journal of Public Health. 11.

80 Wilkinson R and Marmot M (eds) (2003) Social Determinants of Health: The Solid Facts. Second Edition, page 12. Copenhagen: WHO Regional Office for Europe.

The four dimensions of health are physical function (Phys F) Physical Role (Phys R) Emotional Role (Em Ro) and Social Function (Soc Fu). Generally, the two groups with low stress levels reported the highest scores and the two groups with high stress levels report consistently low health scores. Our inference is that stress is a more important determinant of health outcome in Wave 2 than moving into a better home. The pattern is repeated for the other four dimensions of health and also when worry and stress are factored into the equation.

The main effects on health

Finally, we isolated the degree to which each of these four factors had independently contributed to improvements in health. Figure 14.12 summarizes the results of general linear modelling for energy efficiency, comfort and stress.

Figure 14.12 Main Influences on health outcomes

SF36 wave 2	Non intervention	SAP: no or low change	Overall comfort: no/low change	Overall comfort: modest improvement	Low stress (process)
Physical Function	6.60 (0.06)	-4.89 (0.27)	**-9.85 (0.02)**	-6.77 (0.11)	4.10 (0.18)
Role Physical	10.42 (0.09)	-13.54 (0.08)	-11.74 (0.12)	-5.26 (0.48)	9.59 (0.08)
Role Emotional	20.25 (0.00)	**-21.38 (0.00)**	-6.86 (0.24)	1.87 (0.75)	8.28 (0.06)
Social Function	3.53 (0.36)	-6.28 (0.21)	-1.86 (0.69)	4.41 (0.34)	**8.40 (0.02)**
Mental Health	4.38 (0.10)	-3.89 (0.24)	-5.28 (0.10)	0.35 (0.91)	**4.97 (0.03)**
Energy and Vitality	**6.89 (0.02)**	**-11.15 (0.00)**	-6.43 (0.06)	-2.84 (0.39)	**6.92 (0.01)**
Pain	4.83 (0.20)	1.47 (0.76)	-4.70 (0.30)	-3.63 (0.41)	**11.39 (0.00)**
General Health	1.15 (0.70)	1.60 (0.66)	-3.52 (0.31)	-0.65 (0.85)	1.67 (0.51)
	Base: Intervention	Base: High increase	Base: Large increase	Base: Large increase	Base: High stress

Note: The model controls for age, gender and SF-36 wave 1 dimension scores, intervention, SAP change (between waves 1 and 2) and improvement in thermal comfort (between waves 1 and 2)

The result is complex. The essentials are these. Each column reports the increase or decrease in the relevant health dimension (between the baseline and follow-through surveys and on a scale 0-100) which can be independently attributed to the factor at the head of the column. The baseline is given at the foot of the column. So for example, in column three, the group of residents experiencing little or no change in the energy rating (SAP) of their homes between the first and second surveys, report a decrease of -4.89 in their physical function compared with those who experienced a big increase in energy efficiency with their move to a new home. In this case the difference is not statistically significant because there is a 27 per cent chance that it could have occurred at random. Where we are confident that the differences are real (where the chance of their occurring randomly is 5 per cent or less) they are shown in bold. So for example, in column three, the group of residents experiencing little or no change in the energy rating (SAP) of their homes between the first and second surveys, report a statistically significant decrease of -21.38 in their emotional role compared with those who experienced a big increase in energy efficiency with their move to a new home.

Similarly, Figure 14.13 reports on a multivariate analysis of feelings of safety and health, illustrating the complexities behind the relationship shown in Figure 14.10.

Figure 14.13 The influence of safety on health outcomes

SF36 wave 2	Change in state between wave 1 and wave 2: feelings of safety out after dark		
	Safe at w1 and w2	Unsafe w1 and safe w2	Safe w1 and unsafe w2
Physical function	1.69 (0.69)	1.954 (0.69)	-5.94 (0.21)
Role physical	**15.90 (0.03)**	12.43 (0.06)	-1.04 (0.90)
Role emotional	8.03 (0.16)	3.12 (0.59)	4.20 (0.53)
Social function	8.23 (0.07)	**9.09 (0.04)**	-4.18 (0.43)
Mental health	**6.70 (0.03)**	3.33 (0.27)	1.28 (0.72)
Energy and vitality	3.85 (0.27)	4.40 (0.19)	0.55 (0.89)
Pain	4.09 (0.36)	3.25 (0.46)	-3.33 (0.53)
General health	4.47 (0.17)	2.85 (0.37)	-1.45 (0.70)
	Base: unsafe at w1 and w2	Base: unsafe at w1 and w2	Base: unsafe at w1 and w2

1. * Outcomes: main effects GLM parameter estimates adjusted for intervention, SF-36 score at Wave 1, and respondent age and gender. Significance probabilities in brackets. Differences from the base group significant at the 0.05 level are in bold.

2. Because numbers in the follow-through survey were relatively small and feelings mixed, there was again Those reporting that they feel safe both at wave 1 and wave 2 give consistently higher average adjusted SF36 scores at Wave 2 than those who feel unsafe at both Wave 1 and Wave 2. The differences are significant for physical role and mental health.

Though Chapter 12 showed that residents moving to new homes were more likely than before to feel safe out alone at night, the number surveyed was insufficient for us to

show a statistically significant impact on their health. However, as with energy efficiency and comfort, an increase in feelings of safety, whether experienced by movers or stayers, is associated with better health. The middle column of Figure 14.13 shows the change in health scores for those residents who felt safer than before compared with those who consistently felt unsafe. Their social functioning increased significantly by 9.09 points (on a scale of 0-100) compared with those who felt unsafe.

The picture overall is that there is no statistical association between moving into a new home and improved health; in fact just the reverse. Stress associated with the redevelopment process also appears to have a major negative impact on health. Those reporting low stress reported better health and significantly better health on four of the eight SF-36 dimensions of heath. On the positive side of the equation, those who had experienced little or no improvement in the energy efficiency of their homes generally reported poorer health than those who had experienced a big increase in energy efficiency. Those who reported little or no change in overall comfort also consistently reported poorer health across all eight health dimensions compared with those who had experienced a large increase in thermal comfort. Those who reported an increase in feelings of safety reported better health across all eight dimensions compared with those who continued to feel unsafe.

Conclusions

- The summary result is of no significant improvement in any of eight dimensions of the SF-36 measure for the group of residents moving to warmer, more comfortable properties. However a more sophisticated statistical analysis reveals a more complex picture.

- Increased energy efficiency and better living conditions are positively associated with increased thermal comfort and better health. These improvements are likely to be sustained.

- Levels of stress associated with the redevelopment process are significantly associated with poorer health and in the short term appear to counterbalance the benefits of improved living conditions.

- As a result of the HAT programme, residents continue to report relatively high levels of safety in their new homes and out on their estate, feelings associated with better mental health.

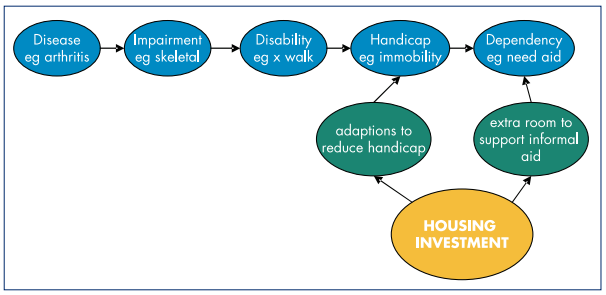
15

Adaptations reducing dependency

This chapter has three main messages. First, *the independence of disabled residents has been enhanced by the design of their new homes in the HAT redevelopment programme.* Second *the independence of disabled residents has been enhanced by aids and adaptations to their new homes.* Third, *it is vital to deploy occupational therapists to assess individual needs prior to the residents moving to a new home.*

HAT has applied a 'Lifetime Homes' concept to its new-build programme, aiming to improve the mobility and accessibility of residents with irreversible disabilities and to anticipate future needs. In addition to these common design features, HAT deployed occupational therapists (as part of their community support team) to ensure residents' new homes were specially equipped to support individual needs. Figure 15.1 hypothesises how these measures may reduce handicap and reduce demand for formal health and community care/services.

Figure 15.1 Reducing dependency



Special study in Everton

A special study was commissioned to test the hypothesis that aids and adaptations can reduce handicap and promote independence. A sample of residents was selected from the Everton district. Before they moved, the senior occupational therapist (OT) in HAT's community support team had undertaken 100 assessments of residents' level of independence. These were undertaken between July 1995 and January 1998 as part of her routine workload. Following residents' move to new homes, the OT was commissioned to undertake a follow-through study of 42 of these residents who had also been interviewed by the research team. Re-assessments were undertaken for 31 residents. No assessment was possible for two who were on remand or in a bail hostel, two who were in hospital, two who had moved away, three who cancelled their re-assessment and three who could not be contacted.

Residents were assessed using a modified activities of daily living (ADL) scale which includes activities that everyone will need to accomplish every day or (on some dimensions) every week. Both the well-established Barthel[81] and Rivermead[82] ADL scales were developed in a hospital setting, using a medical model of disability. The OT adapted the Rivermead ADL for use in a community and community rehabilitation setting. Rivermead covers more aspects of domestic activity than the Barthel ADL, including washing, ironing, carrying shopping, transport to shops and dealing with money. A continence score was added to our scale, taking the maximum score to 111. Free-text areas were added to allow residents to comment on social contacts, leisure activities, mental state, communication, hearing, eyesight and any other problems.

The more inclusive ADL measure adopted in our special study means we can distinguish the disability or handicap component of an ADL score from (a) the living conditions component, (b) the physical features of residents' domestic environment, including building design, aids and adaptations, and (c) residents' social environment, including contact with neighbours, family and friends.

Positive results

Just under half (15/31) the residents assessed scored higher on the ADL scale after their move to a new home. Figure 15.2 summarizes the pattern and causes of change.

In 18 cases (outlined in Figure 15.2) where the net outcome is positive (or in three cases the same), changes in health status account for marginal changes in the ADL score. These changes range from -3 to +3, for a resident whose chest condition had improved. Improvements in physical living conditions always make a positive contribution, in the range +2 to + 11. Changes in the social context are more variable, with scores ranging from -3 to + 15.

Most residents with high net scores had major adaptations. Typical is resident 3, with a new ground floor flat on a level part of the site, a local authority shower with seat and rails, rails either side of the toilet, raised electrical sockets, a smoke alarm for the deaf and a doorbell with a flashing light. These changes account for an increased score of +8. Because his wife had died since the first assessment, this man had also become more independent in his domestic life. This alone accounted for an increased score of +11, and an overall increase of +19.

81 Collin C, Wade, DT, Davis A and Horne V (1988) The Barthel ADL index: a reliability study. International Disability Studies. 10: 61-3.

82 Whiting, S and Lincoln N (1980) An ADL assessment for stroke patients. British Journal of Occupational Therapy. 43:44-6.

Figure 15.2 Positive changes in patterns of dependency

	First Assessment (before move)	Change in score between first and second assessments				Second Assessment (after move)
		(a) change in health	(b) change physical living conditions	(c) change in social context	(d) net change a+b+c	
1	89	0	+6	+15	**+21**	110
2	78	0	+11	+9	**+20**	98
3	74	0	+8	+11	**+19**	93
4	85	+1	+3	+12	**+16**	101
5	87	0	+5	+6	**+11**	98
6	77	-2	+7	+5	**+10**	87
7	101	+2	+3	+4	**+9**	110
8	72	0	+8	+1	**+9**	81
9	100	0	+4	+4	**+8**	108
10	81	+3	+2	+2	**+7**	88
11	78	0	+4	+2	**+6**	84
12	105	+1	+4	+1	**+6**	111
13	92	+1	+4	0	**+5**	97
14	82	-1	+3	0	**+2**	84
15	105	0	+2	0	**+2**	107
16	90	-3	+6	-3	**0**	90
17	103	-2	+2	0	**0**	103
18	106	0	+3	-3	**0**	106

Source. Kay McDermot. Special Study, 1995-1999, n = 31

Adaptations and aids were generally provided by the landlord or social services department. However, in many cases, home loss payments (provided by statute) also made a significant contribution to independence, by providing capital for the purchase of new furniture. Purchasing a new bed, along with bathroom adaptations and a second stair rail contributed to the independence of resident 1, who posted the highest net increase in ADL score. Resident 4 also scored a big increase because she had tried out and then purchased a new three-piece suite which allowed her to sit down and get up more easily.

Negative results

Only nine of the 31 residents assessed recorded a negative net change in ADL score. Figure 15.2 summarizes the pattern and causes of change.

Typically, the health of these residents had deteriorated and improved aids and adaptations were not able to compensate. For example, an operation on resident 19 had left him in a weak condition. Adaptations had improved his ability to use the bathroom and toilet but he was still struggling to use the stairs. The health of resident 26 had also deteriorated due to a serious operation, but he was

Figure 15.3 Mixed changes in the pattern of dependency

	First Assessment (before move)	Change in score between first and second assessments				Second Assessment (after move)
		(a) change in health	(b) change physical living conditions	(c) change in social context	(d) net change a+b+c	
19	98	-20	+2	-1	**-19**	77
20	80	0	-3	-8	**-11**	69
21	93	-2	-3	4	**-9**	84
22	83	-4	-1	-2	**-7**	76
23	111	-3	0	-3	**-6**	105
24	110	0	-1	-5	**-6**	104
25	102	-5	+3	-5	**-6**	96
26	81	-6	+2	0	**-4**	77
27	105	0	0	-1	**-1**	104

Source. Kay McDermo, Special Study 1995-1999, n = 31

assisted by living on a ground floor with ramped access, a local authority shower with fold-down seat and rails, separate toilet and bathroom and rails either side of the toilet.

There are a handful of cases where living conditions had not improved. Sometimes this was because a resident's previous flat was already adapted, so there was no change in score. For example, resident 24 already had a specially adapted shower with fold-down seat and rails, a rail by the toilet and raised electrical sockets. Sometimes however, the OT recommendation had not been implemented, as in the house of resident 19 where grab rails had not been installed in the downstairs toilet, making it difficult to use. In a couple of cases, new adaptations were dysfunctional. Resident 20 had problems with the shower flooding and the flashing light on the doorbell and linkline were not working.

Social life

Social context was often a significant element in residents' level of independence. In some cases – resident 16 for example – living with a family member had compromised the installation of major adaptations which would have been implemented if he had lived alone. Resident 22 had a shower over the bath with rails and a rail by the toilet. However, the bath was only retained because she lived with her daughter. A free-standing shower would have significantly increased her level of independence. Resident 21's son provided mixed blessings. He had moved in with her and his company improved the social component of her ADL score, but she had decided against a shower because of his preference.

The wider 'peri-domestic' social environment can also influence the ADL score. Resident 2 had more visitors and a better social life because her house was more accessible than her previous tower-block flat. However, resident 27 felt isolated because his young friends did not visit because of complaints from neighbours. Another was worried about security (see Chapter 12) and another had not recovered from the stress of moving (see Chapter 13). Both these aspects eroded the sense of independence.

Conclusions

- In the majority of cases reviewed, the independence of disabled residents has been enhanced by both the design of their new homes and by specific aids and adaptations.

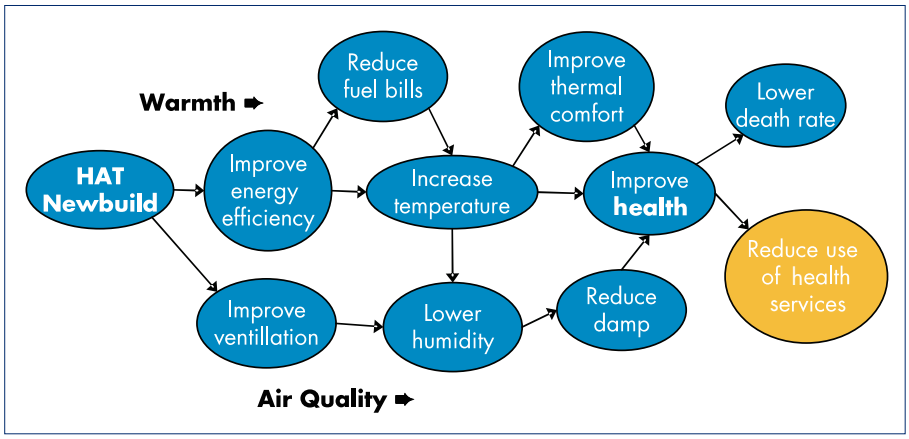
- The social dimension of residents' lives interacts both positively and negatively with living conditions to influence their level of independence.

- It is essential that residents' needs are assessed and adaptations implemented prior to their move into a new home.

There are two main messages from the evidence summarized in this chapter. *First, HAT tenants use health and community services much more than the average member of the population*. This is to be expected in a group which over the course of a long life has become older and poorer.

A key issue in the previous chapter was whether some illness and disability can be reversed by improving social and environmental conditions. A key issue for this chapter is whether any such improvements in health will reduce the use of health services. This is shown schematically in Figure 16.1.

Figure 16.1 Hypothesised impact of HAT programme on use of health services



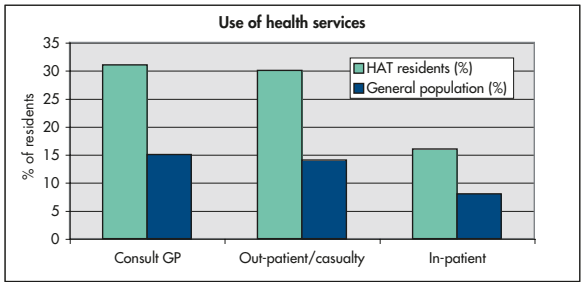
A second key message is that within the group who moved to new homes, there is evidence of a significant decline in consultations with general practitioners compared with the position before they relocated. There is therefore a possibility that intervention to improve the housing stock can reduce demands on the National Health Service. This will be of interest to government and partner agencies undertaking cross-cutting reviews.[83]

The baseline position

The use of health and community services by HAT residents in the 1997 baseline survey was about twice the national average as reported in the General Household Survey. Over 30 per cent of residents had consulted their GP during the previous two weeks compared with only 15 per cent of the general population. As Figure 16.2 shows, a similar proportion of residents used hospital outpatient or casualty services during the previous three months – again a rate of use more than twice the national average. Over 15 per cent reported they had been a hospital in-patient during the last year compared with 8 per cent of the general population.

Figure 16.2 Use of health services in 1997

	Consult GP	Out-patient/casualty	In-patient
HAT residents (%)	31	30	16
General population (%)	15	14	8



Sources: CRESR Baseline Household Survey 1997, n = 402, General Household Survey, 1994

This high use of health services obviously reflects the greater age and poorer health of HAT residents. But it does not explain differences, which are sometimes significant, between the control and experimental groups. Though the average age of the experimental group (Everton and Childwall) is three years less than the control group (Sefton and Riverview), it had a significantly higher take-up of some services in the baseline year of 1997, as shown in Figure16.3.

16.3 Use of resources – comparisons in baseline year

	Control Group		Experimental Group	
	Sefton Park	Riverview	Everton	Childwall
Consultation with GP in previous 2 weeks	25%	27%	36%	37%
O/P dept. attendance in last 3 months	25%	30%	28%	29%
A & E Dept. attendance in last 3 months	5%	10%	9%	3%
Inpatient stay in last year	11%	15%	18%	21%

Source: CRESR Baseline Household Survey 1997, n = 402

The use of hospital inpatient services by the experimental group was significantly (at the 5 per cent level) higher – an aggregated 19.6 per cent compared with 12.8 per cent for the control group. However, there were no significant differences in the proportion attending outpatients or casualty during the past three months (28.6 per cent in the experimental group and 26.7 per cent in the control group had attended outpatients, and 6.3 per cent in the control and 5.5 per cent of the experimental group had attended casualty in the last three months).

83 HM Treasury/ Department of Health. Tackling Health Inequalities: Summary of the 2002 Cross-Cutting Review (2002) Department of Health.

There was a marginally significant difference between the groups in terms of the *number of occasions* they had attended outpatients within the last three months. (The median number of occasions the control group had attended outpatients was once whereas it was twice in the experimental group.) No statistical differences were detected between the groups in terms of the number of occasions they had attended casualty in the last three months. Similarly, there was no significant difference between the groups regarding the number of occasions they had been in hospital as an inpatient during the past year, or the number of nights they had spent in hospital during the past year. The control group reported a mean number of 16 nights in hospital, and the experimental group a mean of 15 nights; this compares with a mean of nine nights in hospital during the last year reported in the GHS statistics for 1994.

Significant differences were detected in 1997 between the groups (at the 5 per cent level of significance) for the proportions (greater in the experimental group) having consultations with their general practitioner in the previous two weeks (36.5 per cent in the experimental groups versus 26.0 per cent in control group). However, there was no significant difference when the number of contacts in the last two weeks were disaggregated by type of contact, be it 'by telephone', 'in your own home' or 'at the doctor's surgery'; only the number of contacts, as a whole, over the past two weeks was significantly different between the groups. This utilisation is high when compared with levels reported in the 1994 GHS, which reported consultation rate statistics over the past two weeks with levels of 12 per cent for males and 17 per cent for females.

There were no significant differences detected between the groups in the baseline year with regard to their use of community services during the last month (the question was phrased with a yes/no response); indeed usage was very low. The most frequently used service during the last month was home help (6.8 per cent in the control group versus 4 per cent in the experimental group). The relatively small numbers currently using community services is most probably due to the composition of the samples in that there were relatively small numbers of 'elderly' people in either group (see below).

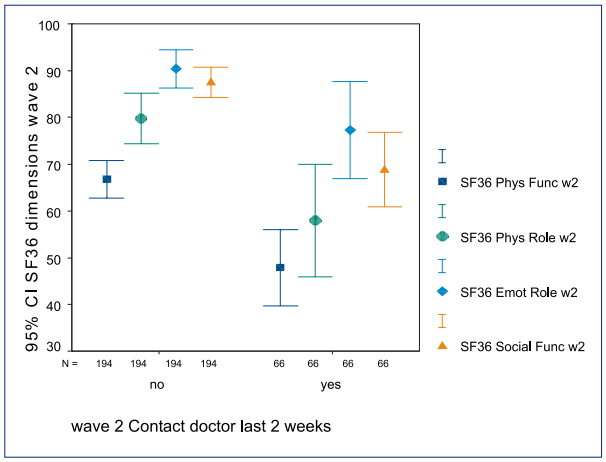
Very few respondents reported frequent use of community services (as distinct from the HAT community support team). Slightly more use was made of home help services in the control group, but generally, for both groups, there were fewer than six respondents using each of the services with any greater frequency than once a week. A couple of respondents used one or other of the services on a more regular basis, but their use was minimal, and their impact on the analysis minor. The low frequency of usage of community services makes differences between the groups in this respect difficult to detect and thus interpret. Any inferences should be treated with caution.

The 1994 GHS survey reports that 6 per cent of elderly respondents had been visited at home by a district nurse, health visitor or other nurse during the previous month, though this varied with age. Similarly, around 8 per cent had received support from a local authority home help or home care worker, and 3 per cent had used meals on wheels in the previous month; usage was much greater for those aged 85 and over (for example, 1 in 10 used meals on wheels). This might well explain the 'low' uptake of such services in this study, where only around 5 per cent of the people in the total sample was aged over 85 years.

Changes in the use of health services

The previous chapter on health demonstrated a complex relationship between HAT intervention and health outcomes. There is no such ambiguity between health outcomes and the use of health services. Figure 16.4 compares the health scores on four of the eight dimensions of SF-36 for those who had contact with a general practitioner during the previous two weeks with those who had not.

Figure 16.4 Health and contact with a general practitioner.



Source : CRESR Household Resurvey 1999/2000, n = 250

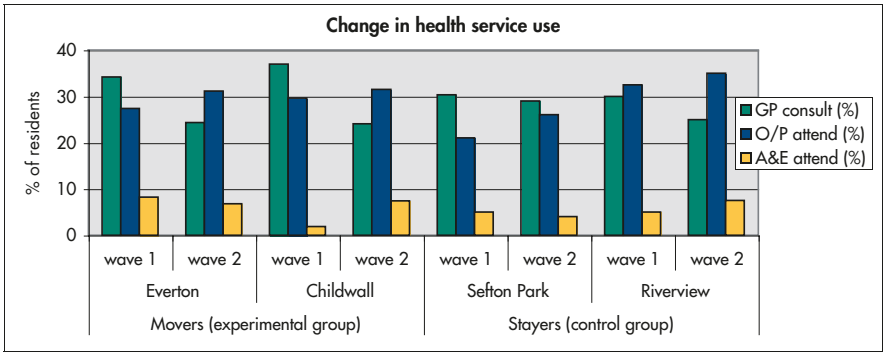
Only the 250 residents responding to this question in the second wave survey are a reported in Figure 16.4. The result is a systematic and statistically significant difference (at the 1 per cent level of confidence) between the two groups on all four dimensions of health. For example, those who had not seen a doctor during the past two weeks reported an average score of 66 on the physical function dimension compared with a score of 46 for those who had seen a doctor. (All the scores are points on a scale 1 to 100). The pattern is repeated for the other seven dimensions. For example, the difference between the two groups in the SF-36 score for pain averages 20 points (77 minus 57). The difference for general heath perception is 14 points (58 minus 44).

Finally, were there any changes in the use of health services between the first wave of surveys in 1997 and the

second wave of surveys in 1999/2000. Figure 16.5 summarizes the results, showing the frequency of contact with three key services provided by the NHS.

Figure 16.5 Use of the health service in Wave 1 and Wave 2 compared

	Movers (experimental group)				Stayers (control group)			
	Everton		Childwall		Sefton Park		Riverview	
	wave 1	wave 2	wave 1	wave 2	wave 1	wave 2	wave 1	wave 2
GP consult (%)	34.2	24.3	37.0	24.1	30.3	29.0	30.0	25.0
O/P attend (%)	27.4	31.1	29.6	31.5	21.0	26.0	32.5	35.0
A&E attend (%)	8.2	6.8	1.9	7.4	5.0	4.0	5.0	7.5



Source: CRESR Baseline Household Survey, 1997 and Household Resurvey, 1999/2000, n = 268 Note: GP consultation in previous 2 weeks, Out patient attendance in last 3 months, Attendance at Hospital Accident & Emergency Dept in last 3 months.

The second wave of surveys in 1999 and 2000 indicated a significant drop in GP consultations by those moving into new homes compared with those who stayed put. These results were validated by comparing a small sample of GP records with the survey responses. There was variation in both directions in terms of recollection compared with records. Overall, these variations seemed to cancel out each other. We cautiously suggest that improved living conditions may reduce use of primary health services, despite the stresses and strains of moving house.

Conclusions

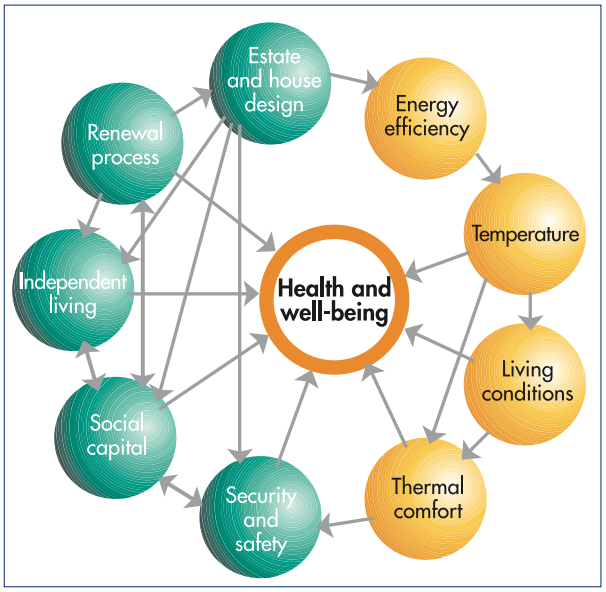
- HAT tenants use health and community services much more than the average member of the population, as expected of a group which over the course of a long life has become older and poorer.

- There is a significant drop in GP consultations by those moving into new homes compared with those who stayed put, suggesting that intervention to improve the housing stock can reduce demands on the National Health Service.

17

Our research team could not have imagined the complexities of this study when we embarked on an investigation into the impact of housing investment on health. The difficult issues were not conceptual. At the outset, our steering group recommended we address the psychosocial route to health (feelings about safety and security and about the process of renewal) as well the physiological route via physically improved living conditions. In the event, this twin-track approach was essential to a proper understanding of the dynamics of the renewal process both in Liverpool and in our later national health impact evaluation of the UK government's Warm Front programme. Our holistic model of housing investment and health is summarised in Figure 17.1.

Figure 17.1 Holistic model of housing investment and health

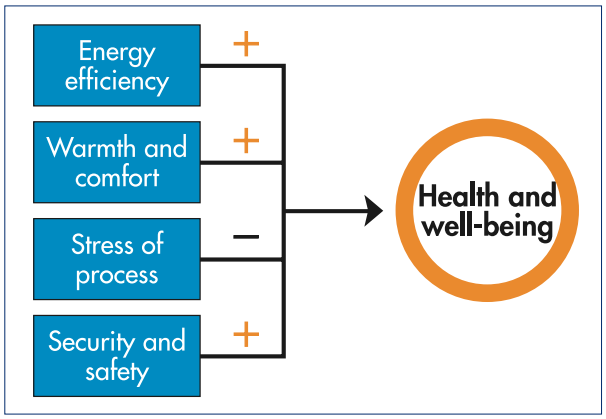


The difficult issues were the realities of undertaking a longitudinal study of health impacts outside the relatively controlled conditions of a laboratory or hospital. The redevelopment programme undertaken by Liverpool HAT was exceptionally well-organised. Nevertheless slippages in the timing of the residents' move to their new properties delayed the follow-through survey and increased the attrition in our baseline sample of residents. The baseline itself was problematic. In the period following their acquisition of 67 Liverpool tower blocks in 1993, HAT significantly improved the management of their estate and, with catch-up repairs, the condition of their properties. Our survey in 1997 therefore constitutes an enhanced 'baseline,' delimiting the scope for further improvements in health and well-being.

Key findings

Despite these qualifications, the study reveals significant results and gives clear messages to the policy community. Figure 17.2 summarises the main findings.

Figure 17.2 Main impacts on health and well-being



Key messages

The key messages are summarised at the beginning and end of each of the Chapters 8 to 16 and briefly in the table overleaf. Our five main messages resonate with current programmes of reform initiated during the period of our study by central and local government. Their agendas have developed rapidly over the past six years and share many of the objectives of this study. Most important is the determination of four great departments of state – HM Treasury, the Department of Health, the Department of Environment, Food and Rural Affairs and the Department of Trade and Industry – to eradicate fuel poverty *en route* to achieving a decent standard of homes for all. Nesting within this policy framework are the innovative programmes of our partners, Liverpool HAT, the Housing Corporation and the Public Health Team of the North West Region of England in tackling the upstream determinants of health inequalities.

Our *first* set of results on living conditions therefore reinforces a message which is broadly accepted by the policy community. Our *other messages* also address a major government agenda, that of neighbourhood renewal. But here the issues are more complex and the evidence less certain. Despite the major research effort of our colleagues at CRESR in evaluating New Deal for Communities, relatively little is known for certain about the complex interplay of people and place, process and cross-cutting outcomes, in reviving and sustaining urban communities.

Here our research has the greatest salience. HAT's success in making residents feel safe and secure in their homes, within even the poorest neighbourhoods, should be fed into the community safety policies being developed by the Home Office and local authority partners. HAT's star performance in housing management and in managing a large-scale redevelopment process should provide a salutary lesson to the Housing Market Renewal Pathfinders promoted by the Office of the Deputy Prime Minister.

Figure 17.3 Impacts and messages

Chapters	Impact of HAT investment programme	Key messages
8-11 Living Conditions	• Dramatic improvements in energy efficiency • All households removed from fuel poverty • Average temperature rise of 3.8°C in living rooms • Big rise in thermal comfort	Carefully targeted housing investment can eliminate fuel poverty and dramatically improve living conditions.
12 Security	• Very high levels of reported safety in home • Increased levels of reported neighbourhood safety	Carefully designed estates can enhance safety in even the poorest urban areas
13 Process of renewal	• Positive response to process • But a third found it stressful • Exceptional satisfaction with new homes	Much can be done to ease the process of renewal and deliver a positive outcome
14 and 16 Health	• Impact on health is complex rather than clear cut • Health gain linked to comfort • Reduced use of health services	Attention should focus on feelings as well as physical conditions
15 Independence	• 'Lifetime homes' and special adaptations reduced dependency	'Lifetime homes' promote independence

Finally, we add to the mounting evidence that a secure and comfortable *home* has more influence on health than the 'bricks and mortar' which define a *house*. Of course, the two are related, and renewal programmes should encompass improvements in both physical fabric and social infrastructure. In this respect the HAT community support team is a microcosm of good practice – ensuring that vulnerable residents move into appropriately designed and adapted housing but also facilitating access to appropriate support and care services. Their aim (and ours in undertaking this research) is to maintain residents' optimum physical and mental health and social well-being.

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