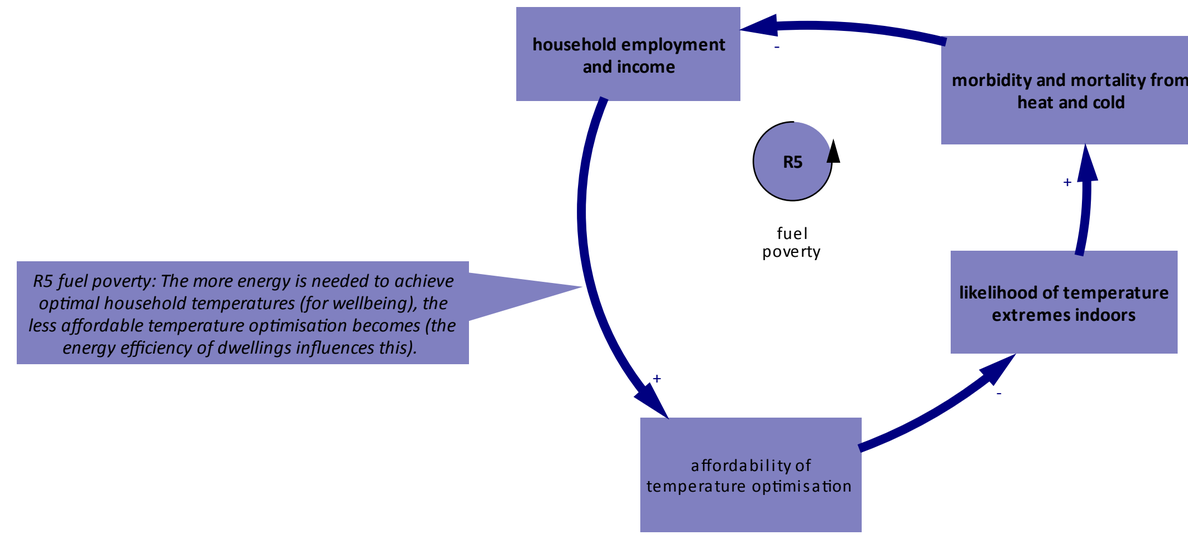
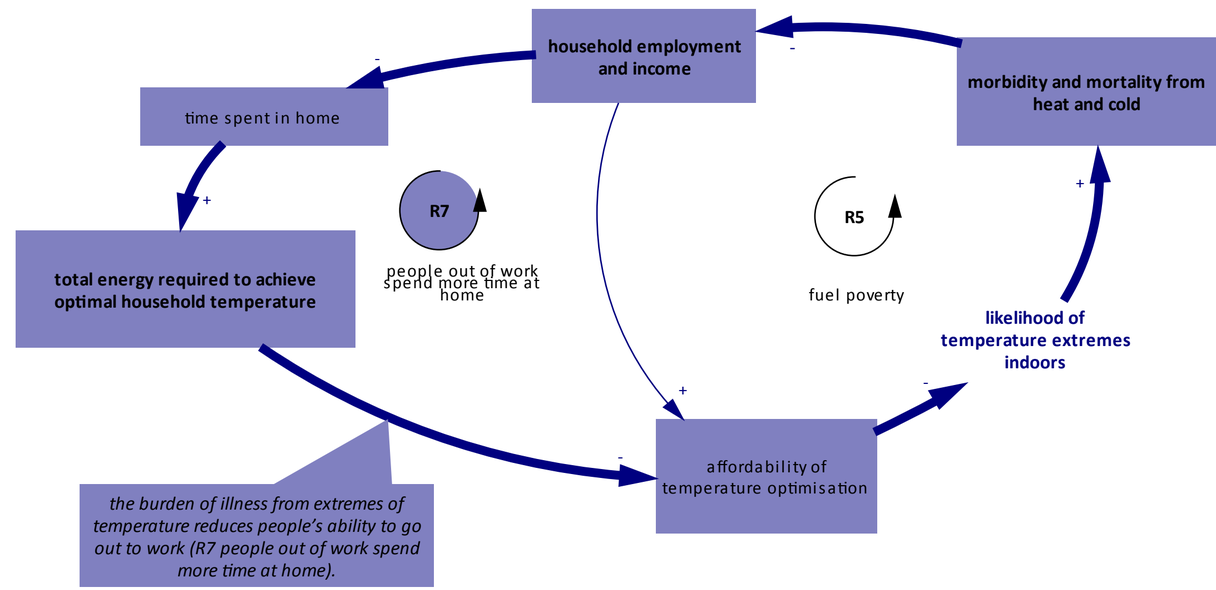
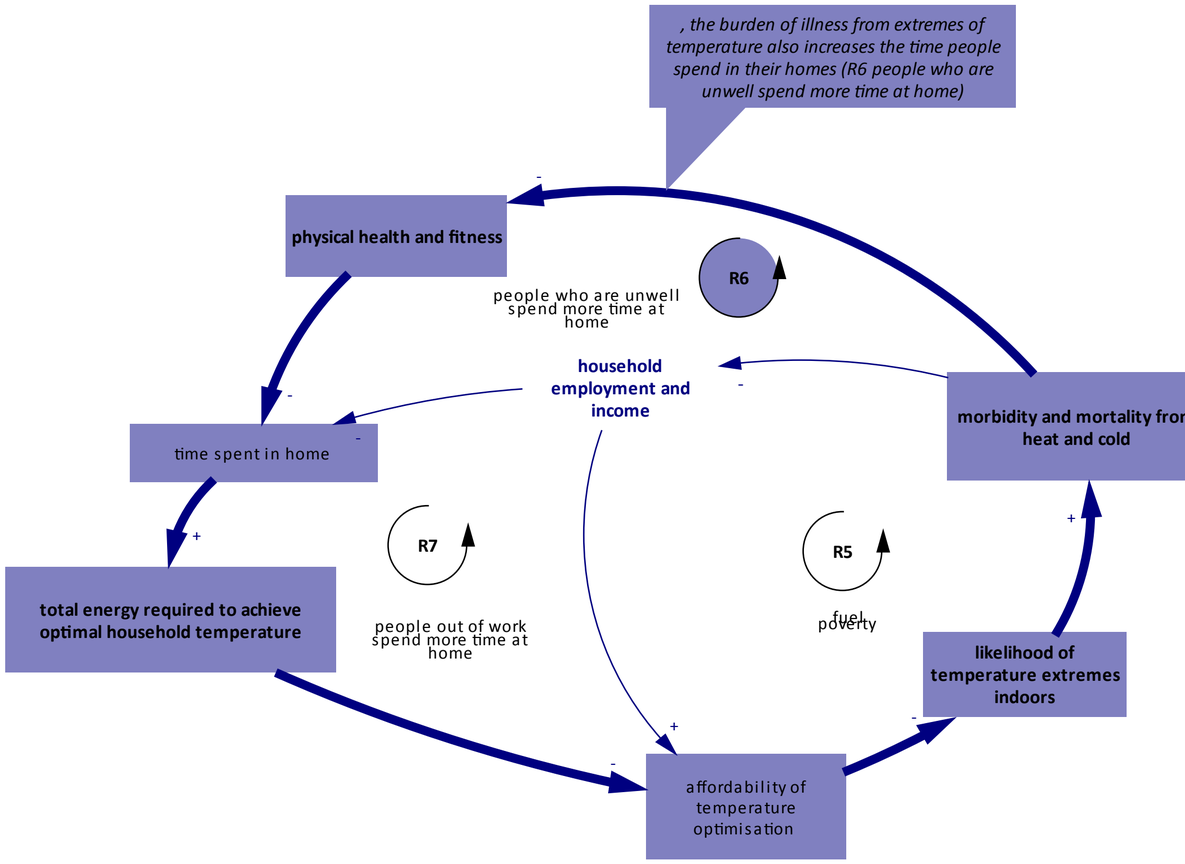
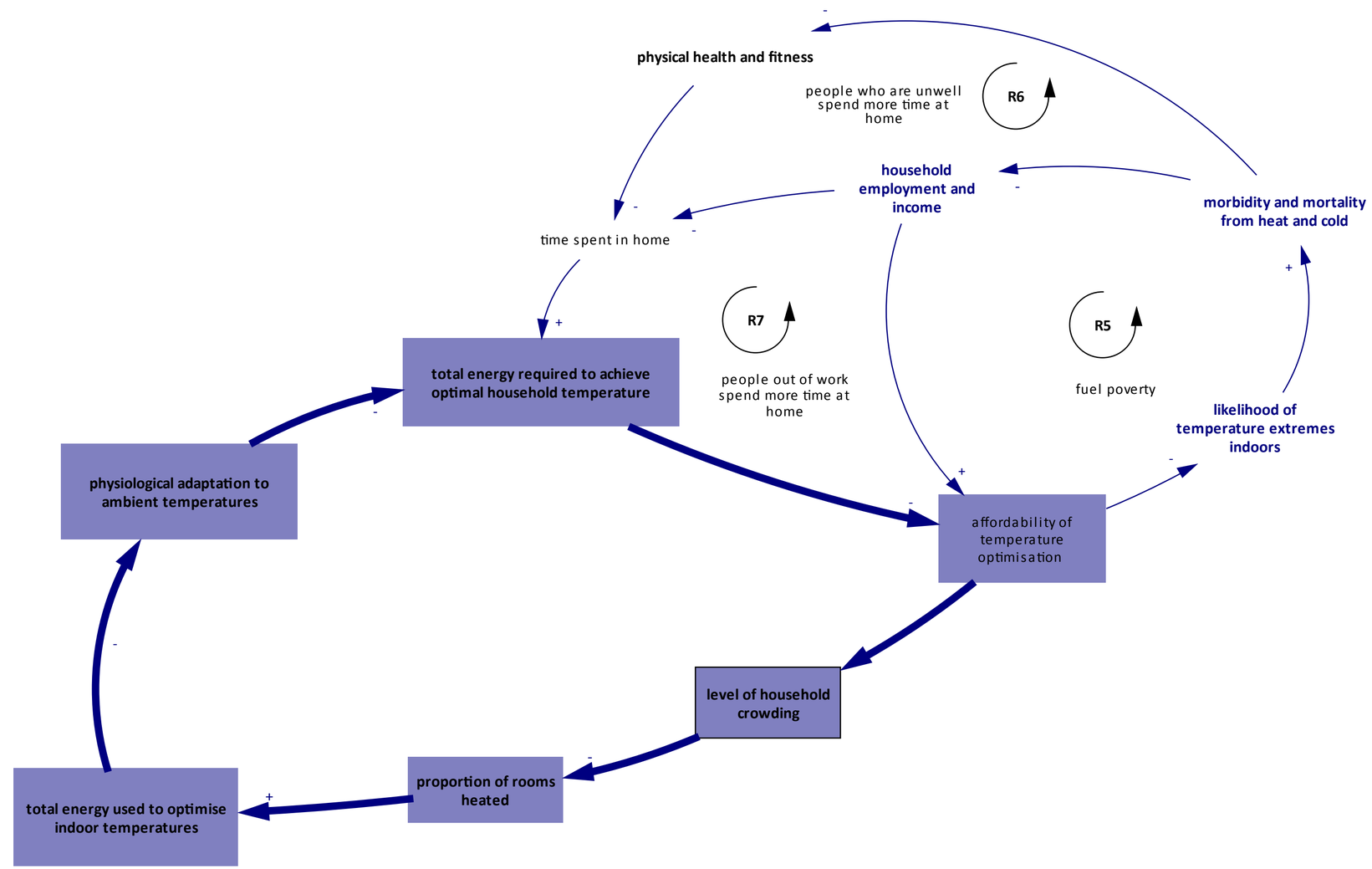
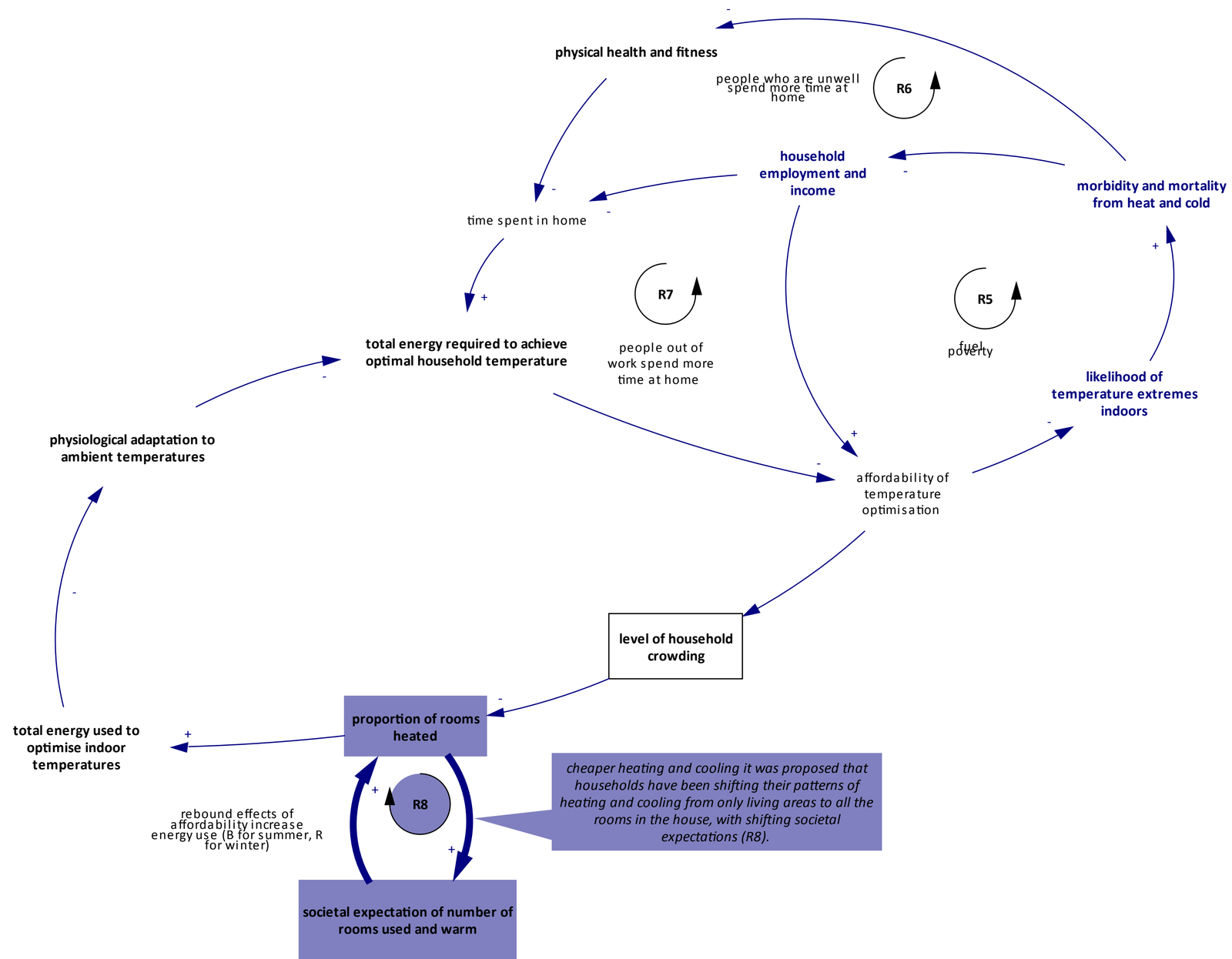
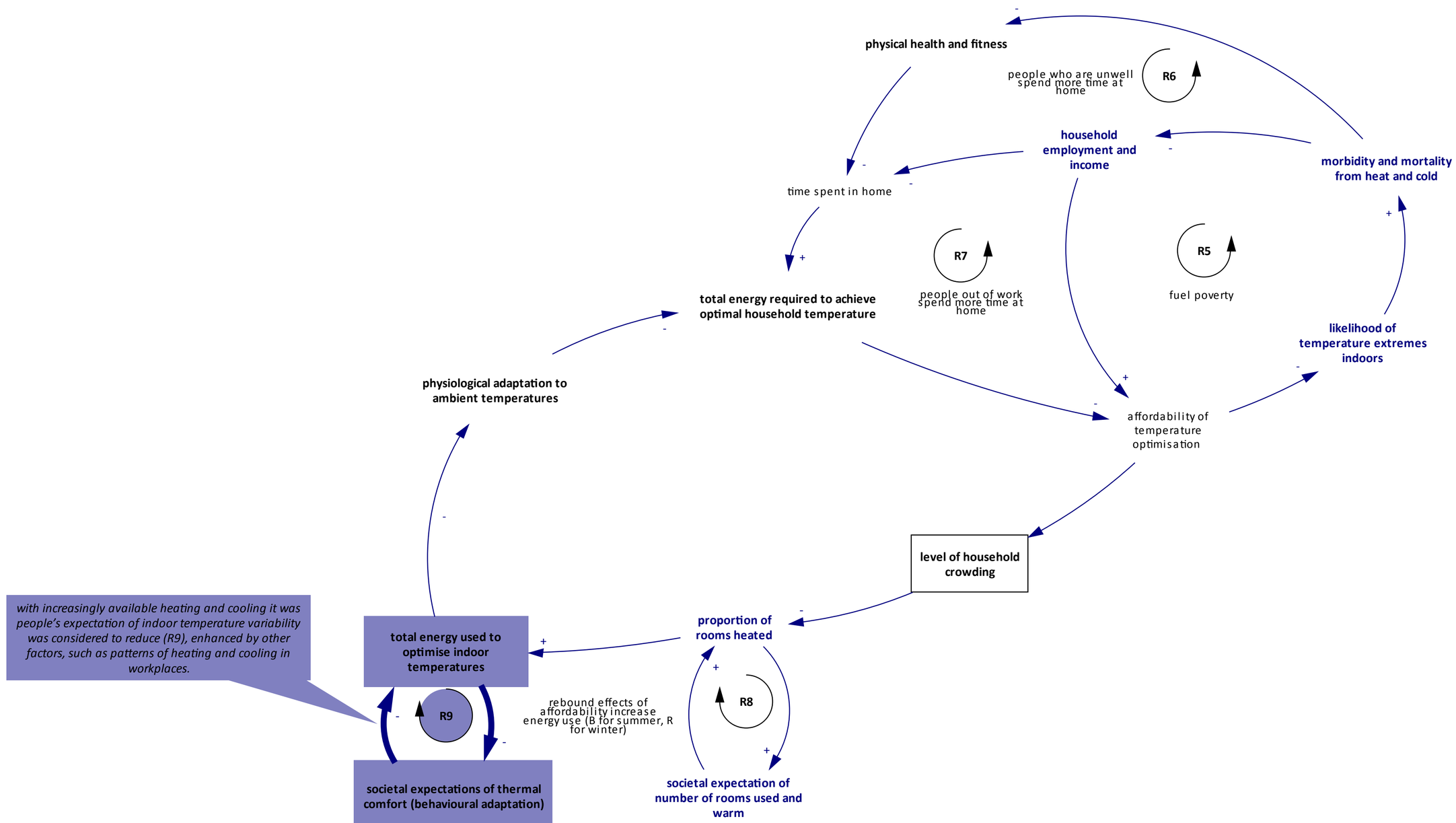

household employment and income
-
morbidity and mortality from heat and cold
R5
+
fuel poverty
R5 fuel poverty: The more energy is needed to achieve optimal household temperatures (for wellbeing), the less affordable temperature optimisation becomes (the energy efficiency of dwellings influences this).
likelihood of temperature extremes indoors
+
-
affordability of temperature optimisation

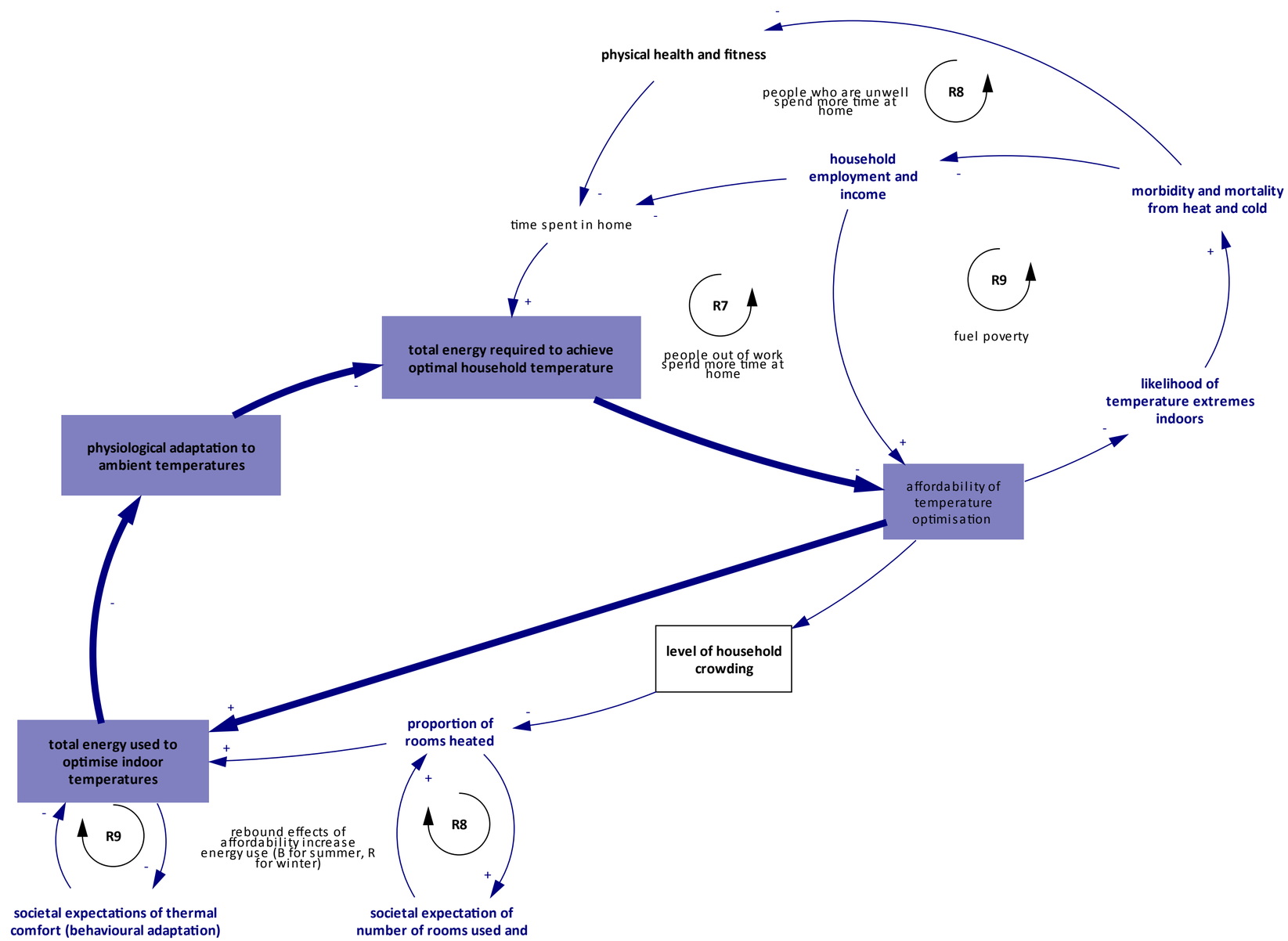

household employment and income
morbidity and mortality from heat and cold
time spent in home
total energy required to achieve optimal household temperature
R7
people out of work spend more time at home
R5
fuel poverty
likelihood of temperature extremes indoors
affordability of temperature optimisation
the burden of illness from extremes of temperature reduces people's ability to go out to work (R7 people out of work spend more time at home).
-
-
+
+
+
-
-

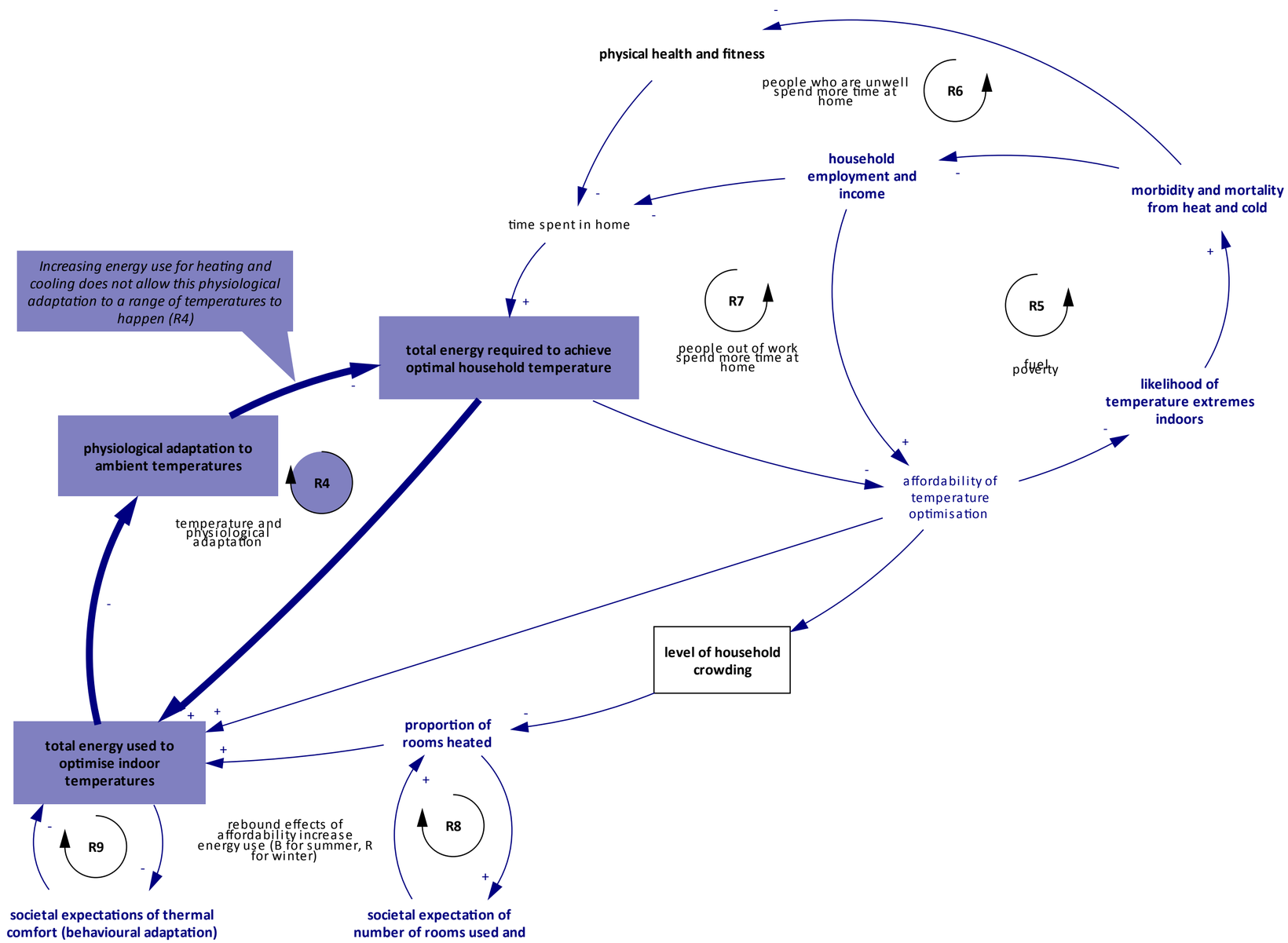

, the burden of illness from extremes of temperature also increases the time people spend in their homes (R6 people who are unwell spend more time at home)
physical health and fitness
R6
people who are unwell spend more time at home
household employment and income
time spent in home
morbidity and mortality from heat and cold
R7
R5
total energy required to achieve optimal household temperature
people out of work spend more time at home
fuel poverty
likelihood of temperature extremes indoors
affordability of temperature optimisation

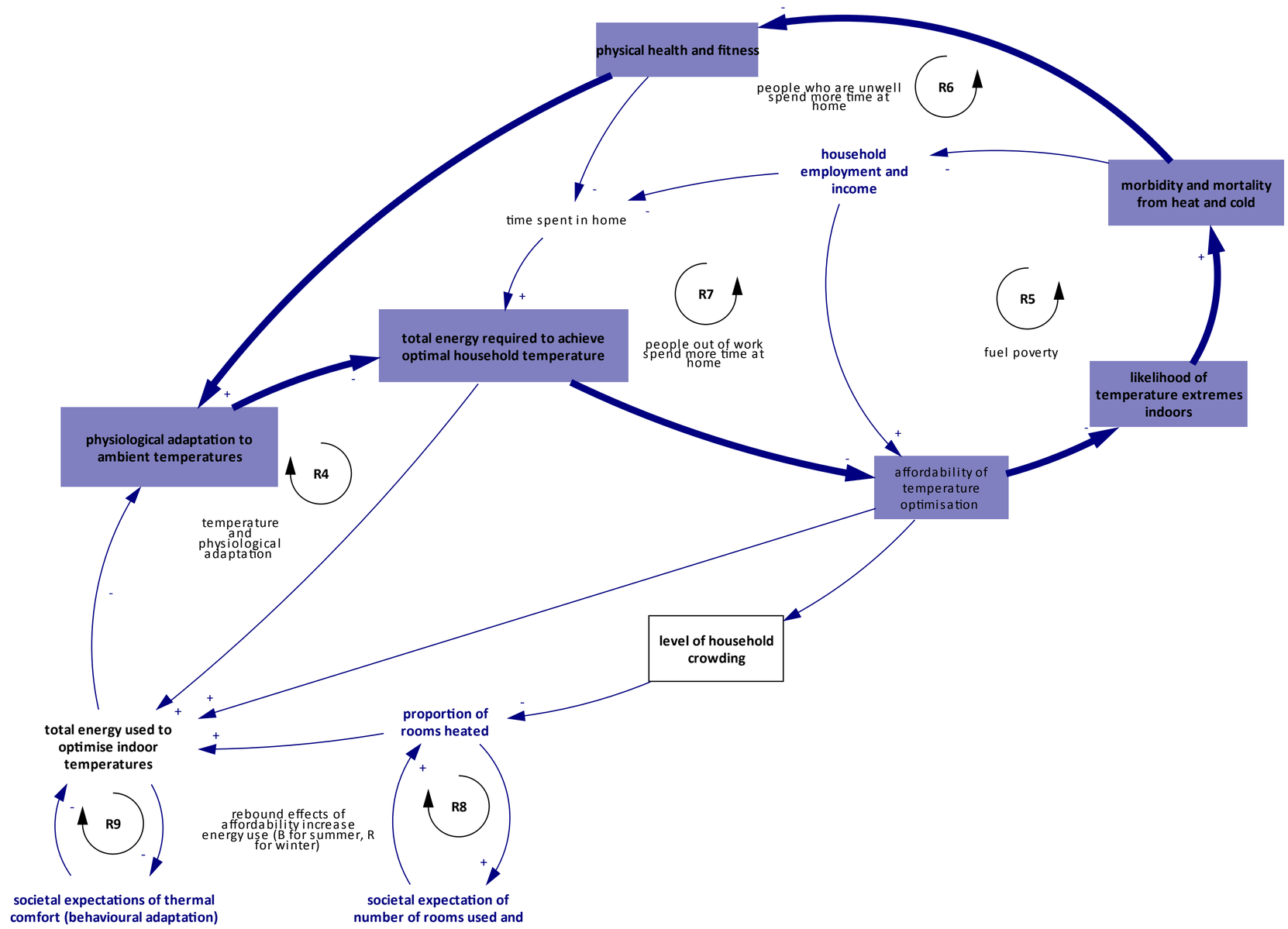

physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
R7
people out of work spend more time at home
R5
fuel poverty
likelihood of temperature extremes indoors
total energy required to achieve optimal household temperature
physiological adaptation to ambient temperatures
affordability of temperature optimisation
level of household crowding
proportion of rooms heated
total energy used to optimise indoor temperatures

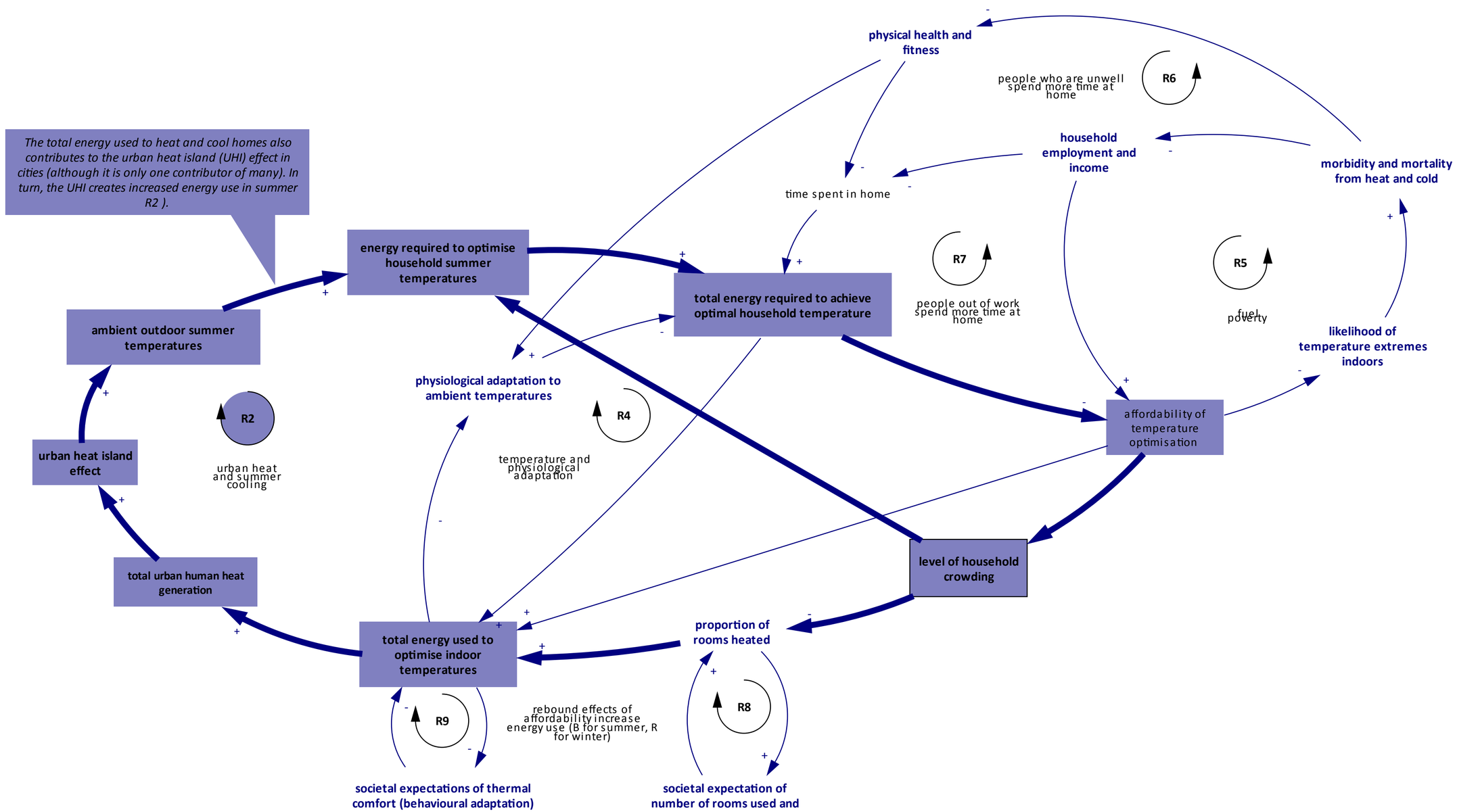

physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
R7
R5
people out of work spend more time at home
fuel poverty
total energy required to achieve optimal household temperature
likelihood of temperature extremes indoors
physiological adaptation to ambient temperatures
affordability of temperature optimisation
level of household crowding
proportion of rooms heated
total energy used to optimise indoor temperatures
R8
rebound effects of affordability increase energy use (B for summer, R for winter)
cheaper heating and cooling it was proposed that households have been shifting their patterns of heating and cooling from only living areas to all the rooms in the house, with shifting societal expectations (R8).
societal expectation of number of rooms used and warm

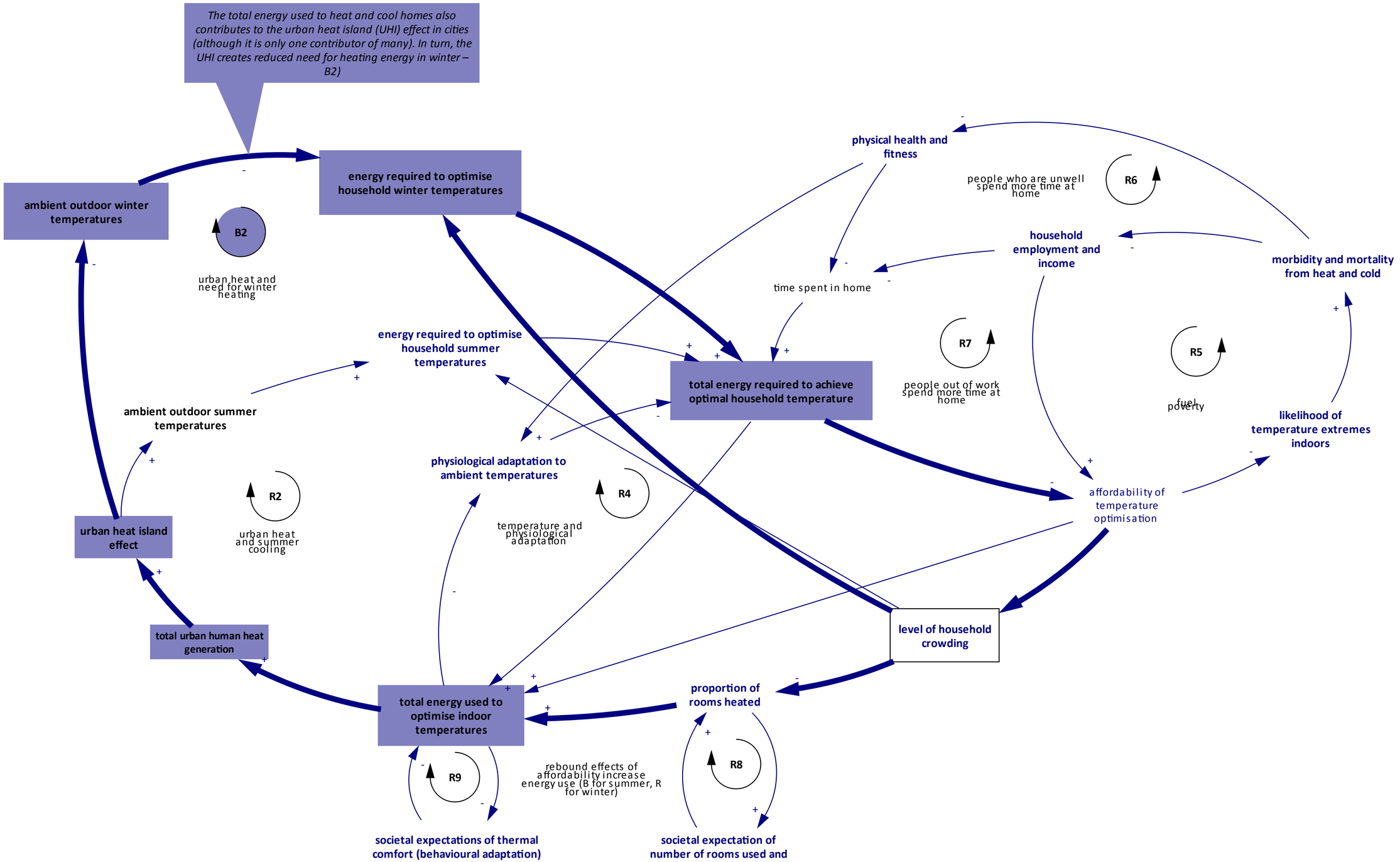

physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
R7
people out of work spend more time at home
R5
fuel poverty
total energy required to achieve optimal household temperature
likelihood of temperature extremes indoors
physiological adaptation to ambient temperatures
affordability of temperature optimisation
level of household crowding
proportion of rooms heated
with increasingly available heating and cooling it was people's expectation of indoor temperature variability was considered to reduce (R9), enhanced by other factors, such as patterns of heating and cooling in workplaces.
total energy used to optimise indoor temperatures
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm

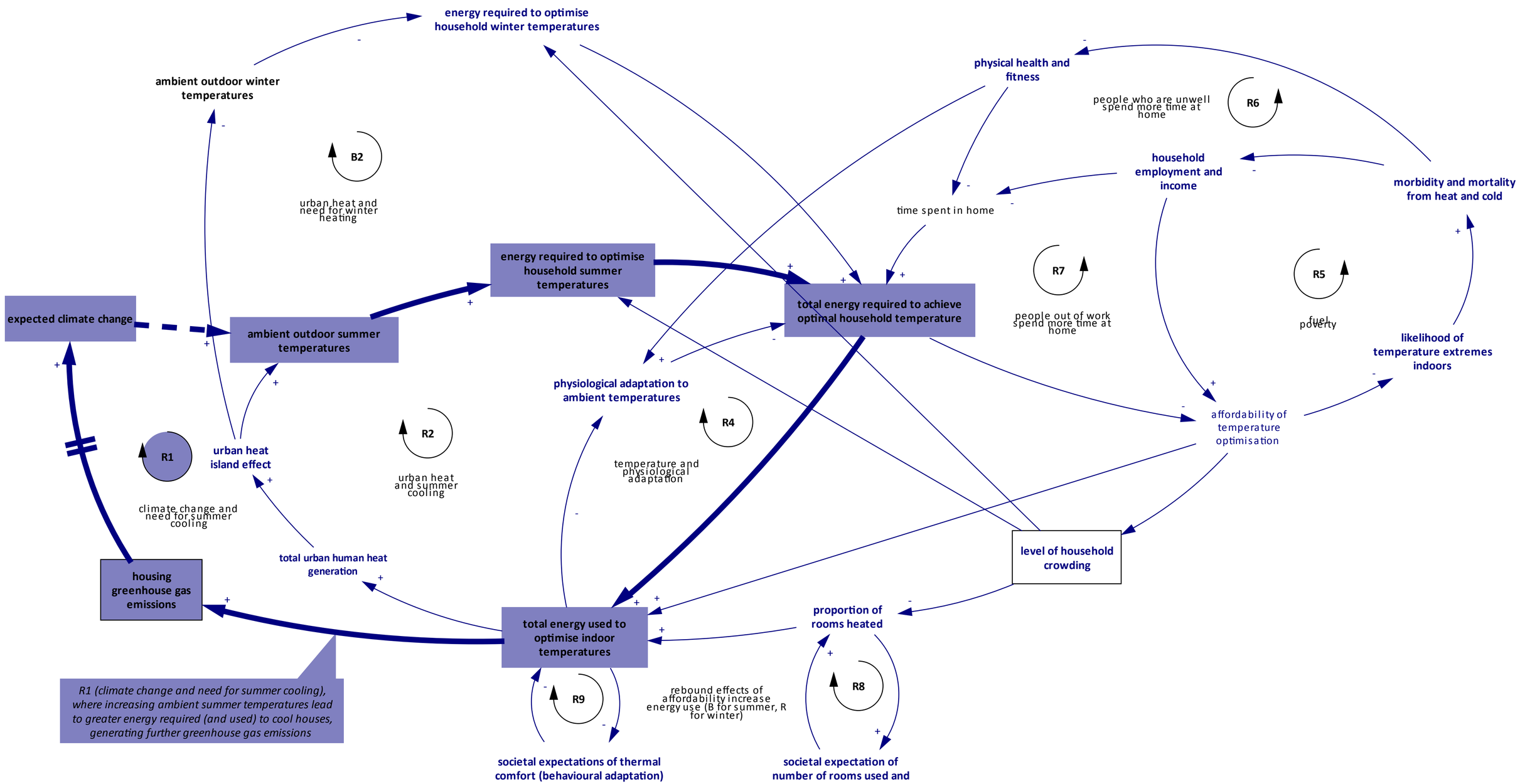

physical health and fitness
people who are unwell spend more time at home
R8
household employment and income
morbidity and mortality from heat and cold
time spent in home
R9
fuel poverty
R7
people out of work spend more time at home
total energy required to achieve optimal household temperature
likelihood of temperature extremes indoors
physiological adaptation to ambient temperatures
affordability of temperature optimisation
level of household crowding
total energy used to optimise indoor temperatures
proportion of rooms heated
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm

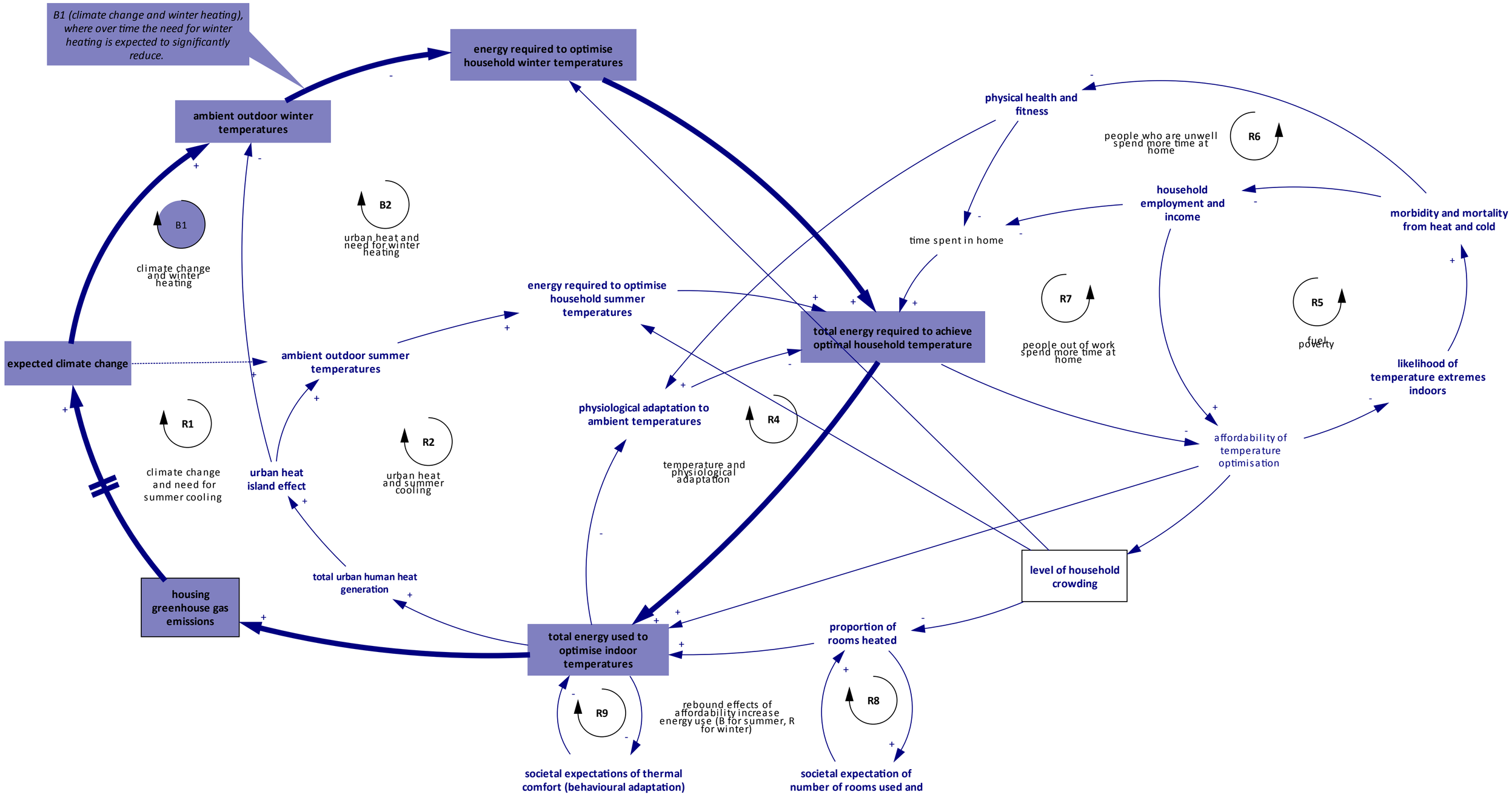

physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
Increasing energy use for heating and cooling does not allow this physiological adaptation to a range of temperatures to happen (R4)
R7
people out of work spend more time at home
R5
fuel poverty
total energy required to achieve optimal household temperature
likelihood of temperature extremes indoors
physiological adaptation to ambient temperatures
R4
temperature and physiological adaptation
affordability of temperature optimisation
level of household crowding
total energy used to optimise indoor temperatures
proportion of rooms heated
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm

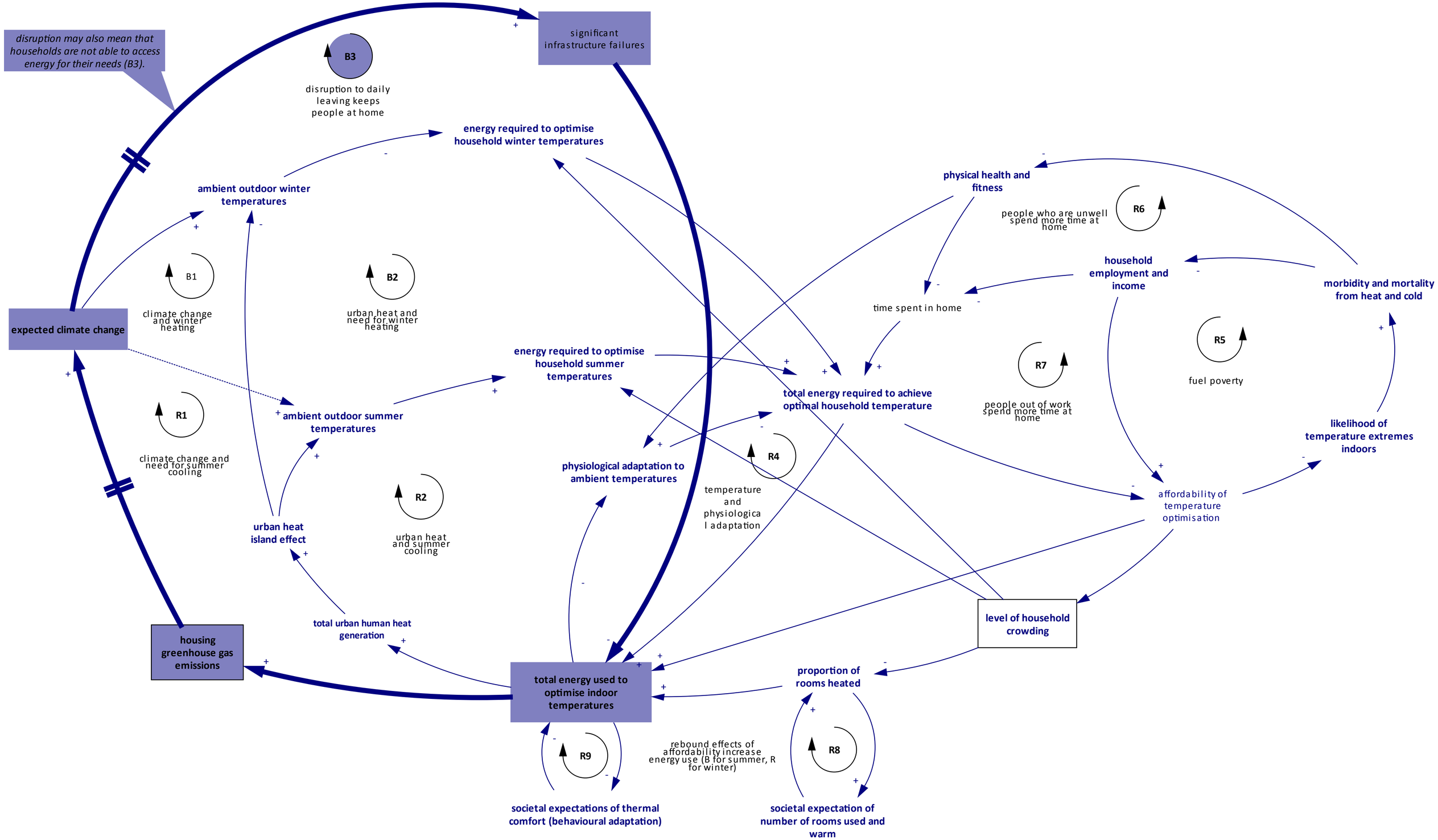

physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
R7
R5
total energy required to achieve optimal household temperature
people out of work spend more time at home
fuel poverty
likelihood of temperature extremes indoors
physiological adaptation to ambient temperatures
R4
affordability of temperature optimisation
temperature and physiological adaptation
level of household crowding
total energy used to optimise indoor temperatures
proportion of rooms heated
R9
R8
rebound effects of affordability increase energy use (B for summer, R for winter)
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm

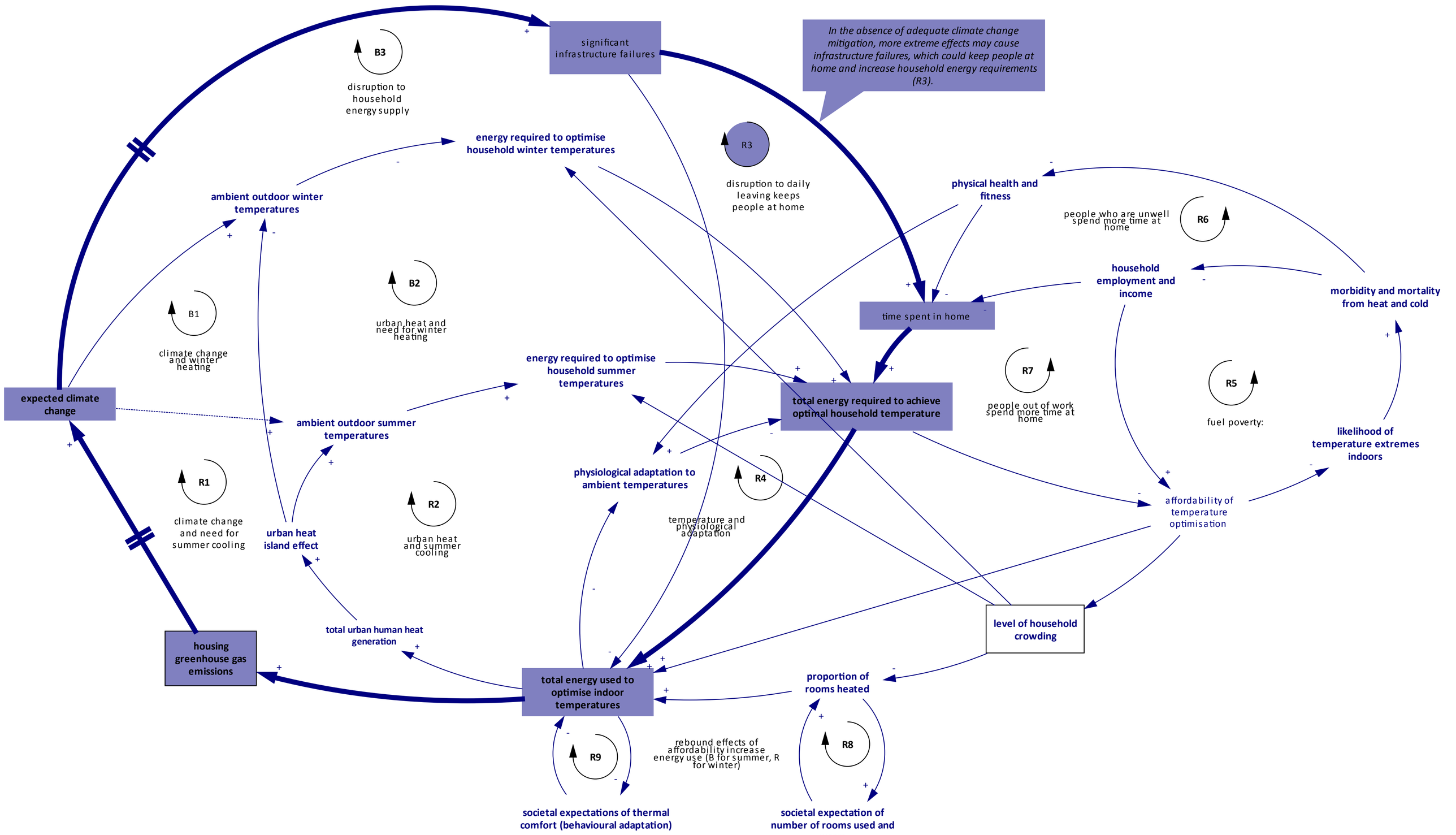

The total energy used to heat and cool homes also contributes to the urban heat island (UHI) effect in cities (although it is only one contributor of many). In turn, the UHI creates increased energy use in summer R2).
ambient outdoor summer temperatures
energy required to optimise household summer temperatures
urban heat island effect
R2
urban heat and summer cooling
total urban human heat generation
total energy used to optimise indoor temperatures
physiological adaptation to ambient temperatures
R4
temperature and physiological adaptation
total energy required to achieve optimal household temperature
physical health and fitness
time spent in home
R7
people out of work spend more time at home
people who are unwell spend more time at home
R6
household employment and income
R5
fuel poverty
morbidity and mortality from heat and cold
likelihood of temperature extremes indoors
affordability of temperature optimisation
level of household crowding
proportion of rooms heated
R8
societal expectation of number of rooms used and warm
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
societal expectations of thermal comfort (behavioural adaptation)

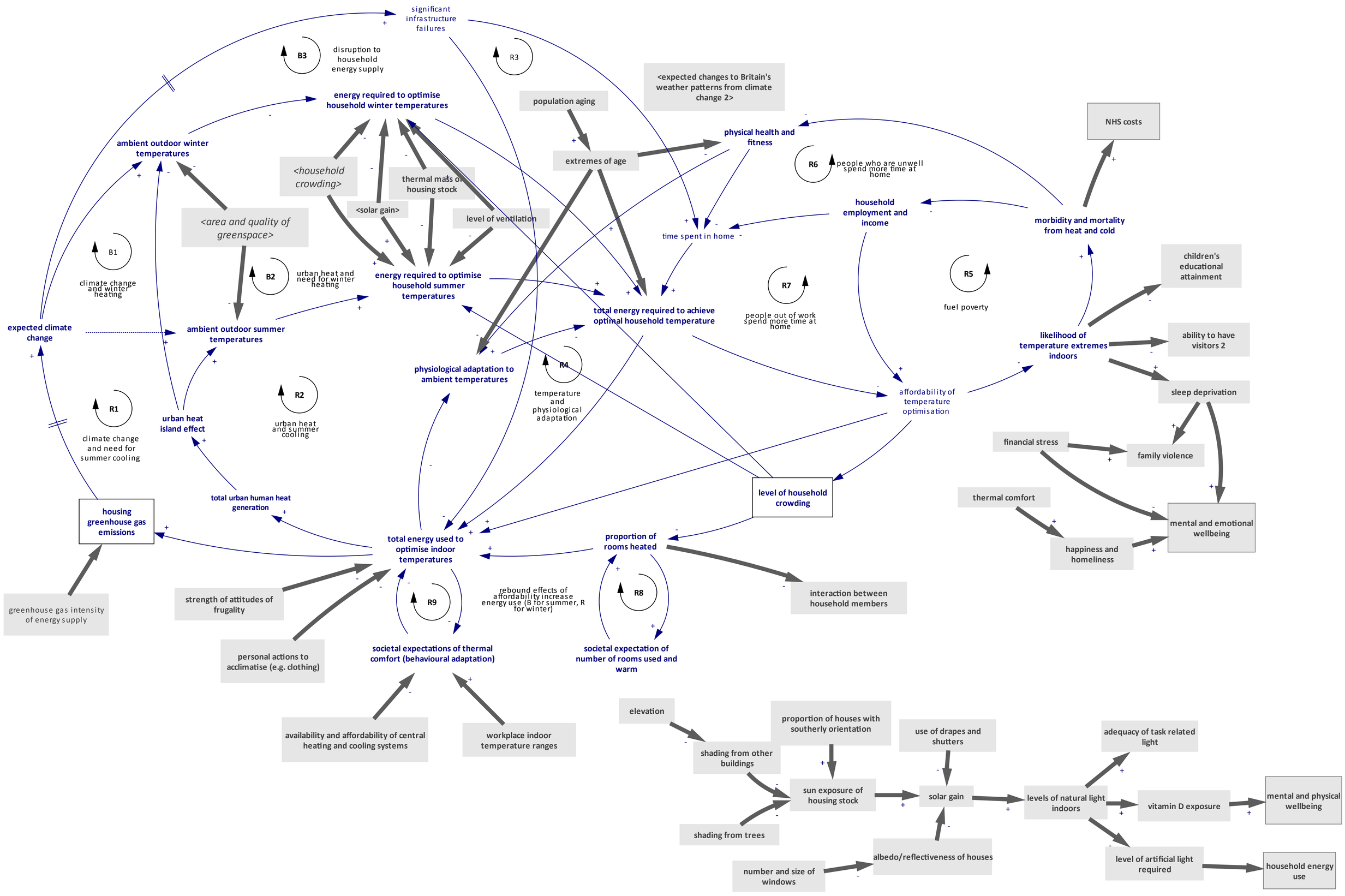

The total energy used to heat and cool homes also contributes to the urban heat island (UHI) effect in cities (although it is only one contributor of many). In turn, the UHI creates reduced need for heating energy in winter – B2)
ambient outdoor winter temperatures
energy required to optimise household winter temperatures
B2
urban heat and need for winter heating
physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
energy required to optimise household summer temperatures
R7
R5
total energy required to achieve optimal household temperature
people out of work spend more time at home
fuel poverty
likelihood of temperature extremes indoors
ambient outdoor summer temperatures
physiological adaptation to ambient temperatures
R4
affordability of temperature optimisation
R2
urban heat and summer cooling
temperature and physiological adaptation
urban heat island effect
level of household crowding
total urban human heat generation
proportion of rooms heated
total energy used to optimise indoor temperatures
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm


energy required to optimise household winter temperatures
ambient outdoor winter temperatures
B2
urban heat and need for winter heating
physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
energy required to optimise household summer temperatures
total energy required to achieve optimal household temperature
R7
people out of work spend more time at home
R5
fuel poverty
likelihood of temperature extremes indoors
expected climate change
ambient outdoor summer temperatures
physiological adaptation to ambient temperatures
R4
temperature and physiological adaptation
affordability of temperature optimisation
R2
urban heat and summer cooling
R1
urban heat island effect
climate change and need for summer cooling
level of household crowding
total urban human heat generation
housing greenhouse gas emissions
total energy used to optimise indoor temperatures
proportion of rooms heated
R1 (climate change and need for summer cooling), where increasing ambient summer temperatures lead to greater energy required (and used) to cool houses, generating further greenhouse gas emissions
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm


B1 (climate change and winter heating), where over time the need for winter heating is expected to significantly reduce.
energy required to optimise household winter temperatures
ambient outdoor winter temperatures
B1
climate change and winter heating
B2
urban heat and need for winter heating
physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
morbidity and mortality from heat and cold
time spent in home
energy required to optimise household summer temperatures
total energy required to achieve optimal household temperature
R7
people out of work spend more time at home
R5
fuel poverty
likelihood of temperature extremes indoors
expected climate change
ambient outdoor summer temperatures
physiological adaptation to ambient temperatures
R4
temperature and physiological adaptation
affordability of temperature optimisation
R1
climate change and need for summer cooling
urban heat island effect
R2
urban heat and summer cooling
level of household crowding
total urban human heat generation
housing greenhouse gas emissions
total energy used to optimise indoor temperatures
proportion of rooms heated
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm


disruption may also mean that households are not able to access energy for their needs (B3).
significant infrastructure failures
B3
disruption to daily leaving keeps people at home
energy required to optimise household winter temperatures
ambient outdoor winter temperatures
B1
climate change and winter heating
B2
urban heat and need for winter heating
expected climate change
energy required to optimise household summer temperatures
R1
climate change and need for summer cooling
ambient outdoor summer temperatures
R2
urban heat and summer cooling
urban heat island effect
physiological adaptation to ambient temperatures
total energy required to achieve optimal household temperature
R4
temperature and physiological adaptation
physical health and fitness
people who are unwell spend more time at home
R6
household employment and income
time spent in home
R7
people out of work spend more time at home
R5
fuel poverty
morbidity and mortality from heat and cold
likelihood of temperature extremes indoors
affordability of temperature optimisation
level of household crowding
housing greenhouse gas emissions
total urban human heat generation
total energy used to optimise indoor temperatures
proportion of rooms heated
R9
societal expectations of thermal comfort (behavioural adaptation)
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectation of number of rooms used and warm


In the absence of adequate climate change mitigation, more extreme effects may cause infrastructure failures, which could keep people at home and increase household energy requirements (R3).
significant infrastructure failures
B3
disruption to household energy supply
energy required to optimise household winter temperatures
R3
disruption to daily leaving keeps people at home
physical health and fitness
people who are unwell spend more time at home
R6
ambient outdoor winter temperatures
household employment and income
morbidity and mortality from heat and cold
B2
urban heat and need for winter heating
B1
climate change and winter heating
time spent in home
energy required to optimise household summer temperatures
R7
people out of work spend more time at home
R5
fuel poverty:
total energy required to achieve optimal household temperature
expected climate change
ambient outdoor summer temperatures
likelihood of temperature extremes indoors
physiological adaptation to ambient temperatures
R4
temperature and physiological adaptation
R1
climate change and need for summer cooling
urban heat island effect
R2
urban heat and summer cooling
affordability of temperature optimisation
level of household crowding
total urban human heat generation
housing greenhouse gas emissions
total energy used to optimise indoor temperatures
proportion of rooms heated
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm


significant infrastructure failures
B3
disruption to household energy supply
R3
<expected changes to Britain's weather patterns from climate change 2>
energy required to optimise household winter temperatures
population aging
ambient outdoor winter temperatures
physical health and fitness
NHS costs
extremes of age
R6
people who are unwell spend more time at home
<household crowding>
thermal mass of housing stock
<solar gain>
level of ventilation
household employment and income
morbidity and mortality from heat and cold
time spent in home
<area and quality of greenspace>
B1
climate change and winter heating
B2
urban heat and need for winter heating
energy required to optimise household summer temperatures
R5
fuel poverty
children's educational attainment
total energy required to achieve optimal household temperature
R7
people out of work spend more time at home
expected climate change
ambient outdoor summer temperatures
likelihood of temperature extremes indoors
ability to have visitors 2
physiological adaptation to ambient temperatures
R4
temperature and physiological adaptation
affordability of temperature optimisation
sleep deprivation
R1
urban heat island effect
R2
urban heat and summer cooling
climate change and need for summer cooling
financial stress
family violence
level of household crowding
thermal comfort
total urban human heat generation
housing greenhouse gas emissions
total energy used to optimise indoor temperatures
proportion of rooms heated
mental and emotional wellbeing
happiness and homeliness
greenhouse gas intensity of energy supply
strength of attitudes of frugality
R9
rebound effects of affordability increase energy use (B for summer, R for winter)
R8
interaction between household members
personal actions to acclimatise (e.g. clothing)
societal expectations of thermal comfort (behavioural adaptation)
societal expectation of number of rooms used and warm
availability and affordability of central heating and cooling systems
workplace indoor temperature ranges
elevation
proportion of houses with southerly orientation
use of drapes and shutters
adequacy of task related light
shading from other buildings
sun exposure of housing stock
solar gain
levels of natural light indoors
vitamin D exposure
mental and physical wellbeing
shading from trees
albedo/reflectiveness of houses
number and size of windows
level of artificial light required
household energy use