

How do leisure activities affect health?

Supplementary Materials

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Search Strategy & Selection Criteria

This review had the aim of identifying potential mechanisms of action linking leisure engagement with health outcomes, taking a cross-disciplinary perspective. A key challenge, however, is that the language used across disciplines, especially for ‘mechanisms of action’, varies substantially. Therefore, we adopted a three-point strategy for identifying mechanisms as part of a larger five-stage process.

1) Key text searches

First, four authors (DF, HA, SF & EW) each independently developed a list of disciplines that were considered likely to have examined mechanisms relating to one or more leisure activities and health. The lists were then combined and duplicates excluded to provide a full list, which included the following:

aesthetics, affective psychology, architecture, arts in health, behavioural economics, behavioural science, bioacoustics, biological anthropology, clinical psychology, cognitive psychology, community psychology, computational psychiatry, cultural anthropology, cultural psychology, cultural studies, ecological psychology, ecology, economics, education, engineering, evolutionary psychology, genetics, health economics, health geography, health humanities, health promotion, health psychology, health sociology, leisure studies, medical humanities, medicine, music psychology, nature studies, neuroscience, occupational therapy, performance science, philosophy, positive psychology, psychiatry, psychobiology, psychophysics, psychotherapy, public health, recreational therapy, social epidemiology, social geography, social psychology, social work, sociology, sport psychology

Four authors (DF, HA, SF & EW) then identified 3 key textbooks for each discipline that were either general textbooks on the discipline (where the discipline as a whole was felt to be of relevance to understanding leisure and health), or textbooks that focused on the specific cross-over between a discipline and leisure and health. These textbooks were identified through personal experience in respective fields of expertise and consultation with experts in each field from the MARCH Mental Health Research Network (see below). The four researchers then pooled their suggestions for key texts and discussed until a consensus was reached on which texts were most appropriate.

These four authors then split the reading of the textbooks between them and whenever mention was made of a mechanism that was either (i) theoretically discussed as a mechanism of action linking one or more types of leisure activities with health, or (ii) empirically tested as a mechanism, it was added to a master database of mechanisms.

2) Database searches

Second, we conducted database searches for key papers focusing on leisure and mechanisms of action using the following key terms:

<i>Leisure</i>	<i>Mechanisms</i>	<i>Outcome</i>
<i>Activity(ies)</i>	<i>Mechanism(s) of action</i>	<i>Health</i>
<i>Art(s)</i>	<i>Mechanism</i>	<i>Mental health</i>
<i>Club(s)</i>	<i>Process</i>	<i>Physical health</i>
<i>(Community) group(s)</i>	<i>Theory</i>	<i>Health behaviour(s)</i>
<i>Craft(s)</i>	<i>Pathway</i>	<i>Wellbeing</i>
<i>Creative(ity)</i>	<i>Causal</i>	
<i>Culture</i>	<i>Affect</i>	
<i>Dance</i>	<i>Effect</i>	
<i>DIY</i>	<i>Impact</i>	
<i>Exercise</i>	<i>Psychological</i>	
<i>Free time</i>	<i>Biological</i>	
<i>Game(s)</i>	<i>Social</i>	
<i>Green space(s)</i>	<i>Behavioural</i>	
<i>Heritage</i>		
<i>Hobby(ies)</i>		
<i>Leisure</i>		
<i>Libraries</i>		
<i>Music</i>		
<i>Nature</i>		
<i>Outdoor(s)</i>		
<i>Reading</i>		
<i>Religion</i>		
<i>Social engagement</i>		
<i>Socialising</i>		
<i>Sport(s)</i>		
<i>Television</i>		
<i>Volunteer(ing)</i>		

Keyword searches were conducted using the following databases: Google Scholar, Scopus, Web of Science, PubMed, ScienceDirect, Europe PMC, and PsycINFO. We only looked at studies that had been published in English since 1st January 1950 up until 31st January 2020. Any relevant papers were then manually searched and any further mechanisms identified were added to the database.

3) Expert opinion

Third, the MARCH Mental Health Network Disciplinary Expert Group was consulted. The MARCH Mental Health Network is one of the UK's national mental health research networks funded by UK Research and Innovation. The network focuses on the role of social, cultural and community engagement on mental health (including all leisure activities included within this review) and consists of over 1,300 member researchers and community organisations. Of these, 42 members are part of the Disciplinary Expert Group, with each specialising in a different field related to social, cultural and/or community engagement and mental health.

The Disciplinary Expert Group members were all contacted and asked to provide details on further key texts either reviewing mechanisms or focusing on specific mechanisms of action. The additional texts were then screened and further mechanisms identified were also added to the database. As explained above, the Disciplinary Expert Group were also called upon throughout the process to clarify terminology, identify key texts, and supporting the identification and definition of mechanisms in the review.

4) Mechanism screening

Once the mechanisms had all been catalogued in the master database, four researchers (DF, HA, SF & EW) went through each mechanism individually. For a mechanism to be included in the final review, it had to be deemed (a) relevant to the research question, (b) definable and distinct from other mechanisms, and (c) either theoretically proposed or empirically shown to act as a mechanism of action linking one or more leisure activities with health (i.e. a "potential mechanism of action", as described in the review). Where there was disagreement on any of these three criteria, the researchers either returned to literature on that mechanism or sought expert advice from the Disciplinary Expert Group until consensus was reached.

5) Thematic grouping

All included mechanisms were then grouped into themes with similar mechanisms and approved by the four researchers (DF, HA, SF & EW). The fifth author (AS) then undertook a full review of all included mechanisms and their thematic grouping and all researchers approved the final versions of the tables.

1. Full List of Mechanisms

1.1 Psychological processes

Categories	Sub-categories	Mechanisms
MICRO-LEVEL		
AFFECTIVE STATES	Eliciting affective responses	<ul style="list-style-type: none"> Increased experience of positive emotions Decreased experience of negative emotions Decreased stress Increased eustress Changes in valence Experience of pleasure
	Supporting emotion regulation	<ul style="list-style-type: none"> Improved attention-focused emotion regulation Improved knowledge-focused emotion regulation Improved expression-focused emotion regulation Increased self-soothing Changes in mood Broadening of momentary thought-action repertoire
RESILIENCE	Supporting coping	<ul style="list-style-type: none"> Increased emotion-focused coping Increased problem-focused coping Increased stress buffering Decreased catastrophizing Reduced suicidal ideation Increased terror management Improved management of grief Development of supportive internal dialogue Increased adjustment Increased accommodation Greater availability of cognitive bandwidth
	Building psychological strength	<ul style="list-style-type: none"> Increased self-confidence Increased resilience Increased vitality Improved psychic homeostasis Increased sense of continuity Improved tolerance of uncertainty Decreased submissiveness Decreased denial Decreased resignation Reduced subjective weathering Increased conservation of resources
SENSE OF SELF	Building identity	<ul style="list-style-type: none"> Formation & affirmation of self-identity Improved self-knowledge Improved self-concept Decreased self-discrepancy Decreased de-individuation Increased self-expression Development of a future self Increased self-awareness
	Developing self-acceptance	<ul style="list-style-type: none"> Increased self-esteem Increased self-enhancement Increased self-protection Reduced self-stigmatisation Increased self-affirmation Decreased self-derogation Increased authenticity Acceptance of personal fallibility

PERSONAL TRANSFORMATION	Supporting changing identity	<ul style="list-style-type: none"> Reduced 'loss of self' Reduced biographical disruption Increased reminiscence Increased self-restoration Provision of alternative identities Building of new narratives Development of personal pathography
	Aiding personal evolution	<ul style="list-style-type: none"> Increased openness to experience Increased agreeableness Increased conscientiousness Increased extroversion Decreased neuroticism Increased optimism Personal transformation Increased growth Increased regulatory focus Self-transcendence
FLOURISHING	Enhancing meaning in life	<ul style="list-style-type: none"> Provision of meaning Increased sense of life being worthwhile Improved life satisfaction Increased sense of coherence Formation and affirmation of central values Increased gratitude Increased purpose
	Developing autonomy	<ul style="list-style-type: none"> Increased self-locus of control Changes in self-attribution Increased autonomy Increased agency Increased empowerment Compensation for imbalanced demand-control in other life domains
PSYCHOLOGICAL CAPABILITIES	Supporting cognitive learning	<ul style="list-style-type: none"> Enhanced information processing Enhanced semantic memory Enhanced episodic memory Enhanced procedural memory Enhanced convergent thinking Enhanced divergent thinking Improved reasoning Expansion of perceptual sets Increased use of heuristics Enhanced transfer effects Enhanced aesthetic judgement Enhanced attention
	Supporting emotional learning	<ul style="list-style-type: none"> Increased emotion recognition Improved theory of mind Increased empathy Increased compassion Enhanced sense of conscience Increased decentering Increased mentalising Increased mind-mindedness

	Supporting overarching cognitive processes	Enhanced processing fluency Enhanced cognitive development Enhanced cognitive restructuring Enhanced transformative learning Increased diversification of intelligence Increased curiosity Enhanced creativity Enhanced visualisation Increased imagination Reduced cognitive decline
PSYCHOLOGICAL RESOURCES	Building general resources	Enhanced maturity Increased human capital Increased cultural capital Improved educational attainment Increased personal conversion factors
	Building health-related resources	Expanded lay theories Changes in illness cognitions Increased health consciousness Increased health literacy Increased understanding of others' health conditions Increased salience of healthcare engagement Experience of healing Improved quality of life
MESO/MACRO-LEVEL		
GROUP MIND	Developing a group self	Increased sense of group self Increased collective rationality Altered cultural perception Increased group knowing Enhanced sense-making
	Developing group values and understanding	Increased meaning-making Development of social norms Reduced anomie Increased collective responsibility Development of collective consciousness
GROUP ATTITUDES	Reducing stigma	Reduced social labelling Reduced prejudice Increased tolerance Disruption of stereotypes Decreased social death
	Changing attitudes to health	Changes in the social construction of illness Decreased medicalisation of social deviance Decreased cultural camouflage Decreased risk discourse Enhanced satisfaction with healthcare
LANGUAGE	Changing communication	Increased voice for minority groups Enhanced group matrix Increased spontaneous communication Increased symbolic communication Development of memes Increased symbolic interactionism
	Modifying group emotions	Elicitation of collective emotions Increased collective emotional convergence Decreased collective stress Formation of collective memories Development of collective effervescence

1.2 Biological processes

Categories	Sub-categories	Mechanisms
MICRO-LEVEL		
NERVOUS SYSTEM	Activating perceptual processes	<ul style="list-style-type: none"> Changes in activation of the auditory system Changes in activation of the visual system Changes in activation of the somatosensory system Changes in activation of the gustatory system Changes in activation of the olfactory system Changes in activation of the vestibular system Increased proprioception Increased interoception Increased kinaesthesia Increased perceptual sensitivity Increased sensory equilibrium Modulated levels of sensory deprivation Increased multisensory integration Decreased central & peripheral sensitisation Reduced pain
	Increasing brain activation	<ul style="list-style-type: none"> Increased overall cerebral activation Improved overall cerebral blood flow Increased activation of brain regions involved in basic vision and object perception Increased activation of brain regions involved in attention and sensory processing Increased activation of brain regions involved in knowledge and meaning Increased activation of brain regions involved in reward, valuation or response to perceived beauty Increased activation of brain regions involved in affective responses Increased activation of the motor cortex Activation of mirror neurons
	Altering brain physiology	<ul style="list-style-type: none"> Changes in brain structure Increased grey matter & grey matter integrity Increased white matter & white matter integrity Increased neurogenesis Increased neuroplasticity Decreased neurotoxicity Reduced brain atrophy Increased cognitive reserve
	Modulating brain biomarkers	<ul style="list-style-type: none"> Changes in acetylcholine production Increased dopamine production Increased serotonin levels Changes in oxytocin and vasopressin levels Increased levels of opioids Increased levels of cannabinoids Increased levels of melatonin Changes in GABA and glutamate levels Decreased neuro-inflammation Reduced disruption of biological rhythms

	Modifying arousal	<ul style="list-style-type: none"> Changes in arousal levels Increased chills Changes in electrodermal activity Changes in activation of the autonomic nervous systems Improved autonomic tone Changes in brainwaves Brainwave entrainment Decreased muscle tension Increased nerve stimulation
ENDOCRINE & IMMUNE SYSTEMS	Changing hormone levels	<ul style="list-style-type: none"> Improved regulation of the Hypothalamic-Pituitary-Adrenal axis Reductions in excessive glucocorticoid activity Reductions in excess production of catecholamines Changes in thyroid function Changes in growth hormone levels Changes in levels of sex hormones
	Altering immune function	<ul style="list-style-type: none"> Changes in levels of innate immunity Changes in levels of acquired immunity Decreased cellular ageing Decreased bacterial and viral infections Changes in antibody levels Changes in levels of growth factors Decreases in levels of inflammation Shifts in cytokine profiles Decreased oxidative stress Increased vitamin D levels
CARDIOMETABOLIC SYSTEM	Modulating cardiovascular factors	<ul style="list-style-type: none"> Reduced heart rate Increased heart rate variability Reduced vasoconstriction Decreased blood pressure Reduced hypertension Changes in cardiovascular reactivity Increased angiogenesis Decreased aortic stiffness Improved cardiac function
	Modulating metabolic factors	<ul style="list-style-type: none"> Decreased glucose levels Changes in lipid levels Changes in haemoglobin levels Decreased body mass Changes in body composition Improved gut microbiota Changes to the microbiome
PERFORMANCE	Improving physical function	<ul style="list-style-type: none"> Improved balance Improved gait Improved reflexes Decreased reaction time Improved flexibility Improved posture Increased bone health Improved limb function Improved motor coordination Increased ability to perform activities of daily living Increased physical fitness Reduced falls

	Improving respiratory function	Strengthened respiratory muscles Increased lung capacity Improved structured respiratory variability Improved diffusing capacity Increased oxygen saturation
	Improving voice	Improved speech Improved language Improved voice quality
MULTI-SYSTEM	Reducing load	Increased homeostasis Changes in visceral factors Reduced fatigue Reduced allostatic load Rebalanced stress reactivity Reduced weathering Reduced biological embedding Decreased frailty
	Increasing beneficial nature exposure	Enhanced exposure to microbial diversity Enhanced exposure to phytoncides Increased exposure to negative air ions Reduced development of allergies and asthma
	Affecting genetic / epigenetic factors	Reduced damage to telomeres Changes in DNA methylation patterns Changes in gene expression
MESO/MACRO-LEVEL		
ENVIRONMENTAL DIVERSITY	Increasing positive environmental exposures	Increased nature connection Increased biodiversity of spaces Increased natural capital
	Decreasing negative environmental exposures	Decreased pollution Decreased exposure to hazards
DISEASE SUSCEPTIBILITY	Affecting disease patterns	Reduced environmental risk of certain diseases Changes in disease distribution Increased resilience to disease
	Altering generational transmission	Changes in transgenerational programming Intergenerational genetic adaptation Changes in penetrance of specific traits Stabilising selection

1.3 Social processes

Categories	Sub-categories	Mechanisms
MICRO-LEVEL		
SOCIAL ACTIVITY	Increasing social contact	<ul style="list-style-type: none"> Increased frequency of social contact Increased unmediated interactions Increased social integration Increased social engagement Increased cultural mixing
	Stimulating social actions	<ul style="list-style-type: none"> Increased social mimicry Changes in social influence Changes in social contagion Audience effects Increased social performance Increased prosocial behaviour Increased altruism
SOCIAL RELATIONSHIPS	Enhancing social engagement	<ul style="list-style-type: none"> Increased positive attitude towards social exchange Increased social networks Stronger network ties Greater satisfaction of social needs Reduced iso-strain
	Supporting social bonding	<ul style="list-style-type: none"> Increased reciprocity Increased emotional closeness Increased social bonding Improved attachment styles Increased satisfaction of desire for attachment Reduced social isolation Reduced loneliness Decreased alienation Increased opportunity for solitude Increased belonging Achievement of biosocial goals
LEARNING AND TRAITS	Building social learning and traits	<ul style="list-style-type: none"> Improved social skills Reduced othering Reduced individualism Enhanced civic individualism Increased social trust Increased social responsibility Changes in framing
	Building cultural learning and traits	<ul style="list-style-type: none"> Increased cultural attachment Increased cultural learning Increased cultural consonance Increased acculturation Reduced acculturative stress Increased inter-cultural competence Increased cultural embodiment
SOCIAL RESOURCES	Building social identity	<ul style="list-style-type: none"> Changes in anonymity Development of an interdependent self Development of social identity Development and reinforcement of social roles Validation of experiences Increased feeling of being valued Increased positive social comparisons Heightened social status

	Building capital	<ul style="list-style-type: none"> Increased social support Increased social capital Increased employability Increased physical capital Increased socio-economic position Increased social conversion factors Increased environmental conversion factors
MESO/MACRO-LEVEL		
GROUP STRENGTH	Supporting group cohesion	<ul style="list-style-type: none"> Enhanced social surroundings Increased mutual dependence Enhanced social solidarity Enhanced collectivism Increased social cohesion Increased community cohesion Decreased ostracism Increased shared achievements
	Building integration & resilience	<ul style="list-style-type: none"> Reduced marginalisation Decreased cultural homogenisation Increased normative multi-culturalism Preservation of cultural traditions Increased polyculturalism Improved social resilience Improved community resilience
GROUP POWER	Disrupting hierarchies	<ul style="list-style-type: none"> Changes in social hierarchies Reduced social dominance Increased social mobility Social change Increased community empowerment Changes in social power Increasing cultural evolution
	Improving equality	<ul style="list-style-type: none"> Increase in social justice Decreased relative deprivation Decreased area deprivation Increased neighbourhood security Reduced income inequality Reduced social inequality Increased health equity
	Developing the leisure industry	<ul style="list-style-type: none"> Increased leisure industrialisation Increased numbers of jobs within leisure Changes in labour market structure Improvements in economic stability & security Development of leisure-related public policies

1.4 Behavioural processes

Categories	Sub-categories	Mechanisms
MICRO-LEVEL		
DEVELOPMENT OF HABIT	Disrupting existing habits	<ul style="list-style-type: none"> Disruption of autopilot Discontinuity of habits Disruption of script Disrupted status quo bias Reduced psychological reactance to norms
	Assisting in the formation of new habits	<ul style="list-style-type: none"> Operant learning Classical conditioning Performing action slips Formation of habits Reinforcement of behaviours Increased continuity of positive behaviours Development of harmonious addiction
BEHAVIOURAL DECISIONS	Influencing individual choice	<ul style="list-style-type: none"> Reduced cognitive dissonance Decreased dynamic inconsistency Reduced cognitive bias Reduced disconfirmation bias Increased considerations underlying choice Increased balancing of outcome expectancies Increased reasoned action Increased controlled risk-taking Changes in perception of boundaries
	Supporting the prediction of behaviours	<ul style="list-style-type: none"> Changes in default effects Changes in deadline effects Changes in norm effects Changes in self-fulfilling prophecies Changes in behavioural prediction Increased response inhibition Enhanced inhibitory control
BEHAVIOURAL DRIVE	Enhancing behavioural activation	<ul style="list-style-type: none"> Unfreezing of behaviours Increased initiative Increased goal setting Increased self-activation Increased self-efficacy Increased readiness to act Increased mental simulation Increased action tendency Increased self-determination Decreased ego depletion Decreased self-sabotaging beliefs
	Increasing motivation	<ul style="list-style-type: none"> Decreased apathy Increased extrinsic motivation Increased intrinsic motivation Increased expectancy motivation Increased task-based motivation Increased identity-based motivation Reduced fear of failure Anticipated regret from non-engagement Increased evaluation apprehension Increased implementation intentions Perception of being given a second chance

	Supporting achievement	<ul style="list-style-type: none"> Increased sense of reward Increased commitment Increased perseverance Increased goal attainment Increased experience of making mistakes Improved personal competence Increased self-actualisation Increased generativity
BEHAVIOURAL DEVELOPMENT	Supporting child development	<ul style="list-style-type: none"> Improved infant behaviours Increased social referencing Enhanced school readiness Reduced truancy Improved parenting practices Increased play
	Supporting behavioural adjustment	<ul style="list-style-type: none"> Reduced externalising behaviours Reduced internalising behaviours Improved development of childhood adaptive behaviours Reduced bullying Increased independence
PERSONAL LOCATION	Enhancing a sense of time	<ul style="list-style-type: none"> Increased flow Increased sense of momentum Decreased boredom Provision of routine Displacement of time to engage in unhealthy behaviours Changes in perception of time Reduced present bias Increased anticipation of forthcoming positive events Increased prospection
	Enhancing a sense of place	<ul style="list-style-type: none"> Enhanced sense of place Development of a safe space Increased perceptions of safety Enhanced attachment to place Enhanced field of care Changes in place-based behaviour Increased local engagement Expanded life-world
MESO/MACRO-LEVEL		
COOPERATION	Increasing social control	<ul style="list-style-type: none"> Changes in patterns of herd behaviour Enactment of ritual Changes in social shaping Changes in social regulation of effort Changes in levels of territoriality Changes in informed social control Reduced social strain
	Building group learning	<ul style="list-style-type: none"> Increased social learning Reduced bandwagon effect Increased cooperation Increased cultural consonance Increased collective intentionality Ecological transition

	Encouraging adaptive group behaviours	<ul style="list-style-type: none"> Engagement in collective projects Increased active citizenship Increased collective action Development of social movements Increased political participation Increased sharing of resources Changes in civil unrest Decreased conflict Reduced criminality
APPROACHES TO HEALTH	Increasing social responsibility	<ul style="list-style-type: none"> Altered social conception of illness Increased assumption of social responsibility Increased collective responsibility in health Increased social accountability towards health
	Increasing health promotion	<ul style="list-style-type: none"> Increased collective self-efficacy Increased structuralist-collectivist health promotion Improved social-ecological health promotion Changes in adaptation behaviours
AVAILABILITY OF ASSETS	Increasing leisure assets	<ul style="list-style-type: none"> Increased number of leisure artefacts Increased diversity of leisure artefacts Increased number of leisure experiences Increased diversity of leisure experiences Increased number of community assets Increased diversity of community assets Increased geographical spread of community assets Increased preservation of community assets Increased placemaking
	Increasing healthcare assets	<ul style="list-style-type: none"> Increased numbers of paraprofessionals Increased availability of self-help groups Increased availability of leisure-based activities to support health Increased referral systems to leisure activities

1.5 Health behaviours

Categories	Sub-categories	Mechanisms
MICRO-LEVEL		
ENGAGEMENT IN HEALTHY BEHAVIOURS	Increasing behaviours relating to the prevention of ill-health	<ul style="list-style-type: none"> Increased leisure engagement Reduced sedentary behaviours Increased physical activity Improved sleep Increased engagement with behavioural immunogens Repeated healthy behaviours Increased responsiveness to health communication
	Increasing behaviours relating to the management of ill-health	<ul style="list-style-type: none"> Increased self-management of health Increased treatment adherence Reduced need for medical treatment Avoidance of relapse Changes in use of health services Increased self-protection behaviours Provision of informal care
	Developing behaviours to support the delivery of healthcare	<ul style="list-style-type: none"> Improved clinical skills Improved staff-patient interactions Reduced clinical errors Reduced staff burnout
DISENGAGEMENT IN UNHEALTHY BEHAVIOURS	Reducing engagement in unhealthy activities	<ul style="list-style-type: none"> Decreased unhealthy behaviours Decreased problem behaviours Decreased delinquent or deviant behaviour Decreased unsafe sex practices Decreased screen time
	Reducing engagement with substances	<ul style="list-style-type: none"> Decreased smoking and tobacco use Decreased drug use Improved management of addiction
MESO/MACRO-LEVEL		
HEALTHCARE	Influencing healthcare delivery	<ul style="list-style-type: none"> Enhanced therapeutic landscapes Increased de-institutionalisation Increased primordial prevention Improved health communication Increased availability of person-centred care Reduced demand for healthcare services
	Improving healthcare performance	<ul style="list-style-type: none"> Increased recognition of paraprofessionals Disruption of healthcare societies Rehumanisation of health Development of more compassionate care environments Enhanced performance & quality of healthcare Enhanced mutual recovery
	Removing barriers to healthcare	<ul style="list-style-type: none"> Reduced health discrimination Increased engagement with hard-to-reach groups Increased conversations about health Decreased accumulation of health hazards Decreased clustering of negative health behaviours Reduced health inequities Reduced health inequalities

2. Psychological Processes: in detail

2.1 Micro-level

Mechanism	Definition	Reference
AFFECTIVE STATES		
Eliciting affective responses		
Increased experience of positive emotions	Pleasant or desirable situational responses ranging from interest and contentment to love and joy	1
Decreased experience of negative emotions	Unpleasant situational responses such as hate, anger, jealousy and sadness	1
Decreased stress	A state of bodily or mental tension resulting from factors that alter an existent equilibrium	2
Increased eustress	A positive form of stress that has beneficial effects on health, motivation, performance and wellbeing	2
Changes in valence	An evaluation of an experience as intrinsically attractive (positive valence) or aversive (negative valence)	3
Experience of pleasure	Agreeable or enjoyable feelings that can form the basis for more elaborate emotions or evaluations	4
Supporting emotion regulation		
Improved attention-focused emotion regulation	The regulation of emotions via techniques that deploy attention (e.g. concentration, distraction or suppression)	5,6
Improved knowledge-focused emotion regulation	The regulation of emotions via techniques that involve cognitive change (e.g. reflection or reappraisal)	5,6
Improved expression-focused emotion regulation	The regulation of emotions via techniques such as venting or physiological self-regulation	5,6
Increased self-soothing	The ability of an individual to comfort themselves without the need for others	7
Changes in mood	Pervasive, sustained and less-specific feelings, states or prolonged emotions	8
Broadening of momentary thought-action repertoire	Whereby the experience of positive emotions such as joy, interest, contentment and love sparks a recurring cycle of positive emotions (see also broaden-and-build theory)	9
RESILIENCE		
Supporting coping		
Increased emotion-focused coping	The management of external or internal demands that are appraised as taxing or exceeding one's resources through dealing with the emotional response	10
Increased problem-focused coping	The management of external or internal demands that are appraised as taxing or exceeding one's resources through looking at solutions	10
Increased stress buffering	The reduction of the impact of life stress on oneself through the protective effect of psychosocial resources or engagement in diversified activities	11,12
Decreased catastrophizing	The tendency to irrationally believe something is far worse than it actually is (see also awfulising)	13
Reduced suicidal ideation	Thinking about, considering or planning suicide	14
Increased terror management	Whereby one overcomes one's fear of adverse events (e.g. death) through pursuing activities that promote self-esteem	15
Improved management of grief	The response to loss, particularly to the loss of someone or something to which a bond or affection was held	16
Development of supportive internal dialogue	The voice in one's head that comments on life, events and one's thoughts either consciously or sub-consciously (see also use of self-talk)	17
Increased adjustment	One's ability to find a resolution to a situation through achieving coordinated balance across multiple domains including feelings and actions	18
Increased accommodation	Whereby one is able to manage changes in their life (such as illness) through the pursuit of modified goals	18
Greater availability of cognitive bandwidth	Whereby the regulation of emotions frees up mental space and thereby leads to more rational thinking and behaviours (see also bounded rationality)	19
Building psychological strength		
Increased self-confidence	A feeling of trust in one's abilities, qualities, and judgement	20
Increased resilience	One's ability to recover from or adjust easily to change	21
Increased vitality	A state of being full of life and both mental and physical energy	22
Improved psychic homeostasis	A state of emotional balance that can be markedly altered during psychic disturbances	23
Increased sense of continuity	A sense of maintaining patterns and behaviours from the past in the face of disruptive unexpected and unwanted change	24

Improved tolerance of uncertainty	The assessment of uncertainty as desirable versus threatening	25
Decreased submissiveness	Whereby one obeys or yields to another's will, putting one's own desires lower than another's	26
Decreased denial	An attempt to fight against a situation by minimising events and/or the implications of events (see also crisis theory)	18,27
Decreased resignation	Whereby one feels overwhelmed by events and feels subject to vicissitudes	18
Reduced subjective weathering	A social psychological (perceived) component of accelerated ageing	28
Increased conservation of resources	Whereby one seeks to obtain, retain and protect individual resources (e.g. self-esteem and control), in particular in the face of loss	29
SENSE OF SELF		
Building identity		
Formation & affirmation of self-identity	The perception or recognition of one's characteristics as a particular individual	30
Improved self-knowledge	Understanding of oneself or one's own motives or character	31
Improved self-concept	The perception or mental image one has of oneself	32
Decreased self-discrepancy	Whereby discrepancies between different self-beliefs or self-state representations produce emotional vulnerabilities	33
Decreased de-individuation	Whereby one loses one's sense of individual identity	34
Increased self-expression	The expression of one's feelings, thoughts, or ideas (see also voice)	35
Development of a future self	How one imagines oneself in the future and the degree of continuity between a present self and that future self	36
Increased self-awareness	An awareness of one's own personality or individuality	37
Developing self-acceptance		
Increased self-esteem	One's sense of self-worth or personal value (either general or domain specific such as body-related self-esteem)	38
Increased self-enhancement	Whereby an individual places emphasis on their virtues ahead of their shortcomings	11
Increased self-protection	Whereby an individual construes events in a way that places their attributes in a favourable light	11
Reduced self-stigmatisation	Whereby the sense of self projected by others negatively affects one's perception of oneself	39
Increased self-affirmation	The ability to affirm one's own worthiness and value in the face of information or experiences that threaten one's self concept	40
Decreased self-derogation	The tendency to disparage oneself, often unrealistically (see also self-damning)	41
Increased authenticity	The ability to be true to oneself and one's beliefs	42
Acceptance of personal fallibility	Whereby one comes to terms with and embraces one's tendency to make mistakes or be wrong such that they do not disrupt one's sense of self	43
PERSONAL TRANSFORMATION		
Supporting changing identity		
Reduced 'loss of self'	A loss of subjective self-identity sometimes experienced in the face of an illness or other adverse event	44
Reduced biographical disruption	The way that one makes sense of an illness or other adverse event in the context of their lives	45
Increased reminiscence	The act of recollecting past experiences or events	46
Increased self-restoration	Re-affirmation of a previous identity and reinforcement of valued aspects of one's previous life (e.g. prior to illness)	24
Provision of alternative identities	Whereby an individual can define themselves both according to multiple different factors in their life (e.g. assuming a 'sick role' but also holding an identity relating to their leisure engagement)	47
Building of new narratives	The way one views and understands one's life story. Contingent narratives address beliefs about the origins of an event (e.g. illness), while moral narratives help to constitute changes between an individual, their illness and their identity, and core narratives connect an individual's experience with deeper cultural levels of meaning	48
Development of personal pathography	The formulation of an understanding of one's experience of illness (or other adverse event)	49
Aiding personal evolution		
Increased openness to experience	A personality trait involving characteristics such as imagination and insight	50
Increased agreeableness	A personality trait involving characteristics such as trust, altruism, kindness, affection and other prosocial behaviours	50

Increased conscientiousness	A personality trait involving characteristics such as thoughtfulness, good impulse control, and goal-directed behaviours	50
Increased extroversion	A personality trait involving characteristics such as excitability, sociability, talkativeness, assertiveness, and high amounts of emotional expressiveness	50
Decreased neuroticism	A personality trait involving characteristics such as sadness, moodiness, and emotional instability	50
Increased optimism	An inclination to put the most favourable construction upon future events or actions	24
Personal transformation	Changes in one's life such as restructuring of life goals and commitments, new activity interests and greater attention to the present in the wake of negative life events	24
Increased growth	Personal change and development associated with life events	51
Increased regulatory focus	Whereby an individual works to bring oneself into alignment with one's standards and achieve one's goals	52
Self-transcendence	A decreasing reliance on external factors for one's definition of self, increasing interiority and spirituality, and a greater sense of connectedness with past and future	53
FLOURISHING		
Enhancing meaning in life		
Provision of meaning	Whereby an individual feels their life has significance	54
Increased sense of life being worthwhile	A feeling that one's life is useful, important or good enough	54
Improved life satisfaction	A favourable attitude towards one's life	54
Increased sense of coherence	How manageable, meaningful and comprehensible one finds the world to be	55
Formation and affirmation of central values	Principles or standards of behaviour and judgement of what is important in life	56
Increased gratitude	The quality of being thankful and a readiness to show appreciation for and to return kindness	57
Increased purpose	The courage to envisage and pursue valued goals	58
Developing autonomy		
Increased self-locus of control	The ability to regulate oneself and the world around (internal locus of control) rather than events being due to chance or others (external locus of control)	
Changes in self-attribution	The extent to which one sees oneself as responsible for situations and events as opposed to blaming failures on factors outside of our control (see also self-serving bias)	59
Increased autonomy	Self-directing freedom and independence	60
Increased agency	The capacity to act on one's own behalf	61
Increased empowerment	Personal control and ability to effect change	62
Compensation for imbalanced demand-control in other life domains	Whereby an individual feels high psychological demands but low control in settings unrelated to leisure (such as work settings)	63
PSYCHOLOGICAL CAPABILITIES		
Supporting cognitive learning		
Enhanced information processing	The ability to retain information over time through encoding, storage and retrieval	64
Enhanced semantic memory	Knowledge of facts, concepts, words, definitions, and language rules	64
Enhanced episodic memory	Knowledge of specific events, personal experiences (episodes), or activities	64
Enhanced procedural memory	Memory for motor and some cognitive skills, as well as emotional behaviours learnt through conditioning	64
Enhanced convergent thinking	The weighing of alternatives in solving a problem or answering a question	65
Enhanced divergent thinking	Creative thinking that leads to generation of new and original solutions to problems	65
Improved reasoning	A mental process that involves using and applying knowledge to solve problems/achieve goals	64
Expansion of perceptual sets	One's tendency to perceive or notice some aspects of available sensory data and ignore others (see also auditory discrimination)	66
Increased use of heuristics	Practical mental shortcuts that ease the cognitive load of making decisions	67
Enhanced transfer effects	Whereby the knowledge and skills learnt in one cognitive domain have an effect on the achievement of goals in other cognitive domains (see also non-trained cognitive functions)	68
Enhanced aesthetic judgement	Sensory, emotional and intellectual responses to and reflections on art, culture and nature	69
Enhanced attention	The cognitive-behavioural process of concentrating specifically on one stimulus while ignoring other stimuli	64

Supporting emotional learning		
Increased emotion recognition	The ability to recognise emotions being experienced or expressed by others	70
Improved theory of mind	The ability to attribute mental states to oneself and to others, and to understand that others' beliefs, thoughts and perspectives might be different to one's own	71
Increased empathy	The awareness, understanding, sensitivity to, and vicarious experiencing of someone else's thoughts, feelings, and experiences	72 73
Increased compassion	Sympathetic pity and concern for the challenges faced by others	74
Enhanced sense of conscience	One's moral sense of right and wrong, which acts as a guide to one's behaviour	75
Increased decentering	The ability to consider multiple aspects of a situation, moving from egocentrism to a shared reality with others (see also decentration)	76
Increased mentalising	The ability to see ourselves as others see us, and others as they see themselves	77
Increased mind-mindedness	One's tendency to view another (especially a child) as an individual with a mind	78
Supporting overarching cognitive processes		
Enhanced processing fluency	The ease with which information is processed	79
Enhanced cognitive development	The process by which one acquires knowledge and intelligence through changes in cognitive processes and abilities across childhood and into adulthood	80
Enhanced cognitive restructuring	The identification of problematic cognitions and distortions and the rationalisation and rebuttal of these thoughts	81
Enhanced transformative learning	The expansion of consciousness and change of frames of reference through transforming one's understanding of oneself, a revision of one's belief systems, and changes in lifestyle	82
Increased diversification of intelligence	Intelligence has been proposed to have at least nine different types: verbal, musical, logical-mathematical, spatial, body movement, intelligence to understand oneself, intelligence to understand others, naturalistic intelligence, and existential intelligence	83
Increased curiosity	The urge to know or learn	84
Enhanced creativity	A combination of flexibility in thinking and reorganisation of understanding to produce innovative ideas and new or novel solutions	85
Enhanced visualisation	The formation of a mental image of an object, situation or set of information	86
Increased imagination	The process of forming new ideas or images of something that cannot be perceived at that moment by the senses	87
Reduced cognitive decline	Problems with memory, language, thinking or judgement that occur with ageing and can develop into cognitive impairment and dementias	88
PSYCHOLOGICAL RESOURCES		
Building general resources		
Enhanced maturity	The awareness of how to behave and act according to the circumstances of the environment and the culture or the society in which one lives	89
Increased human capital	Individual resources including knowledge, skills, abilities, talents, intelligence, values	90
Increased cultural capital	Symbolic and embodied resources related to taste, engagement with art, language etc. that indicate social status or ability to have social mobility	90
Improved educational attainment	The highest level of education that an individual has completed	91
Increased personal conversion factors	One's ability to convert resources (such as knowledge) into functionings	92
Building health-related resources		
Expanded lay theories	One's basic assumptions about what health is and what it is influenced by	93
Changes in illness cognitions	Individuals' beliefs about their own illnesses (especially seen in individuals with a chronic illness)	94
Increased health consciousness	Whereby one becomes increasingly aware of one's health, diet and lifestyle	95
Increased health literacy	The degree to which one has the capacity to obtain, process, and understand basic health information so that one can make appropriate health decisions	96
Increased understanding of others' health conditions	The degree to which one comprehends the experience of living with mental or physical illness without resorting to stereotypes or essentialism	97
Increased salience of healthcare engagement	Whereby one perceives engaging with healthcare to be more important or relevant to oneself through it being highlighted alongside leisure engagement	98
Experience of healing	Whereby an individual moves from feeling ill to feeling well, balanced, restored, whole, and vitalised; an experience that can go beyond the resolution of specific medical symptoms	99
Improved quality of life	The standard of health, comfort, and happiness experienced by an individual or group	100

2.2 Meso-/Macro-level

Mechanism	Definition	Reference
GROUP MIND		
Developing a group self		
Increased sense of group self	A collective self with inherent ambitions, ideals and resources (see also collective self-definition)	101
Increased collective rationality	Rational cooperation guided by group reasoning that results in a collaborative effort to achieve or solve something	102
Altered cultural perception	The way that groups of people from a particular culture perceive their social environment	103
Increased group knowing	The building of collaborative knowledge	104
Enhanced sense-making	The situated, embodied activity of learning through interaction between learners and their environment (see also enactivist theory)	105
Developing group values and understanding		
Increased meaning-making	Social understandings of identity, difference, morals, truth, perception and aesthetics (see also social semiotics)	106
Development of social norms	The unwritten rules of behaviour considered acceptable in a group or society	107
Reduced anomie	A condition of instability within society resulting from a lack of group purpose or ideals or a breakdown of collective standards or values	108,109
Increased collective responsibility	Whereby individuals feel responsible for others' actions	110
Development of collective consciousness	The acquisition of critical consciousness as groups understand events around them (see also conscientisation)	111
GROUP ATTITUDES		
Reducing stigma		
Reduced social labelling	A process by which an individual or group obtain labels from how others view their tendencies or behaviours, which can in turn affect individuals' identities and behaviours (see also stereotyping)	112
Reduced prejudice	Irrational and often inflexible opinions or attitudes held by one group about another	113
Increased tolerance	The ability or willingness of a group to tolerate opinions or behaviours that the group dislikes or disagrees with	113
Disruption of stereotypes	Oversimplified images or ideas about individuals or other entities that are widely held	113
Decreased social death	Whereby individuals with certain characteristics or health conditions (such as dementia) are not accepted as fully human by wider society and feel a loss of identity, connectedness and integration	114
Changing attitudes to health		
Changes in the social construction of illness	How individuals come to understand health and illness based on how these concepts are embedded within cultural meaning	115
Decreased medicalisation of social deviance	Whereby problems such as obesity, heavy drinking and smoking are seen as medical rather than social problems	116
Decreased cultural camouflage	Whereby cultural stereotypes are used to excuse unhealthy behaviours such as drinking and smoking	117
Decreased risk discourse	Whereby individuals with health conditions (such as mental illness) are seen first in terms of the risks they pose to themselves and others as opposed to the care and support they need	118
Enhanced satisfaction with healthcare	Positive reporting of experiences by patients and healthcare staff	119
LANGUAGE		
Changing communication		
Increased voice for minority groups	A group of people who experience collective discrimination or unequal treatment because of their physical or cultural characteristics	120
Enhanced group matrix	The conscious and unconscious communicational network in a group	121
Increased spontaneous communication	The non-intentional communication of motivational-emotional states through biologically-shared understanding of displays (see also non-verbal communication)	122
Increased symbolic communication	The intentional communication of information using learned, socially shared signal systems (see also non-verbal communication)	122
Development of memes	Elements of a culture that propagate successfully and have the power to communicate information widely and influence opinions	123
Increased symbolic interactionism	The interaction of individuals in a group via linguistic or gestural communication that builds social meaning	124

Modifying group emotion		
Elicitation of collective emotions	Whereby individuals collectively express group-based sentiments	125
Increased collective emotional convergence	The social calibration of emotional experiences	125
Decreased collective stress	Whereby social suffering at a group level leads to an increase in population stress	126
Formation of collective memories	The development of memories through involvement in identical emotionally relevant events, which heightens the propensity for recurring emotional convergence	125
Development of collective effervescence	Whereby a group comes together and simultaneously communicates the same thought or participates in the same action, leading to collective excitement and unification	127

3. Biological Processes: in detail

3.1 Micro-level

Mechanism	Definition	Reference
NERVOUS SYSTEM		
Activating perceptual processes		
Changes in activation of the auditory system	The process by which sensations transduced in the ear from our surroundings stimulate nerves leading to the perception of sound	128
Changes in activation of the visual system	The process by which photoreceptors detect and interpret information from visible light to build a representation of the surrounding environment	128
Changes in activation of the somatosensory system	The process by which sensory receptor cells respond to changes at the surface or inside of the body and stimulate neural pathways leading to the perception of pain, temperature, touch and both position and movement	128
Changes in activation of the gustatory system	The process by which sensations produced in the mouth stimulate nerves leading to the perception of taste	128
Changes in activation of the olfactory system	The process by which sensations produced in the nostrils and surrounding areas stimulate nerves leading to the perception of smell	128
Changes in activation of the vestibular system	The process by which sensory organs next to the cochlea in the inner ear enable us to maintain balance and body posture	128
Increased proprioception	The perception or cognitive awareness of the position of one's body in space	129
Increased interoception	The awareness and understanding of what is happening inside one's own body (the sense of the internal state of the body)	130
Increased kinaesthesia	The awareness of movements in different parts of the body using sensory organs in the muscles and joints; a key component in hand-eye coordination and muscle memory	131
Increased perceptual sensitivity	The amount one can detect slight, low-intensity stimuli from the external environment	132
Increased sensory equilibrium	The adjustment of the senses to relieve external stress and establish balance	133
Modulated levels of sensory deprivation	The process by which one is deprived of normal external stimuli such as sight and sound for an extended period of time	134
Increased multisensory integration	The neural integration or combination of information from the different senses (see also multimodal integration or multisensory activation)	135
Decreased central & peripheral sensitisation	Whereby the central and peripheral nervous systems become regulated in a persistent state of high reactivity leading to the development and maintenance of chronic pain	136
Reduced pain	Unpleasant sensory and emotional experience associated with actual or potential tissue damage. It is asserted that non-painful sensory input can prevent pain sensations from travelling to the nervous system (see also gate-control theory of pain)	137
Increasing brain activation		
Increased overall cerebral activation	Whereby the engagement of specific parts of the brain leads to increased oxygen delivery beyond the actual metabolic demand, which can support cognitive processes	138
Improved overall cerebral blood flow	The blood supply to the brain in a given period of time, dysregulation of which is associated with problems such as hypertension and risk of stroke and dementias	139,140
Increased activation of brain regions involved in basic vision and object perception	This includes brain regions such as the occipital cortex, fusiform gyrus, and parahippocampal gyrus	141,142
Increased activation of brain regions involved in attention and sensory processing	This includes regions such as the fusiform gyrus, angular gyrus, and superior parietal cortex	141,142
Increased activation of brain regions involved in knowledge and meaning	This includes regions involved in evaluative judgement and information retrieval (e.g. the dorsolateral, ventrolateral, anterior medial prefrontal cortex, temporal pole, posterior cingulate and precuneus)	141,142
Increased activation of brain regions involved in reward, valuation or response to perceived beauty	This includes regions such as the anterior cingulate cortex, orbitofrontal cortex, insula, ventromedial prefrontal cortex, caudate nucleus, substantia nigra, nucleus accumbens, and posterior cingulate cortex	141,142
Increased activation of brain regions involved in affective responses	This includes regions such as the subcortical amygdala, insula, posterior cingulate cortex, and medial temporal lobe	141,142
Increased activation of the motor cortex	A region of the cerebral cortex involved in the planning, control, and execution of voluntary movements, which includes the premotor areas, the primary motor cortex and the supplementary motor area	141,142
Activation of mirror neurons	Neurons that fire both when one acts and when one observes another carrying out an action, supporting in processes such as empathy, mimicry and synchronisation	143

Altering brain physiology		
Changes in brain structure	Changes in dynamic spatial and temporal patterns of brain development, which can be associated with changes in cognitive skills especially across the developmental period	144
Increased grey matter & grey matter integrity	Tissue in the brain composed of neuronal cell bodies and other cells that is found in regions of the brain such as those involved in muscle control, sensory perception, memory, emotions, speech, decision making and self-control	145
Increased white matter & white matter integrity	Tissue in the brain composed of nerve fibres, the integrity of which facilitates connection among distributed neural systems and is associated with good perceptual speed and executive functioning	145
Increased neurogenesis	The process by which neurons are produced by neural stem cells	146
Increased neuroplasticity	The ability of the brain to change continuously throughout an individual's life. Neuroplasticity is decreased by factors such as stress and depression via mediating biological mechanisms such as decreases in brain derived neurotrophic factor (BDNF)	147
Decreased neurotoxicity	Damage to the brain or peripheral nervous system caused by toxins such as stress hormones	148
Reduced brain atrophy	Changes to the brain including suppressed proliferation of neurons, alterations in the morphology of neurons and reductions in the volume of the different brain regions as a result of factors such as stress	148
Increased cognitive reserve	The resilience of the brain against cognitive decline, which helps to explain individual differences in susceptibility to age-related brain changes	149,150
Modulating brain biomarkers		
Changes in acetylcholine production	A neurotransmitter involved in memory, muscle contraction, heart rate, arousal, cognition and memory	141,142
Increased dopamine production	A neurotransmitter in the brain involved in motivation, reward and pain	151,152
Increased serotonin levels	A neurotransmitter in the brain involved in cognition, reward, learning, memory and reducing symptoms of depression and anxiety	153
Changes in oxytocin and vasopressin levels	Biomarkers that play a role in social bonding, trust, generosity and reproduction	154,155
Increased levels of opioids	Neuropeptides and peptide hormones such as endorphins involved in feelings of euphoria, hormonal and metabolic responses	156,157
Increased levels of cannabinoids	Lipids that play a role in memory, pleasure and hunger	158
Increased levels of melatonin	A hormone that regulates circadian rhythms, stress response and has anti-inflammatory properties within the immune system (increased by exposure to daylight, especially through outdoors engagement)	159
Changes in GABA and glutamate levels	GABA (gamma-Aminobutyric acid; an inhibitory neurotransmitter involved in anxiety, alertness, memory, muscle tension and sleep) and glutamate (an excitatory neurotransmitter involved in synaptic plasticity, learning and memory); both major neurotransmitters	160
Decreased neuro-inflammation	Inflammation of the nervous tissue, often triggered by processes such as ageing, exposure to viruses, air pollution, traumatic brain injury, toxic metabolites, and microbes. It can underlie conditions such as depression, anxiety and pain and is modulated by a range of psychosocial factors	161
Reduced disruption of biological rhythms	Natural internal processes that regulates physical, mental and behavioural changes and are affected by psychological, biological, social and behavioural processes, such as circadian rhythms that regulate each daily cycle	162
Modifying arousal		
Changes in arousal levels	A measure of physiological activation ranging from feelings of energy and vigour to the opposite feelings of sleepiness and tiredness, and from subjective tension to placidity and quietness. Arousal underlies a variety of emotions and stress reactions	3
Increased chills	Skin tingling, piloerection and pupil dilation that can occur as a result of an emotional response to a stimulus	163
Changes in electrodermal activity	Differences in the electrical potential between different parts of the skin that give a measure of neutrally-mediated effects on sweat gland permeability in response to processes such as stress and arousal (see also skin conductivity)	164
Changes in activation of the autonomic nervous system	The system responsible for regulating the body's unconscious actions. This has two divisions (the sympathetic and parasympathetic systems) that respectively respond to threat vs control homeostasis within the body, leading to a cascade of biological responses	165
Improved autonomic tone	The general activity rate of the autonomic nervous system and the balance between the sympathetic and parasympathetic aspects of the system	166

Changes in brainwaves	Neural oscillations (repetitive or rhythmic patterns of neural activity) such as alpha waves, beta waves and theta waves that affect physiological states such as arousal as well as processes such as memory and sleep	167
Brainwave entrainment	Whereby brainwave frequencies fall into step with a periodic stimulus leading to synchronisation of natural body functions and processes	168
Decreased muscle tension	Whereby muscles in the body remain semi-contracted for an extended period in response to psychological or physical factors	169
Increased nerve stimulation	Stimulation of peripheral or cranial nerves via electrical impulses, which has been found to reduce pain, depression and seizures	170
ENDOCRINE & IMMUNE SYSTEMS		
Changing hormone levels		
Improved regulation of the Hypothalamic-Pituitary-Adrenal axis	HPA axis; the central endocrine system for stress response that consists of the hypothalamus, pituitary gland and adrenal glands	171
Reductions in excessive glucocorticoid activity	The production of hormones such as vasopressin and cortisol which are increased in response to stress and are involved in processes including memory, mood, metabolism and wound healing	171
Reductions in excess production of catecholamines	Catecholamines act as neuromodulators in the brain and hormones in the blood to facilitate physiological responses such as changes in blood pressure and heart rate. Examples include adrenaline/epinephrine and noradrenaline/norepinephrine, which are part of the sympathetic nervous system's response to stress	171
Changes in thyroid function	The thyroid gland is a part of the endocrine system and acts to regulate metabolism. Thyroid dysfunction can be caused by stress and is associated with a range of physical and psychological symptoms such as weight gain and anxiety	172
Changes in growth hormone levels	A hormone involved in growth, cell production and cell regeneration which is increased during acute physical stress and dysregulated by prolonged psychosocial stress	173
Changes in levels of sex hormones	Sex hormones include testosterone, oestrogen and progesterone, which are involved in functions including fertility, bone health and cardiovascular risk	174,175
Altering immune function		
Changes in levels of innate immunity	Non-specific fast-acting defence mechanisms in the immune system. Multiple types of innate immune cells such as natural killer cells and neutrophils are increased by acute stress, but decreased by chronic stress	176
Changes in levels of acquired immunity	Adaptive defence mechanisms in the immune system that are specific to particular pathogens. Multiple types of acquired immune cells such as T lymphocytes are increased by acute stress, but decreased by chronic stress	176
Decreased cellular ageing	Progressive decline in the resistance of cells to stress and other cellular damages, causing a gradual loss of cellular functions and resulting eventually in cell death	177
Decreased bacterial and viral infections	Both the risk of common infections (e.g. common colds) and severe infections (e.g. sepsis, meningitis and endocarditis) is increased by factors such as stress	178
Changes in antibody levels	Antibodies (immunoglobulins) are molecules that enable the immune system to identify and neutralise foreign bodies such as viruses	176
Changes in levels of growth factors	Proteins or steroid hormones capable of stimulating the growth of immune cells. Growth factors are involved in a wide range of roles including cognition, stimulating the production of stem cells, and encouraging growth of new neurons in the brain	179
Decreases in levels of inflammation	Inflammatory markers include cytokines (chemical messengers that support communication between cells) and other biomarkers such as C-reactive protein (an acute phase protein). They are increased in response to acute stress and can become chronically elevated in response to chronic stress and depression	176,180
Shifts in cytokine profiles	Cytokines are small proteins that are important in cell signalling and activate immune cells and antibodies	176
Decreased oxidative stress	Oxidative stress is a disturbance in the balance between the production of reactive oxygen species (unstable molecules that contain oxygen) and antioxidant defences. It can lead to increased risk of a range of illnesses from cancers to dementias and cardiovascular conditions	181
Increased vitamin D levels	Vitamin D refers to a group of fat-soluble secosteroids (subclasses of steroids) responsible for multiple actions including increasing absorption within the intestines of calcium, magnesium, and phosphate. Vitamin D can be increased through engagement in outdoor activities that provide exposure to sun	182

CARDIOMETABOLIC SYSTEM		
Modulating cardiovascular factors		
Reduced heart rate	The number of beats or contractions your heart makes per minute	183
Increased heart rate variability	The physiological phenomenon of the variation in the time interval between consecutive heartbeats, which is involved in biological responses to factors such as stress and emotions	184
Reduced vasoconstriction	The narrowing or constriction of blood vessels when smooth muscles in blood vessel walls tighten, which can be induced by stress	185
Decreased blood pressure	The force with which the heart pumps blood around the body, increased by physiological arousal and stress	186
Reduced hypertension	A medical condition whereby blood pressure in the arteries is persistently elevated, which is associated with a range of cardiovascular conditions	187
Changes in cardiovascular reactivity	The ability of the cardiovascular system to respond to periods of rest, demand or stress by changing heart rate, blood pressure or other measures of cardiovascular function	188
Increased angiogenesis	The formation of new blood vessels, which can be disturbed by psychosocial factors	189
Decreased aortic stiffness	Whereby the elastic fibres within the arterial wall (elastin) begin to fray due to mechanical stress; a process that is exacerbated by psychological stress	190
Improved cardiac function	The ability of the heart to meet the metabolic demands of the body	191
Modulating metabolic factors		
Decreased glucose levels	Our main source of energy, carried through the bloodstream to provide energy to cells. Glucose levels are affected by factors such as stress	192
Changes in lipid levels	Hydrocarbon based molecules such as cholesterol (lipoproteins) and triglycerides that are essential for the structure and function of living cells, levels of which are affected by psychosocial processes	193,194
Changes in haemoglobin levels	Proteins responsible for transporting oxygen around the body. Levels of haemoglobin are affected by psychosocial processes such as stress and depression and both high and low levels (anaemia) can lead to physical illness	195
Decreased body mass	The ratio of a person's weight to their height, high levels of which are associated with a range of illnesses	196
Changes in body composition	Measures such as muscle mass or waist-hip ratio associated with diet and physical exercise	197
Improved gut microbiota	The gut is populated by biologically active microbes that interact with a range of processes in the host such as immune function, metabolism, organ development and microbiome composition. Gut microbiota have been linked to diet-induced disease predisposition and psychological processes	198 199
Changes to the microbiome	The aggregate of all the microbes - bacteria, fungi, protozoa and viruses - that live on and inside the human body. It plays an important role in health by helping to control digestion and immune function and is affected by factors such as stress and mental illness	200
PERFORMANCE		
Improving physical function		
Improved balance	The distribution of weight that enables one to remain upright and steady	201
Improved gait	One's manner of walking, including parameters such as velocity (speed), stride length and cadence (rhythm)	201
Improved reflexes	One's basic unconscious physical responses to stimuli	201
Decreased reaction time	The length of time taken for a person to respond to a given stimulus or event	202
Improved flexibility	The range of motion in a joint or group of joints	201
Improved posture	The way in which one usually holds their shoulders, neck, and back	201
Increased bone health	Bone health includes factors such as bone density; a measure of the amount of minerals (mostly calcium and phosphorous) contained within bones	203
Improved limb function	One's range of motion, strength and ability to use one's arms and hands (upper limbs) or legs and feet (lower limbs)	201
Improved motor coordination	Combinations of motor movements that result in intended actions, including fine motor skills (smaller movements of wrists, hands, fingers and toes) and gross motor skills (larger movements involving arms, legs, feet or entire body)	201
Increased ability to perform activities of daily living	Essential and routine aspects of self-care, including independently eating, dressing, walking, bathing and using a toilet, and activities related to independent living such as managing money, taking medication, using a telephone and preparing meals	204

Increased physical fitness	One's capacity for exertion or endurance, either via turning oxygen into energy for muscle cells (in aerobic exercise) or using energy stored in muscles (in anaerobic exercise)	201
Reduced falls	When one experiences an event leading to them coming to rest inadvertently on the ground	205
Improving respiratory function		
Strengthened respiratory muscles	Diaphragm and external intercostal muscle contraction and ribcage elevation that lead to changes in volume and air pressure in the lungs	206
Increased lung capacity	The ability of the lungs to move air quickly through the airways via inhalation and exhalation (which is impaired in conditions such as asthma, chronic obstructive pulmonary disease and cystic fibrosis)	206
Improved structured respiratory variability	The ability of the respiratory system to respond to the oxygen demands of the body by varying factors such as breathing rate. Regulation of this system may be improved through physical activity	206
Improved diffusing capacity	The ability of the lungs to transfer gas from the air to red blood cells (see also transfer factor)	206
Increased oxygen saturation	The fraction of oxygen-saturated haemoglobin (a protein in red blood cells that carries oxygen around the body) relative to total haemoglobin in the blood	206
Improving voice		
Improved speech	The expression of thoughts and feelings by articulate sounds. It involves factors such as phonation (ability to sustain the voice to achieve appropriate phrasing during speaking), fluency (e.g. not stuttering or stammering) and articulation	207
Improved language	The method of human communication involving the conveyance, comprehension, and processing of words (see also reduced aphasia)	207
Improved voice quality	The characteristic of auditory colouring of an individual's voice involving factors such as roughness, breathiness, strain, deviations in pitch, deviations in normal volume, or unusual perceptual features such as instability and tremor	207
MULTI-SYSTEM		
Reducing load		
Increased homeostasis	A state of relatively stable equilibrium between physical and chemical conditions in the body	208
Changes in visceral factors	Drive states such as hunger, thirst, sexual desire, drug cravings, physical pain and fervent emotions	209
Reduced fatigue	Extreme tiredness resulting from mental or physical exertion or illness	210
Reduced allostatic load	The presence of too much stress or inefficient operation of the stress response system as a result of overload in trying to adapt to adverse psychosocial or physical situations	211
Rebalanced stress reactivity	One's capacity or tendency to respond to stress, which, at high levels, can increase vulnerability to mental and physical illness	212
Reduced weathering	Accelerated psychological and physical ageing progresses as a result of cumulative exposure to stressful life circumstances (including socioeconomic disadvantage) and prolonged coping demands	213,214
Reduced biological embedding	Whereby an accumulation of biological processes over the life course leads to alterations in biological or developmental processes and poorer health	215
Decreased frailty	Physiological decline in late life that leads to vulnerability to adverse health outcomes	216
Increasing beneficial nature exposure		
Enhanced exposure to microbial diversity	Exposure to microorganisms, such as bacteria, archaea, and eukaryotes, which is associated with improved human health	217,218
Enhanced exposure to phytoncides	Antimicrobial allelochemical volatile organic compounds derived from plants that have effects including improving immune response	219
Increased exposure to negative air ions	Electrically charged molecules in the atmosphere. They are created in nature as air molecules break apart through the movements of air and water and through sunlight and associated with multiple health benefits.	220
Reduced development of allergies and asthma	Exposure to high microbial diversity facilitates the development of an effective adaptive immune system and reduces risk of developing allergic diseases (see also the hygiene hypothesis)	218 221
Affecting genetic / epigenetic factors		
Reduced damage to telomeres	Non-coding, repetitive nucleotide segments on the ends of chromosomes that serve a protective role during DNA transcription and are shortened in length as a result of stress and ageing	222

Changes in DNA methylation patterns	The biological process whereby methyl groups (molecular structural units consisting of hydrogen and carbon atoms) are added to DNA molecules to repress gene expression. Particular patterns in methylation have been found in response to processes such as stress and adverse life experiences as well as enriched environments	223–225
Changes in gene expression	The processing of DNA into proteins that have biological functions. A range of molecular processes, such as DNA methylation, respond to stimuli (including psychological, social and behavioural activities) to change gene expression	226

3.2 Meso-/macro-level

Mechanism	Definition	Reference
ENVIRONMENTAL DIVERSITY		
Increasing positive environmental exposures		
Increased nature connection	As suggested by the biophilia (love of nature) hypothesis, humans have an inherent desire to connect with nature and natural processes (which may be increased at a group level through outdoors leisure engagement)	227
Increased biodiversity of spaces	The variability of animals, plants, fungi and microorganism species (which may be increased through increasing focus on and prioritisation of sustainable outdoor leisure activities)	228
Increased natural capital	The world's stock of natural assets such as geology, soil, air, water and species (which may be increased or preserved through increasing focus on and prioritisation of sustainable outdoor leisure activities)	229
Decreased negative environmental exposures		
Decreased pollution	Some plant and bacteria species are able to store (bioaccumulate) pollutants. So prioritisation of sustainable outdoor leisure activities could support high biodiversity, a nutrient rich ecosystem, and the removal of pollutants such as heavy metals or particulate matter	230,231
Decreased exposure to hazards	Hazardous factors include loud noise and waste (which can be reduced through improvement of spaces within neighbourhoods including leisure spaces)	232
DISEASE SUSCEPTIBILITY		
Affecting disease patterns		
Reduced environmental risk of certain diseases	The risk of certain infectious diseases is reduced through enhanced engagement with diverse ecosystems (which may be promoted through how we engage in outdoor leisure activities; see also dilution effect hypothesis)	233
Changes in disease distribution	The frequency and spatial patterning of communicable and non-communicable diseases (which may be directly affected by leisure behaviours, such as patterns of travelling abroad or staying at home during leisure time affecting communicable diseases, or indirectly via supporting health behaviours and thereby reducing non-communicable diseases)	234
Increased resilience to disease	Whereby changes in social, biological and behavioural factors at individual and group levels interact to provide changes in resistance to disease (see also ecosocial theory)	235
Altering generational transmission		
Changes in transgenerational programming	Whereby environmental conditions and factors such as stress can influence disease risk across multiple generations through both non-genomic processes (e.g. behaviours) and epigenetic processes (e.g. fetal/prenatal programming)	236
Intergenerational genetic adaptation	Whereby humans continue to evolve biologically to adapt successfully to changing environments (which may be affected by persistent trends in leisure behaviours)	237
Changes in penetrance of specific traits	The proportion of individuals carrying a particular variant of a gene (genotype) associated with a particular trait (phenotype) (which may be affected by persistent trends in leisure behaviours)	238
Stabilising selection	Whereby over time selection favours the best suited genotype for the ecological niche (which may be affected by persistent trends in leisure behaviours)	239

4. Social Processes: in detail

4.1 Micro-level

Mechanism	Definition	Reference
SOCIAL ACTIVITY		
Increasing social contact		
Increased frequency of social contact	Interaction with others, whether face-to-face, online, or via other means of communication	240
Increased unmediated interactions	Whereby one has the potential to meet strangers	241
Increased social integration	The process by which one is incorporated into the social structure of a society	240
Increased social engagement	One's degree of participation in a community or society. It can be activated by mechanisms including attitudes, social influence, emotions and habits (see also theory of interpersonal behaviour)	242 243
Increased cultural mixing	Whereby an individual of one culture moves into and interacts with another culture	244
Stimulating social actions		
Increased social mimicry	The copying of postures, mannerisms, facial expressions and other behaviours to facilitate social reactions (see also chameleon effect)	245 246
Changes in social influence	Whereby one changes one's behaviour (either intentionally or unintentionally) to meet the demands of the social environment (see also peer pressure)	247
Changes in social contagion	Whereby the collective behaviours of a crowd can cause a hypnotic impact on an individual, leading to changes in behaviours	248
Audience effects	A type of social facilitation whereby one's actions are influenced by the presence of others	249
Increased social performance	Whereby one performs better on tasks when others are around (see also social inhibition)	250
Increased prosocial behaviour	Behaviour that benefits others or has positive social consequences	251
Increased altruism	Disinterested and selfless concern for the wellbeing of others and the exchange of beneficial acts between individuals	252
SOCIAL RELATIONSHIPS		
Enhancing social engagement		
Increased positive attitude towards social exchange	Whereby we evaluate the pros and cons of social behaviour and determine it to be beneficial	253
Increased social networks	The web of relationships that surround an individual that can be described in terms of size, density, boundedness (degree to which they are defined based on traditional group structures such as kin, work, neighbourhood) and homogeneity	240
Stronger network ties	The characteristics of the relationships within social networks, including duration (the length of time one knows another person), intimacy, multiplexity (the number of types of social transactions or support involved) and reciprocity (the extent to which exchanges are mutual)	240
Greater satisfaction of social needs	Including the formation of friendships, romantic attachments and other emotional relationships that an individual feels are necessary to them	254
Reduced iso-strain	Whereby one experiences high demands, low control and low social support/isolation	255
Supporting social bonding		
Increased reciprocity	Whereby one responds to the positive action of another with a positive action of one's own	256
Increased emotional closeness	A perception of closeness to another that allows the sharing of personal feelings	257
Increased social bonding	A special form of affiliative behaviour in which selective social attachments strengthen social relationships	258
Improved attachment styles	Changes in the type of affectional bonds we build with others, in particular moving towards more secure attachments and away from avoidant or anxious attachments	259,260
Increased satisfaction of desire for attachment	The need for close and secure bonds with others, which functions as a primary motivational system	260
Reduced social isolation	An objective state whereby an individual has low levels of or a complete absence of social contact	261
Reduced loneliness	A complex and typically negative subjective emotional response to perceived deficiencies in the number of or extent of one's social relationships	261
Decreased alienation	A high degree of distance or isolation or lack of common values between individuals	262
Increased opportunity for solitude	A positive condition in which a person is alone but not necessarily separated from others	263
Increased belonging	An affinity for a place, social location, group or collective, or ethical or political value system that leads to the feeling of being 'at home'	264

Achievement of biosocial goals	Such as to elicit and provide care from and to others, find a suitable mate, form cooperative alliances and reach high social rank	265
LEARNING AND TRAITS		
Building social learning and traits		
Improved social skills	The tools that enable one to communicate, learn, make friends and interact with society	266
Reduced othering	Whereby one views another in a negative way because of a distinguishing characteristic or trait	267
Reduced individualism	The prioritisation of the individual over the entire group	268
Enhanced civic individualism	Increasing freedom of action for individuals but in a way that acknowledges global civic culture and diversity	269
Increased social trust	Reliance on the character, ability, strength, or truth of others within society	270
Increased social responsibility	Whereby one feels an obligation to act for the benefit of society at large	271
Changes in framing	Schemas of interpretation that are socially constructed and which individuals rely on to understand and respond to events	272
Building cultural learning and traits		
Increased cultural attachment	The formation of secure attachment to one's native and/or host culture	273
Increased cultural learning	A form of social learning that allows for fidelity of transmission of behaviours and information within cultures	274
Increased acculturation	The process of change by which an individual adjusts to a new cultural environment, adopting and acquiring their behaviours or values (see also sociocultural adaptation)	275
Reduced acculturative stress	The psychological stress of integrating into a new culture	276
Increased inter-cultural competence	Behaving and communicating in a way that is suitable according to one's culture to achieve desired goals	277
Increased cultural embodiment	A means of gaining information about the world and the people within it through perception and attention facilitated by the body	278
SOCIAL RESOURCES		
Building social identity		
Changes in anonymity	Feeling anonymous or invisible (which can be both positive and negative for health)	279
Development of an interdependent self	The self that is dependent on and fundamentally connected to other people	31
Development of social identity	An individual's sense of who they are based on their group membership (e.g. leisure club)	280
Development and reinforcement of social roles	The part an individual plays as a member of a social group and the corresponding changes they make to fit the expectations of that role	281
Validation of experiences	The acceptance of one's own internal experiences, thoughts or feelings as a result of the recognition and acceptance of these experiences by another	282
Increased feeling of being valued	One's perceptions of the respect they receive from others, either generalised respect (e.g. towards all individuals within a group or collective), or individualised respect (for particular attributes, behaviours or achievements) (see also worth)	283
Increased positive social comparisons	The determination of one's social and personal worth based on how one compares oneself to others	284
Heightened social status	One's perceived relative rank within society	285
Building capital		
Increased social support	Instrumental, financial, informational, appraisal or emotional support provided by others	240
Increased social capital	Resources embedded in one's social network and social ties, including bonding social capital (links to like-minded people), bridging social capital (links to heterogeneous groups) and linking social capital (links to people in dissimilar situations or outside of one's community)	90
Increased employability	The attributes of a person that make that person able to gain and maintain employment	90
Increased physical capital	Tangible resources such as wealth, property and assets	90
Increased socio-economic position	An aggregate concept that includes both resource-based and prestige-based measures (e.g. education, income and occupation), as linked to both childhood and adult social class position	286
Increased social conversion factors	One's ability to use social resources (such as public policies, social norms, power relations etc) to support oneself in doing things within one's life	92
Increased environmental conversion factors	One's ability to use environmental resources (such as the physical or built environment in which a person lives, and the means of communication or transportation) to support oneself in doing things within one's life	92

4.2 Meso-/Macro-level

Mechanism	Definition	Reference
GROUP STRENGTH		
Supporting group cohesion		
Enhanced social surroundings	Whereby individuals are surrounded by supportive others who move with them through the life course (see also convoy theory)	287
Increased mutual dependence	Relying upon and benefiting from a collaborative partnership or group membership	288
Enhanced social solidarity	The interdependence between individuals that allows individuals to feel they enhance the lives of others	289
Enhanced collectivism	A focus on group goals, relationships and what is best for the collective group	290
Increased social cohesion	The willingness of members of a society to cooperate with each other across economic divides in a way that reduces inequalities in order to survive and prosper	291
Increased community cohesion	The willingness of members of a society to cooperate and solve problems between different communities, based on ethnic, faith or cultural divisions	292
Decreased ostracism	Whereby certain individuals or groups are ignored or excluded	293
Increased shared achievements	The experience of accomplishing a goal or act as a group or as the result of a group effort	294
Building integration & resilience		
Reduced marginalisation	Whereby certain individuals or groups are relegated to the sidelines with regards to opportunities and resources and treated as less significant	295
Decreased cultural homogenisation	Whereby two or more cultures are integrated in a way that damages cultural heritage	296
Increased normative multi-culturalism	Whereby society is culturally diverse and accepting in a way that avoids stereotyping and bias	297
Preservation of cultural traditions	The languages, relics, events, rituals and customs that a society shares	298
Increased polyculturalism	Whereby different cultural groups connect with and influence one another in a dynamic way	299
Improved social resilience	The capacity of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change	300
Improved community resilience	The ability of a community to use its available resources to respond to and recover from adverse situations	301
POWER		
Disrupting hierarchies		
Changes in social hierarchies	The system of ranking according to relative status or authority within groups or society	302
Reduced social dominance	Whereby group-based inequalities are maintained through processes of discrimination and behavioural inequality	303
Increased social mobility	The movement of individuals, families, households, or other categories of people within or between social strata in a society	304
Social change	Significant alterations over time in behavioural patterns, cultural values or norms	305
Increased community empowerment	The process of enabling communities to increase control over the factors that shape their lives, increase their assets, build their capacities, and gain control	306
Changes in social power	The available tools and social influence an individual or group has to exert influence over others	307
Increasing cultural evolution	Whereby whole population thinking leads to cultural change	308
Improving equality		
Increase in social justice	Fair and just relationships between individuals and a society, as measured by the distribution of wealth, opportunities for personal activity and social privileges	309
Decreased relative deprivation	The lack of resources to sustain the basic lifestyle or activities that a group is accustomed to within society	310
Decreased area deprivation	An area's potential for health risk as a result of a combination of factors such as poverty, unemployment, social problems or economic disinvestment	311
Increased neighbourhood security	The safety of an area such that individuals living or working in the area do not perceive themselves to be vulnerable to risks or threat	312
Reduced income inequality	The disparity of income distributions within a society (which can be reduced through factors such as the provision of skills and employment to diverse social groups)	313
Reduced social inequality	Unequal opportunities and rewards for different social positions or statuses within a group or society	314
Increased health equity	The absence of avoidable or unfair differences among groups	315

Developing the leisure industry		
Increased leisure industrialisation	The transformation of leisure activities into global industries	316
Increased numbers of jobs within leisure	Opportunities for individuals to have paid work (for example within the leisure industry)	317
Changes in labour market structure	Changes in the supply of labour and the demand for labour as a result of factors such as economic growth and social change (which may be achieved through a growth or change in leisure engagement)	318
Improvements in economic stability & security	Whereby the financial system of a nation displays only minor fluctuations in output growth and exhibits a consistently low inflation rate (which may be achieved through the success of industries such as the creative industries)	316
Development of leisure-related public policies	The process by which governments translate their political visions into programmes and actions e.g. constitutions, legislative acts, and judicial decisions	319

5. Behavioural Processes: in detail

5.1 Micro-level

Mechanism	Definition	Reference
DEVELOPMENT OF HABIT		
Disrupting existing habits		
Disruption of autopilot	A state in which subconscious brain activity regulates our behaviour automatically allowing us to carry out activities or routines instinctively without being fully conscious	320
Discontinuity of habits	Whereby a change in context (e.g. through taking up a leisure activity) leads to a disruption in habits and greater deliberation over actions	321
Disruption of script	Whereby a new activity (e.g. taking up a leisure activity) breaks the power of a previous sequence of expected behaviours	322
Disrupted status quo bias	One's tendencies to stick with whatever options are the current default	323
Reduced psychological reactance to norms	Whereby an individual feels their personal freedoms are being restricted (e.g. through attempts to encourage them to avoid unhealthy behaviours) and therefore engages in an act of anti-conformity	324
Assisting in the formation of new habits		
Operant learning	Whereby rewards or punishments for behaviours (e.g. leisure engagement) lead to an association between a particular behaviour and its consequence	325
Classical conditioning	Whereby neutral stimuli take on an emotional tone by being associated with other powerful stimuli, eliciting a specific response	326
Performing action slips	Whereby one engages in a behaviour based on associate cues without intending to do so (see also automatic behaviour)	327
Formation of habits	Whereby a new behaviour is performed repeatedly in similar circumstances so that cognitive associations are formed between context cues and the behaviour that trigger the behaviour	328
Reinforcement of behaviours	Positive responses to behaviours across other mechanisms of action lead to increases in that behaviour	329
Increased continuity of positive behaviours	Whereby one retains adaptive behaviours as one ages	330
Development of harmonious addiction	Whereby an activity becomes a favourite pastime and the subject of autonomous involvement as a 'passion'	331
BEHAVIOURAL DECISIONS		
Influencing individual choice		
Reduced cognitive dissonance	Whereby there is an inconsistency between our attitudes and behaviours that has to be resolved, often through changes in behaviours	332
Decreased dynamic inconsistency	Whereby our preferences change over time and our future selves and present self have contradictory desires	333
Reduced cognitive bias	A systematic pattern in one's thinking where one deviates from norms or rationality in judgement	334
Reduced disconfirmation bias	Whereby individuals refute or ignore arguments that go against their prior beliefs	335
Increased considerations underlying choice	Whereby decisions are made through comparing the characteristics of the options under consideration (see also multi-attribute utility theory)	336
Increased balancing of outcome expectancies	Whereby one acknowledges both the positive and negative outcomes of engaging in specific behaviours	337
Increased reasoned action	Whereby one's decision to engage in a particular behaviour is based on pre-existing attitudes and behavioural intentions	338
Increased controlled risk-taking	The action of engaging in risky behaviours but in a limited risk setting (such as trying new experiences or taking on new challenges in life that are unlikely to cause harm)	339
Changes in perception of boundaries	The perceived dividing lines between different thoughts, feelings or current or prospective experiences	340
Supporting the prediction of behaviours		
Changes in default effects	Whereby one engages in a behaviour because it is presented as the default option	341
Changes in deadline effects	Whereby the setting of deadlines (e.g. through having leisure activity goals) affects procrastination and choice behaviours (either promoting or reducing these behaviours)	342
Changes in norm effects	Whereby social norms and personal norms guide one's actions. In particular injunctive social norms (the perception of how others approve/disapprove of one's conduct) can guide behavioural change (see also focus theory of normative conduct)	343

Changes in self-fulfilling prophecies	Whereby predictions or expectations come true because an individual believes it will and aligns their behaviour to fulfil those beliefs	344
Changes in behavioural prediction	Whereby one's behaviour follows reasonably from their beliefs	345
Increased response inhibition	Suppression of actions that are inappropriate in a given context and interfere with goal-driven behaviour	346
Enhanced inhibitory control	Whereby an individual inhibits their impulses and dominant behavioural responses to a stimuli in order to select a more appropriate behaviour	347
BEHAVIOURAL DRIVE		
Enhancing behavioural activation		
Unfreezing of behaviours	Whereby one becomes aware of problems with the current situation and accepts the need to make change (see also change theory)	348
Increased initiative	One's ability to independently assess and carry out appropriate actions in a given situation	349
Increased goal setting	As a result of mechanisms relating to motivation, attitudes and subjective norms (see also goal-setting theory)	350
Increased self-activation	Whereby behaviours are activated when values that are seen as a core part of one's self-concept are cognitively activated (e.g. through leisure engagement)	321
Increased self-efficacy	An individual's belief in their ability to succeed in specific situations or accomplish tasks	351
Increased readiness to act	Whereby an individual enters pre-contemplation or contemplation stages that can lead to preparation, action and maintenance of behaviours (see also transtheoretical model)	352
Increased mental simulation	Our mind's ability to imagine taking a specific action and simulating what the probable result will be before acting	353
Increased action tendency	The urge to carry out certain behaviours linked to specific emotions	354
Increased self-determination	One's free choice of one's future actions	355
Decreased ego depletion	Whereby energy for mental activity is limited and if depleted leads to low self-control. Ego depletion can be restored through short-term good mood and long-term building of inner resources and self-regulation	356
Decreased self-sabotaging beliefs	Thoughts that create problems in daily life or interfere with goals such as procrastination, self-injury or negative internal dialogue (see also goal sabotaging)	357
Increasing motivation		
Decreased apathy	A lack of interest, enthusiasm or concern that may be decreased through social connection or behavioural change	358
Increased extrinsic motivation	A desire to engage in activities or behaviours that either reduce biological needs or help us to obtain incentives or external rewards (see also drive theory)	359 360
Increased intrinsic motivation	A desire to engage in activities or behaviours because they are personally rewarding and fulfil our expectations and beliefs	359
Increased expectancy motivation	Whereby the expectation of positive responses increases engagement	361
Increased task-based motivation	Whereby core characteristics of a task are associated with task satisfaction, motivation and engagement (see also job characteristics model)	362
Increased identity-based motivation	Whereby one's identity and self-concept motivates one to take action towards one's goals	363
Reduced fear of failure	Motivation to avoid failure by not doing tasks that are too challenging and finding ways to ensure one does not succeed (see also self-handicapping)	364
Anticipated regret from non-engagement	Whereby the anticipated regret of not engaging leads one to engage further in a behaviour (see also fear of missing out)	365
Increased evaluation apprehension	Whereby we fear the evaluation of others, which motivates behaviour	366
Increased implementation intentions	A self-regulatory strategy whereby an individual plans how and when to engage in a behaviour in order to achieve a specific goal	367
Perception of being given a second chance	An opportunity to try something again after failing	368
Supporting achievement		
Increased sense of reward	Satisfaction or a feeling of profit that results from factors such as learning, emotion and motivation	369
Increased commitment	As a result of an individual making choices that make it more costly for them to make unwanted choices in the future (e.g. signing up to a group performance or paying up front for annual gym membership)	370
Increased perseverance	Persistence in doing something despite difficulty or delay in achieving success	371

Increased goal attainment	As a result of the achievement of one goal (e.g. relating to leisure engagement) leading to the setting and achievement of further goals (see also goal-setting theory)	350
Increased experience of making mistakes	Errors or slip-ups, that can in turn lead to processes of improvement and learning	372
Improved personal competence	An ever-evolving accumulation of related capabilities that facilitate learning and other forms of goal attainment	373
Increased self-actualisation	The realisation or fulfilment of one's talents and potentials	254
Increased generativity	Making one's mark on the world through creating or nurturing things that will outlast oneself	374
BEHAVIOURAL DEVELOPMENT		
Supporting child development		
Improved infant behaviours	Such sleeping, suckling, feeding, cuddling and crying and responses to behavioural cues and interaction	375
Increased social referencing	Whereby a child regulates their behaviour towards environmental objects, people or situations	376
Enhanced school readiness	The academic, attention, and socioemotional skills required for a child to enter school ready to engage in and benefit from early learning experiences	377
Reduced truancy	Absenteeism from school without good reason	378
Improved parenting practices	Behavioural approaches of parents towards children, including monitoring behaviours (parents' awareness of their children's actions), nurturance behaviours (the degree to which parents are supportive of their children), and the consistency of how parents address their children's inappropriate behaviours	379
Increased play	Engagement in activities for enjoyment and recreation rather than a serious or practical purpose (relevant both to children and adults)	380
Supporting behavioural adjustment		
Reduced externalising behaviours	Behavioural problems manifested in outward behaviours such as disruptive, hyperactive, aggressive or anti-social behaviours	381
Reduced internalising behaviours	Behavioural problems that more centrally affect an individual's internal psychological environment including anxiety, withdrawal, inhibition, and over-controlled behaviours	381
Improved development of childhood adaptive behaviours	Such as developing social skills, personal responsibility, cognitive skills and learning how to carry out essential activities of daily living. They can occur as a result of supportive social and environmental factors during child development (ecobiodevelopmental model)	382
Reduced bullying	Repeated oppression, psychological or physical, of another	383
Increased independence	A personality trait in which a person is comfortable and confident acting on his/her own thoughts and feelings	384
PERSONAL LOCATION		
Enhancing a sense of time		
Increased flow	A state in which one becomes absorbed in an activity such that nothing else seems to matter	385
Increased sense of momentum	Impetus and driving force gained through an action or course of events	386
Decreased boredom	An emotional state experienced when one has nothing in particular to do	358
Provision of routine	A regular schedule of actions and events	387
Displacement of time to engage in unhealthy behaviours	Whereby one has less time available to engage in unhealthy behaviours due to less spare time	388
Changes in perception of time	Whereby an individual re-orientates their sense of time for the past, present and/or future	389
Reduced present bias	Whereby one places disproportionate weight on present rather than future concerns (see also hyperbolic discounting)	390
Increased anticipation of forthcoming positive events	Pleasure in considering or waiting for expected events (including leisure events)	
Increased prospection	The act of anticipating, thinking forwards or simulating future events (see also futures thinking)	391
Enhancing a sense of place		
Enhanced sense of place	A social phenomenon whereby one's sense of personal and cultural identity is bound up with place identity	392
Development of a safe space	A place or environment in which an individual feels confident they will not be exposed to any physical or emotional harm, including discrimination, criticism or harassment	393

Increased perceptions of safety	Perceptions of being both protected from harm and unlikely to cause harm to others	394
Enhanced attachment to place	The affective bond between people and place or setting (see also field of care)	395
Changes in place-based behaviour	Whereby a particular place (the behaviour setting e.g. a museum) provides inputs and controls that predict human behaviour in that place	396
Increased local engagement	Whereby engaging in a leisure activity increases the likelihood one will engage in other activities close by as the cost and effort required for these further activities is lower (see also friction of distance)	397
Expanded life-world	The spatio-temporal setting or horizon of one's everyday life as defined in cultural terms	398

5.2 Meso-/Macro-level

Mechanism	Definition	Reference
COOPERATION		
Increasing social control		
Changes in patterns of herd behaviour	The tendency of large groups to conform to group choices (see also informational social influence)	399
Enactment of ritual	Whereby groups perform a series of actions according to a prescribed order (e.g. when engaging in a leisure activity)	400
Changes in social shaping	The modulation of an individual's psychological, biological, social, and behavioural responses to events and circumstances through one's social relationships	401
Changes in social regulation of effort	Whereby one's adaptation to the social environment leads to an expectation of the amount of energy that will be required for tasks, such that changes in the resources available lead to increases in required effort and consequent distress (see also social baseline theory)	402
Changes in levels of territoriality	How people use space (territory) to communicate occupancy or ownership of areas or assets	403
Changes in informed social control	Whereby the reactions of individuals and groups lead to conformity to norms and laws (see also social surveillance)	404
Reduced social strain	Whereby social structures, such as area deprivation, may pressure citizens to commit crimes	405
Building group learning		
Increased social learning	Whereby groups learn behaviours (within and across generations) by observing, imitating and modelling the actions of others	406,407
Reduced bandwagon effect	Whereby the rate of uptake of beliefs, ideas, fads and trends increases the more that these things have already been adopted by others, without individual conscious thought	408
Increased cooperation	The action or process of individuals working together to maximise outcomes for self and others	409
Increased cultural consonance	The degree to which individuals are able to follow behaviours encoded in shared cultural models	410
Increased collective intentionality	The power of minds in a group to be jointly directed at objects, goals, or values through joint attention, shared intention, shared belief and collective acceptance	411
Ecological transition	The shift of roles that occurs over life course, leading to change in a person's behaviour but also affecting the wider environment they interact with	412
Encouraging adaptive group behaviours		
Engagement in collective projects	Whereby individuals work together to achieve something (see also supra-individual projects)	101
Increased active citizenship	The involvement of individuals in their local communities and democracy at all levels	413
Increased collective action	Action taken together by a group with the aim of enhancing their status or achieving a common objective	414
Development of social movements	A type of group action that focuses on specific social or political issues and empowers oppressed groups to mount effective challenges to or resist the status quo (see also social movement theory)	415
Increased political participation	The engagement of individuals in activities that develop and express their opinions on the world and how it is governed and try to shape these decisions	416
Increased sharing of resources	The process of dividing and distributing money, materials or other tangible and intangible assets between individuals and groups (see also distributive justice)	417
Changes in civil unrest	Fighting between different groups of people such as between groups of citizens and their authorities (see also civil disorder or disturbance)	418
Decreased conflict	Active disagreement or fighting between opposing groups	419
Reduced criminality	Behaviour that is contrary to or forbidden by criminal law	420

APPROACHES TO HEALTH		
Increasing social responsibility		
Altered social conception of illness	Changing perception of health conditions from “disease” (something that needs to be cured and is the health professional’s concern) to “illness” (something that needs to be managed and is an innately human experience of symptoms and suffering)	48
Increased assumption of social responsibility	Whereby the development of new roles within society (e.g. as a result of leisure activities) places pressure on individuals to take on responsibilities (see also staffing theory or manning theory)	421
Increased collective responsibility in health	Whereby cooperation between individuals and health professionals leads to greater group engagement in prevention and treatment of illness	422
Increased social accountability towards health	Actions initiated by citizen groups to hold authorities (e.g. public health officials, politicians, and health providers etc) to account (e.g. for delivering health services and improving public health)	423
Increasing health promotion		
Increased collective self-efficacy	A group’s beliefs in its ability to carry out actions successfully	424
Increased structuralist-collectivist health promotion	Health promotion activities that focus on involving the community with health programmes and developing health legislation	425
Improved social-ecological health promotion	Approaches to health promotion that recognise that individuals are embedded within larger social systems an individual, interpersonal, organisational, community and policy level	426
Changes in adaptation behaviours	The strategies adopted at a group level such as planning, budgeting and decision-making to tackle health problems	427
AVAILABILITY OF ASSETS		
Increasing leisure assets		
Increased number of leisure artefacts	The tangible products produced as a result of leisure engagement e.g. artworks, books, performances, gardens and monuments	428
Increased diversity of leisure artefacts	The extent to which leisure artefacts represent and have a relevance to a wide range of groups, cultures and societies	428
Increased number of leisure experiences	The intangible products produced as a result of leisure engagement e.g. performances, festivals, events and stories	428
Increased diversity of leisure experiences	The extent to which leisure experiences represent and have a relevance to a wide range of groups, cultures and societies	428
Increased number of community assets	The number of buildings, monuments or other land of community value e.g. parks, gardens, leisure centres, cultural venues, libraries and other recreational spaces	429
Increased diversity of community assets	The extent to which community assets represent and have a relevance to a wide range of groups, cultures and societies	429
Increased geographical spread of community assets	The distribution of community assets across countries, geographical regions, areas of urban or rural classification, and areas of varying deprivation	429
Increased preservation of community assets	The protection and safeguarding of cultural, heritage and natural sites	430
Increased placemaking	The development of public spaces in way that capitalises on local community assets with the aim of promoting individuals’ health and wellbeing	431
Increasing healthcare assets		
Increased numbers of paraprofessionals	Non-medical professionals who support the delivery of healthcare (including arts therapists, social prescribing link workers, and leisure staff running community health programmes)	432
Increased availability of self-help groups	Groups of people who share a common problem (e.g. illness or addiction) and provide mutual support for each other (see also mutual help, mutual aid, or support groups)	433
Increased availability of leisure-based activities to support health	Leisure activities specifically designed or provided in order to support aspects of mental or physical health	434
Increased referral systems to leisure activities	Such as social prescribing schemes that support the referral of individuals from health and social care professionals to leisure programmes	435

6. Health Behaviours: in detail

6.1 Micro-level

Mechanism	Definition	Reference
ENGAGEMENT IN HEALTHY BEHAVIOURS		
Increasing behaviours relating to the prevention of ill-health		
Increased leisure engagement	Engagement in leisure activities. This can result from mechanisms including learning to engage in leisure activities (see also leisure socialisation)	436
Reduced sedentary behaviours	Behaviours that involve sitting or lying down	437
Increased physical activity	Whereby individuals become more active, increasing behaviours that involve moderate or vigorous exercise or activity	437
Improved sleep	A condition of body and mind in which the nervous system rests and consciousness is largely suspended	438
Increased engagement with behavioural immunogens	Behavioural immunogens (see also health promoting behaviours) include healthy eating, exercise and attending health checks. They can be increased as a result of combinations of mechanisms relating to coping and the perception of the threat (see also protection motivation), combinations of mechanisms relating to perceived risk, benefits, motivation and psychological factors leading to change in health beliefs (see also health belief model), or combinations of mechanisms relating to self-efficacy, goal setting, risk perception and outcome expectancies (see also Health Action Process Approach)	439–441 442
Repeated healthy behaviours	Health-promoting behaviours can become regular as a result of mechanisms involving social bonding, others' behaviour and attitudes, cultural knowledge and values, a sense of self and social competence leading to motivational beliefs, attitudes, self-efficacy and trials of behaviour (see also triadic influence model)	443
Increased responsiveness to health communication	The degree to which one reacts quickly and positively to health messages. This can be enhanced through combinations of mechanisms relating to motivation, cognitive processing, personal beliefs and comprehension (see also elaboration-likelihood model)	444
Increasing behaviours relating to the management of ill-health		
Increased self-management of health	The ability of an individual to look after their own health. This can be enhanced through combinations of mechanisms relating to knowledge and beliefs, self-regulation skill and ability and social facilitation (see also integrated theory of health behaviour change)	445
Increased treatment adherence	The degree to which an individual correctly follows medical advice (see also compliance)	446
Reduced need for medical treatment	Reduced experience of symptoms or health conditions that require medication or other medical intervention, or the better tolerance or management of such symptoms or conditions	446
Avoidance of relapse	A deterioration in one's mental or physical health after a period of improvement. This can be protected against through combinations of mechanisms relating to coping and self-efficacy (see also Marlatt's cognitive behavioural model)	447
Changes in use of health services	Use of healthcare services or spaces can be increased through such engagement becoming the default option e.g. via co-location of leisure activities within healthcare settings (see also nudge theory), or via individuals taking more responsibility for their own health, or could be decreased as a result of healthcare problems being addressed	98
Increased self-protection behaviours	Behaviours that an individual engages in to protect their health. These can be encouraged through combinations of mechanisms relating to planning and implementation intentions (see also precaution adoption process)	448
Provision of informal care	Unpaid care provided to older or dependent individuals by individuals with whom the individual has a social relationship (e.g. family or friends)	449
Developing behaviours to support the delivery of healthcare		
Improved clinical skills	Procedural knowledge, science knowledge and clinical reasoning that enable the development and application of physical examination skills, communication skills, management skills or the execution of practical procedures	450
Improved staff-patient interactions	The quantity (i.e. frequency of contact) and quality (e.g. clarity of communication and compassion) of engagement between healthcare professionals and patients	451

Reduced clinical errors	The failure of a planned action within healthcare to be completed as intended or the use of a wrong plan to achieve an aim	452
Reduced staff burnout	A syndrome that results from chronic workplace stress that has not been successfully managed, involving feelings such as exhaustion, negativity, cynicism, psychological distance from one's work, and reduced job performance	453
DISENGAGEMENT IN UNHEALTHY BEHAVIOURS		
Reducing engagement in unhealthy activities		
Decreased unhealthy behaviours	Engagement in behaviours that are detrimental to health such as poor diet or lack of exercise. These behaviours can be triggered by a perceived dissonance between one's attitudes and one's behaviours (see also post-decisional conflict) or due to attempts to convince oneself that our behaviours are adequate and to ignore behaviours that do not fit our sense of self (see also compensatory health beliefs)	454,455
Decreased problem behaviours	Problems such as anger and aggression. These can be reduced through combinations of mechanisms relating to values, control, social support and socialisation (see also problem behaviour theory)	456
Decreased delinquent or deviant behaviour	Behaviours that violate social norms such as crime or violence. These can be reduced through combinations of mechanisms relating to socialisation, skills and beliefs (see also social development model), or mechanisms relating to negative self-attitudes (see also general theory of deviant behaviour)	457,458
Decreased unsafe sex practices	This includes engaging in sex without protection or putting an individual at risk of sexually transmitted diseases. Unsafe sex can be increased as a result of the normalisation of aggressive behaviour and the alteration of norms governing behaviour (see also disinhibition theory)	459
Decreased screen time	The amount of time spent using devices with a screen such as computers, televisions, smartphones, or games consoles	460
Reducing engagement with substances		
Decreased smoking and tobacco use	Including the smoking of cigarettes, pipes, cigars and e-cigarettes. It can be reduced through combinations of mechanisms relating to status, self-image, personality, physiological reactions and social engagement	461
Decreased drug use	The use of illegal substances or overuse of prescription medication. Drug use can be increased as a result of negative self-attitudes (see also general theory of deviant behaviour)	458
Improved management of addiction	The need for a particular substance or activity. It can be reduced as a result of increased control over negative aspects of withdrawal via emotional mechanisms (see also opponent process theory)	462

6.2 Meso-/macro-level

Mechanism	Definition	Reference
HEALTHCARE		
Influencing healthcare delivery		
Enhanced therapeutic landscapes	The combination of physical, social and human factors within environments to produce an atmosphere that is conducive to health and healing	463
Increased de-institutionalisation	Whereby individuals are cared for in the community rather than in institutions (e.g. hospitals) as much as possible	464
Increased primordial prevention	The prevention of risk factors through changes in social and environmental conditions with a focus on childhood	465
Improved health communication	The practice of communicating health information e.g. through public health campaigns, health education, and doctor-patient interactions	466
Increased availability of person-centred care	Whereby people have choice and control over the way their care is planned and delivered (see also personalised care)	467
Reduced demand for healthcare services	The need and desire for health-related goods or services that result from the desire of individuals to have good health	468
Improving healthcare performance		
Increased recognition of paraprofessionals	The appreciation of non-medical professionals supporting healthcare (including arts therapists, social prescribing link workers, and leisure staff running community health programmes)	432

Disruption of healthcare societies	The rules of behaviour, tradition, language, hierarchies and priorities that can be detrimental to individual or humanised care provision	469
Rehumanisation of health	Whereby healthcare is reconnected with individuals and rewards are based on caring for patients above meeting targets (see also depersonalisation)	470
Development of more compassionate care environments	Whereby care is designed and delivered in a way that seeks to minimise the sufferings or misfortunes of others	470
Enhanced performance & quality of healthcare	Achievement of targets and delivery of high quality care	471
Enhanced mutual recovery	A more fully social understanding of recovery processes, encompassing groups including patients, informal carers, healthcare professionals and paraprofessionals	472
Removing barriers to healthcare		
Reduced health discrimination	The unjust or prejudicial treatment of different groups such as those defined by race, age, disability, religion, sex, gender, illness etc	113
Increased engagement with hard-to-reach groups	Contact and collaborative work with minority populations or those with specialist needs who may find mainstream assistance or healthcare inappropriate or difficult to access	473
Increased conversations about health	Discussions between individuals or groups about symptoms, experiences or actions relating to health	474
Decreased accumulation of health hazards	Exposure to occupational hazards (e.g. pollution, chemicals, ergonomic strain, noise) and social hazards (discrimination, harassment, abuse). Health hazards tends to occur more frequently amongst groups with limited power and resources	475
Decreased clustering of negative health behaviours	The patterning of negative health behaviours as a result of choices made available to individuals being patterned based on factors such as class, gender, and cultural background (see also health lifestyle theory)	476
Reduced health inequities	Unfair differences in health status or the distribution of health determinants arising from avoidable factors such as poor governance, corruption or cultural exclusion	313
Reduced health inequalities	The uneven distribution of health or health resources as a result of a lack of resources or genetic factors	313

7. Literature linking leisure, mechanisms, and health

Mechanism	Literature linking these mechanisms to leisure	Literature linking these mechanisms to health outcomes
Affective States	Mechanisms relating to affective responses have been the subject of an extensive body of research. For example, interventional and observational studies have found changes and associations with various leisure activities in regards to improved mood, affect, and emotion regulation strategies across different population ⁴⁷⁷⁻⁴⁸¹ . These findings have been shown in a number of randomised controlled trials showing increases in positive emotions and reductions in negative emotions ⁴⁸² , and meta-analyses incorporating different study designs showing a relationship between physical activity and positive affect ⁴⁸³⁻⁴⁸⁵ . There is also an extensive body of evidence on leisure activities in regards to psychological stress and anxiety across different groups, including meta-analyses showing reduction in psychological stress and anxiety via music exposure (including music therapy) ^{486,487} , and reductions in anxiety following physical activity ⁴⁸⁸ .	Affective states have been linked directly to mental health and physical health as well as indirectly via other mechanisms such as developing a group self, modifying group emotions, increasing brain activation, changing hormone levels, building capital, and enhancing behavioural activation ^{6,489-491} .
Resilience	Numerous studies have investigated leisure activities in regards to resilience mechanisms. For example, intervention studies have shown increases in resilience after leisure engagement ⁴⁹²⁻⁴⁹⁴ , observational studies have also shown associations between leisure activities and resilience ⁴⁹⁵⁻⁴⁹⁸ , and intervention studies have shown that leisure activities can improve coping ⁴⁹⁹ , although the strongest evidence specifically utilises therapy models in those facing illness ^{500,501} . Numerous studies have also shown how leisure activities contribute to psychological strength, such as vitality ⁵⁰² , with a particularly large body of intervention studies focusing on how leisure-time physical activity increases vitality ⁵⁰³⁻⁵⁰⁶ .	Resilience has been linked directly to mental health and physical health as well as indirectly via other mechanisms such as eliciting affective responses, modifying brain biomarkers, altering immune function, increasing social contact, increasing motivation, and increasing behaviours relating to the prevention of ill health ⁵⁰⁷⁻⁵¹¹ .
Sense Of Self	A large number of studies have investigated leisure engagement in regards to mechanisms of sense of self. For example, mixed-methods systematic reviews have highlighted associations between leisure activities (including creative therapies) and improved self-expression and self-esteem ⁵¹²⁻⁵¹⁴ . Intervention studies have also shown that different leisure activities can improve sense of identity and self-acceptance, with physical activity improving self-concept and self-esteem ^{515,516} , and therapeutic creative activities enhancing self-esteem ^{517,518} . Meta-analyses have found the strongest evidence for leisure-time physical activity in improving self-worth and self-concept ⁵¹⁹⁻⁵²¹ .	Sense of self is linked both directly and indirectly to health, for example via mechanisms such as increasing brain activation, building social learning and traits, building social identity, increasing social responsibility, and building group learning ⁵²²⁻⁵²⁴ .
Personal Transformation	A number of studies have looked at how leisure activities can affect personal transformation. For example, a large number of mixed-method studies have investigated how engagement with leisure activities can be used to understand experiences of one's own narrative and identity, particularly surrounding perceptions of health and illness via creative engagement and literature ⁵²⁵⁻⁵³⁰ . A smaller body of intervention studies have shown that leisure-time physical activity increases personal growth ⁵³¹ and improves self-regulation ⁵³² .	Personal transformation is directly associated with mental and physical health as well as indirectly via other mechanisms such as supporting cognitive and emotional learning, building social learning and traits, influencing individual choice, and increasing behaviours relating to the management of ill health ⁵³³⁻⁵³⁶ .
Flourishing	There is a large body of literature on how leisure activities can enable flourishing. Human flourishing encompasses aspects of meaning, purpose and life satisfaction ⁵³⁷ , so whilst complex to measure, a number of conceptual studies have explored this relationship ^{538,539} . Observational studies have shown associations between leisure engagement and higher ratings of life being worthwhile ⁵⁴⁰ . Additionally, mixed-design evidence syntheses have highlighted how leisure activities promote meaning-making and purpose ^{541,542} , with these findings echoed by conceptual studies ⁵⁴³ and multicultural perspectives	Flourishing is linked with health directly and via a range of other mechanisms such as aiding personal evolution, altering immune function, modulating cardiovascular factors, building capital, enhancing behavioural activation, supporting achievement and reducing engagement in unhealthy activities ⁵⁴⁸⁻⁵⁵² .

	⁵⁴⁴ . Systematic reviews of observational studies have also shown associations between different leisure activities and life-satisfaction ^{545,546} , mirrored by intervention studies also showing improvements ⁵⁴⁷ .	
Psychological Capabilities	A large body of evidence has investigated at how leisure activities are related to mechanisms of psychological capabilities, with substantial research related to improved cognition and cognitive processes. For example, a number of observational studies have looked at how leisure engagement is associated with reduced cognitive decline and the maintenance of cognitive reserve ⁵⁵³⁻⁵⁵⁶ , which is supported in part by a number of meta-analyses, particularly for physical activity ⁵⁵⁷⁻⁵⁵⁹ . Additionally, there is also some research for leisure activities supporting mechanisms such as divergent thinking ⁵⁶⁰⁻⁵⁶² .	Enhanced psychological capabilities are associated directly with health as well as indirectly via mechanisms such as developing autonomy, activating perceptual processes, improving physical function, catalysing social actions, supporting social bonding, building group learning, and improving healthcare delivery ⁵⁶³⁻⁵⁶⁷ .
Psychological Resources	There is a large body of research on how leisure engagement can build psychological resources. For example, a particularly well-evidenced area is health literacy and understanding of health via engagement with leisure-based activities, supported by an array of mixed-methods intervention studies ⁵⁶⁸⁻⁵⁷³ . As further examples, meta-analyses have explored more specific activities and types of health literature, such as studies showing a relationship between storyline engagement and sexual health literacy ⁵⁷⁴ . There is also an extensive body of literature that has explored how leisure participation is embedded within and contributes to different forms of capital ⁵⁷⁵⁻⁵⁷⁹ .	Psychological resources are directly linked to health outcomes as well as being linked indirectly through effects on other mechanisms such as building identity, reducing load, disrupting hierarchies, building capital, increasing health promotion, increasing healthcare assets and developing behaviours to support the delivery of healthcare ^{580,581} .
Group Mind	Overall, group-level psychological processes have received less attention than many of the individual-level processes discussed. However, a number of studies have researched leisure engagement in relation to mechanisms of group mind. For example, qualitative analyses have reported that group leisure activities can build collective sense, through themes such as shared responsibility ⁵⁸² , fieldwork reflections have highlighted the interplay between leisure and collective consciousness in respect to ethnic minority groups ⁵⁸³ , and an observational study has reported that cultural consonance related to leisure activities is an important aspect of leisure satisfaction ⁵⁸⁴ . Research has also explored sense-making via leisure engagement through interactions with one's environment ^{585,586} .	Group mind is associated with other mechanisms such as supporting changing identity, building general resources, supporting social cohesion, encouraging adaptive group behaviours, and improving healthcare performance ^{102,587-589} .
Group Attitudes	Numerous studies have explored leisure activities in relation to mechanisms of group attitudes. For example, a number of intervention studies have shown how leisure-based activities can help to reduce stigma and negative stereotypes within different contexts ^{590,590-593} . There is also a number of intervention studies that have looked at how leisure-based activities used within clinical settings can contribute to increased satisfaction with healthcare ⁵⁹⁴⁻⁵⁹⁸ .	Group attitudes can affect health through mechanisms such as changing hormone levels, modulating brain biomarkers, supporting social bonding, improving equality, increasing social responsibility, and removing barriers to healthcare ⁵⁹⁹⁻⁶⁰² .
Language	There is a large body of literature on leisure activities in regards to mechanisms of group communication and group emotions. Much of the work in this space is theoretical and conceptual, based on observations. For example, studies have discussed the role of music and the arts in building collective effervescence ^{603,604} and community resilience ⁶⁰⁵ . Observational studies have reported how music is associated with the formation of collective memories ⁶⁰⁶ , how attending music festivals is related to the building of collective emotion and collective effervescence ⁶⁰⁷ , and how physical activity can support collective effervescence ⁶⁰⁸ . But there are also some preliminary intervention studies, such as showing how leisure activities can help in collective recovery from trauma ⁶⁰⁹ .	Language has been shown to affect health through activating mechanisms including supporting emotional learning, eliciting affective responses, supporting emotion regulation, supporting social bonding, building social identity, and supporting achievement ⁶¹⁰⁻⁶¹² .
Nervous System	There is a large body of experimental research demonstrating associations between leisure activity interventions such as exercise ⁶¹³ mindfulness ⁶¹⁴ and music ⁶¹⁵ and changes to	Activities within the nervous system have been linked either directly to health or indirectly to other mechanisms such as eliciting affective

	neurophysiology, and many observational analyses have further found associations between creativity and neurophysiology ⁶¹³⁻⁶¹⁹ . Diverse nervous system mechanisms activated by music ^{620,621} , arts ⁶²² , socialising ⁶²³ , exercise ^{624,625} , dance ⁶¹⁸ and spirituality have been summarised in a range of reviews and theory articles ^{626,627} .	responses, improved sensory perception, supporting cognitive learning and cognitive processes, influencing individual choice, increasing motivation, and modulating cardiovascular and metabolic factors ^{171,623,628,629} .
Endocrine & Immune Systems	There is a substantial literature reporting links between leisure-related interventions such as singing or concert attendance ⁶³⁰⁻⁶³² , art making ⁶³³ and competitive games ⁶³⁴ and changes to stress hormones. In addition, multiple leisure activities have been shown in intervention studies to affect cytokine responses ^{635,636} and social leisure activities have been associated in observation studies with changes to immune gene expression ⁶³⁷ . These findings have been summarised in a number of review publications ^{622,624,627,638,639} .	Endocrine and immune responses have been linked to mental and physical health directly as well as via wider mechanisms such as eliciting affective responses, enhancing social engagement, enhancing behavioural activation and increasing behaviours relating to the prevention and management of ill health e.g. ⁶⁴⁰⁻⁶⁴⁶ .
Cardiometabolic System	Leisure activity interventions have been shown to affect cardiometabolic factors, such as improved cardiac output ^{647,648} , vagal tone ^{649,650} and reduced arterial stiffness ⁶⁵¹ . These findings are supported by a number of longitudinal observational studies ⁶⁵²⁻⁶⁵⁴ . In addition, some reviews articles have synthesised evidence between features of leisure such as socialisation ⁶⁵⁵ , music ⁶⁵⁶ or spirituality ⁶²⁷ and improved cardiometabolic health. Improved cardiometabolic outcomes have been additionally summarised in systematic reviews of arts interventions ⁶³⁸ .	Cardiometabolic factors have been shown to affect health directly and via other mechanisms including supporting emotion regulation, building social identity, enhancing behavioural activation, and reducing engagement in unhealthy behaviours and via body composition and associated physical and psychosocial health ^{171,657-664} .
Performance	A small number of randomised control trials have found links between leisure interventions and physical performance, especially in older people ^{665,666} . These are supported by a number of systematic reviews of mixed observational and interventional evidence for leisure activities such as music ⁶⁶⁷ , singing ⁶⁶⁸ and physical activity ⁶⁶⁹ across all age groups. In addition, a number of systematic reviews of leisure interventions have been conducted for outcomes such as frailty ⁶⁷⁰ and general physical performance ^{671,672} . Volunteering interventions have also been reported to improve performance in older adults ^{673,674} .	Physical performance is often considered a measure of physical health outcomes as well as being linked with a range of health conditions ^{638,667,675,676} . Further, physical performance is related to other mechanisms including enhancing meaning in life, building psychological strength, supporting cognitive processes, building social identity, improving equality, supporting the prediction of behaviours, and increasing social contact ⁶⁷⁷⁻⁶⁸⁰ .
Multi-System	Whilst intervention studies are limited, several cross-sectional observational studies have identified associations between multisystem biological responses and leisure. This includes studies on epigenetic systems such as histone modification and leisure ⁶⁸¹ , and telomere length and leisure time physical activity ⁶⁸²⁻⁶⁸⁴ , meditation ⁶⁸⁵ and green space exposure ⁶⁸⁶ . Longitudinal studies have further identified observational associations between improved allostatic load and leisure time physical activity ^{687,688} and socialising ⁶⁸⁹ .	Multi-system responses have been associated with a range of health outcomes and other mechanisms including through supporting coping, altering immune function, improving physical function, altering generational transmission, encouraging adaptive group behaviours, and reducing engagement in unhealthy activities ^{213,215,220,690-693} .
Environmental Diversity	Whilst much of the research in this area focuses on the health benefits of green spaces instead of links between leisure and environmental biodiversity, a few case studies have observed improved community level biodiversity from both public and private horticulture interventions ^{694,695} and some articles have reviewed theories and observational evidence on how leisure may be associated with local and global environmental diversity ⁶⁹⁶⁻⁶⁹⁸ . In addition, many leisure activities occur outdoors, so a range of observational analyses have found associations between leisure activities, such as cycling and walking, and increased exposure to nature and green spaces ⁶⁹⁹⁻⁷⁰¹ .	A broad literature of review articles ⁷⁰²⁻⁷⁰⁸ and number of intervention studies ⁷⁰⁹⁻⁷¹¹ have linked exposure to green spaces or improved biodiversity to physical and mental health directly, as well as via mechanisms such as improved health behaviours ^{698,712-714} and social capital within neighbourhoods ^{696,703} .
Disease Susceptibility	Observational analyses have found longitudinal associations between leisure time physical activity and non-communicable diseases ^{715,716,717} , disease clusters ⁷¹⁸ , and mortality ^{719,720} . In addition, much theoretical work has framed arts and cultural activities as evolutionarily advantageous ⁷²¹⁻⁷²³ . However, this area of research remains less well developed than for many of the other mechanisms.	There is a direct link between disease patterns, disease transmission and health, as well as indirect links via mechanisms such as changing hormone levels, altering immune function, modulating cardiovascular and metabolic factors, changing exposure, affecting genetic and epigenetic factors, and changing behaviours

		relating to the prevention and management of ill health ⁷²⁴⁻⁷²⁸ .
Social Activity	Observational studies have found associations between social activity outcomes in young people, such as reduced antisocial behaviours ⁷²⁹ , crime ⁷³⁰ and improved social and academic engagement ⁷³¹ and leisure activities. Other observational studies have identified associations between volunteering and pro-social attitudes ⁷³² and between art-making and civic engagement ⁷³³ and pro-sociality ⁷³⁴ . A number of papers have reviewed theory and observational evidence for leisure and social activity ⁷³⁵⁻⁷³⁸ . Although interventional evidence is limited, exposure to pro-social song lyrics has been shown to promote sociality ⁷³⁹ and leisure interventions have been linked to social activity in children with autism ⁷⁴⁰⁻⁷⁴² .	Social activity is related to health directly and via mechanisms such as supporting coping, building general resources, altering immune function, modulating cardiovascular factors, increasing positive exposures, supporting the prediction of behaviours, increasing social control, reducing engagement in unhealthy activities, and improving healthcare performance ⁷⁴³⁻⁷⁴⁹ .
Social Relationships	A number of intervention studies have shown that leisure engagement can increase social engagement and quality of social relationships ⁷⁵⁰⁻⁷⁵² and these effects are supported by some systematic reviews of interventions ^{694,694} . In addition, there are a range of observational ⁷⁵³⁻⁷⁵⁵ and many theoretical publications in this area ^{621,622,625,638} , which suggest similar findings.	Social relationships are linked to health in a number of ways including through changing hormone levels, modulating cardiovascular factors, supporting emotion regulation and coping, supporting achievement, and increasing behaviours relating to the prevention of ill health ^{240,655,756-758} .
Learning And Traits	There is a significant body of literature on how leisure activities can build learning and traits (in both children and adults), including systematic reviews, multiple qualitative studies and case studies, and experimental studies ^{638,759-769} . For example, intervention studies have shown arts and leisure programmes can improve social skills and participation in adolescents with brain injuries, and decreased hyperactivity and problem behaviours in children, as well as improved motor skills ^{759,762,770} .	Social and cultural learning are related to health outcomes via mechanisms such as building identity, supporting cognitive and emotional learning, activating perceptual processes, improving voice, enhancing social engagement, encouraging adaptive group behaviours, and removing barriers to healthcare ⁷⁷¹⁻⁷⁷⁵ .
Social Resources	Many observational studies have suggested associations between leisure activities can increased social resources ⁷⁷⁶⁻⁷⁸⁰ and this work is reported in a number of review articles ⁷⁸¹ . This area has been discussed extensively in theoretical publications too ⁷⁸²⁻⁷⁸⁵ . However, there are limited intervention studies.	Social resources have been linked directly with health as well as indirectly via affecting mechanisms such as building identity, changing exposure, altering brain physiology, catalysing social actions, supporting behavioural adjustment, increasing health promotion, building group learning, increasing healthcare assets, and influencing healthcare delivery ^{784,784,786-791} .
Group Strength	There is a growing literature on how leisure engagement can build group strength and group cohesion, including ethnographic, qualitative-interview, and intervention studies ^{638,792-801} . For example, mixed methods intervention studies have found increased sense of group cohesion, social support and sense of community experienced through group leisure ⁷⁹⁴⁻⁷⁹⁶ . Theoretical work has explored how 'focal practices' such as singing in a choir might contribute to enhanced group strength ⁷⁹² .	Group strength can affect health through mechanisms such as building general and health-related resources, decreasing negative exposures, affecting disease patterns, building capital, building group learning, increasing social control, encouraging adaptive group behaviours and reducing engagement in unhealthy activities ^{790,802-804} .
Group Power	There is a small but growing literature on how leisure activities can enhance group power, especially within ethnic studies and feminist literature. This includes mostly in-depth qualitative studies alongside also some observational studies ⁸⁰⁵⁻⁸¹³ . However, to date there is a paucity of intervention studies on these mechanisms.	Factors relating to power are linked to health in a number of ways, including through reducing stigma, changing attitudes to health, increasing social responsibility, increasing health promotion, influencing healthcare delivery and improving healthcare performance ⁸¹⁴⁻⁸¹⁷ .
Development Of Habit	A number of studies have shown how leisure engagement can affect the development of leisure-specific habits and thus longer-term leisure engagement. Most of these are observational studies including longitudinal analyses and cross-sectional studies ⁸¹⁸⁻⁸²⁴ , but early results from intervention studies including several randomised control trials (especially those addressing specific conditions such as contextual repetitions, cues and scripts) also find increases in habit formation after leisure activity interventions ^{822,825-827} .	The development of habits is associated directly and indirectly with health outcomes, including through supporting emotion regulation, developing autonomy, modifying arousal, modulating brain biomarkers, catalysing social actions, enhancing behavioural activation, influencing individual choice, encouraging adaptive group behaviours, and increasing behaviours relating to the prevention and management of ill health ^{823,828-832} .

Behavioural Decisions	There has been some research on leisure and behavioural decisions, especially focusing on the prediction of behaviours, mediated via enhanced inhibitory control, offsetting of delayed neural timing, and physiological effects. This is supported through numerous intervention studies, which demonstrate reductions in aggressive and agitated behaviour and increases in cooperation ⁸³³⁻⁸³⁶ . Experimental studies examining the impact of music listening on the pre-frontal cortex have also reported behaviour is affected by enhanced learning and implementation of inhibitory control ^{837,838} . Further, systematic reviews have suggested active leisure engagement can reduce adolescent risk behaviours ⁸³⁹ .	Behavioural decisions have been related to health outcomes via mechanisms such as supporting emotion regulation, building identity, supporting overarching cognitive processes, changing attitudes to health, increasing brain activation, changing exposure, improving equality, enhancing behavioural activation, encouraging adaptive group behaviours, developing behaviours to support the delivery of healthcare, and influencing healthcare delivery ⁸⁴⁰⁻⁸⁴⁵ .
Behavioural Drive	Aspects of behavioural engagement have been researched in relation to leisure in a number of studies, including cross-sectional studies demonstrating leisure activities can improve school achievement ⁸⁴⁶ , and qualitative interview studies showing leisure activities can enhance generativity and inter-generational bonding ⁸⁴⁷ . A growing number of intervention studies are now demonstrating leisure activities such as music, physical activity and virtual reality can enhance goal orientation and intrinsic motivation ⁸⁴⁸⁻⁸⁵¹ . Longitudinal analyses also seem to support these findings ^{852,853} . However, there has been more of a focus on how to motivate leisure engagement rather than how leisure engagement could motivate individuals in other aspects of their lives or support wider achievement.	Behavioural drive has been associated with health both directly and via mechanisms such as developing autonomy, building general resources, modifying arousal, modulating brain biomarkers, catalysing social actions, enhancing social engagement, and increasing behaviours relating to the prevention and management of ill health ⁸⁵⁴⁻⁸⁵⁷ .
Behavioural Development	There is a large literature on how leisure activities can support behavioural development in children, comprising experimental ^{545,625,858-861} and observational studies ^{545,625,862-864} . But systematic reviews and meta-analyses of physical leisure activity in children found less research to date on behavioural mechanisms ^{545,625} .	Behavioural development is itself associated with health both directly and via mechanisms such as building identity, building psychological strength, altering brain physiology, building social learning and traits, enhancing behavioural activation and supporting achievement ⁸⁶⁵⁻⁸⁷⁰ .
Personal Location	A wide range of leisure activities have been found to affect a sense of time and place, most commonly researched through qualitative studies, longitudinal and secondary data analyses ⁸⁷¹⁻⁸⁷⁹ . For example, cross-sectional studies have reported that leisure activities can improve mental health by providing a sense of daily structure and enhancing individuals' sense of spending their time effectively ⁸⁸⁰ . However, to date there is limited data from intervention studies on these mechanisms, although leisure activities have been shown to positively impact participants' relationship with the past and future amongst individuals struggling with addiction ⁸⁸¹ .	Personal location has been shown to affect health via mechanisms such as building identity, enhancing meaning in life, modifying arousal, changing exposure, building social identity, assisting in the formation of new habits, and increasing behaviours relating to the prevention of ill health ⁸⁸²⁻⁸⁸⁷ .
Cooperation	Leisure activities have been shown to be associated with multiple aspects of cooperation. Longitudinal and qualitative studies have suggested this is mediated through enhanced social capital, trust and sense of community and reductions in anti-social behaviour and social isolation ^{404,737,888-892} . There are a small number of intervention studies on these mechanisms, demonstrating exercise classes can enhance mutual support and group cohesion ^{795,893} .	Cooperation is associated with health via mechanisms such as developing group values and understanding, changing attitudes to health, changing communication, building capital, increasing motivation, increasing health promotion, increasing behaviours relating to the prevention and management of ill health, and removing barriers to healthcare ⁸⁹⁴⁻⁸⁹⁸ .
Approaches To Health	There is a growing body of largely qualitative studies and quantitative survey data showing that the leisure industry and particular leisure programmes can alter behavioural processes relating to health ⁸⁹⁹⁻⁹⁰⁵ . However, longitudinal and intervention studies are scarce.	Behavioural processes relating to approaches to health are linked directly to health outcomes as well as indirectly via mechanisms such as building psychological strength, building general and health-related resources, reducing load, improving physical function, building power, improving equality, and influencing healthcare delivery ⁹⁰⁶⁻⁹⁰⁹ .
Availability Of Assets	Whilst evidence - largely from secondary data analyses - has shown a link between leisure engagement and both leisure and healthcare assets ⁹¹⁰⁻⁹¹³ , these mechanisms remain less well researched.	Increased availability of leisure assets has been linked with health via mechanisms such as eliciting affective responses, supporting group cohesion, developing the leisure industry, increasing social responsibility, and increasing

		behaviours relating to the prevention of ill health 914-916
Engagement In Healthy Behaviours	There is a substantial literature on how leisure activities can increase healthy behaviours. This includes large cohort studies that demonstrate associations between leisure activities and remaining active in later life, medication adherence, better sleep quality and adolescent healthy behaviours ⁹¹⁷⁻⁹²⁰ . Cross-sectional data also supports this, for example finding associations between leisure in green spaces and general health ^{921,922} . Ethnographies and intervention studies also provide evidence for the use of leisure activities such as arts and music to enhance healthy behaviours ⁹²³⁻⁹²⁶	Health behaviours are all strongly related to mental and physical health outcomes ^{927,928} .
Disengagement In Unhealthy Behaviours	A large number of mostly cross-sectional studies have suggested that certain types of positive leisure engagement are associated with protection against engaging in unhealthy behaviours, such as anti-social behaviour ^{862,917,929-934} . There is a small but growing body of evidence from intervention studies on these mechanisms, for example through arts, music and physical activity programmes decreasing problem behaviour and sedentary activity ^{833-835,935} .	Maladaptive health behaviours are also strongly related to mental and physical health outcomes ^{928,936} .
Healthcare	Multiple reviews involving mainly intervention and qualitative studies have shown how leisure can affect healthcare delivery and performance, for example by utilising leisure activities (such as music and arts) in healthcare spaces, or utilising leisure spaces (such as museums and parks) for healthcare delivery ⁹³⁷⁻⁹⁴⁵ .	The delivery and performance of healthcare is strongly linked with health outcomes ⁹⁴⁶⁻⁹⁴⁹ .

8. Factors that can predict leisure engagement or moderate the mechanisms linking leisure activities with health

Whilst remembering that boundary between leisure activities and their context is blurred⁹⁵⁰, it is helpful to consider which factors could affect leisure participation and/or moderate the activation and impact of any mechanisms. A summary of these is presented below.

Micro-level	<i>References:</i> 951-954 955
CAPABILITIES	
Psychological capabilities	E.g. personality traits, attitudes, cognitive abilities and mental health
Physical capabilities	E.g. physical health, physical ability, and biological predispositions
OPPORTUNITIES	
Physical opportunities	E.g. early life exposure to leisure, socio-economic resources, education
Social opportunities	E.g. education, family engagement with leisure
MOTIVATIONS	
Automatic motivations	E.g. likes and dislikes, individual talent, perceptions of benefits, and previous childhood and adulthood leisure patterns
Reflective motivations	E.g. preconceptions or beliefs about leisure, self-identity and goals
Meso-level	<i>References:</i> 240,951-953 884
SPACE & PLACE	
Access to leisure	E.g. the quantity, quality, diversity and accessibility of activities available
Physical environment	E.g. green spaces, community spaces, play areas, climate, pollution and natural resources
Infrastructure	E.g. education, transport, street cleaning, lighting, policing, health services and welfare services, housing, employment and area deprivation
PEOPLE	
Social networks	E.g. frequency of social contact, extent of reciprocity within social relationships, and the types of social transactions and support
Social influence	E.g. norms and values, social cohesion, peer pressure and social comparisons
Community culture	E.g. community integration, levels of crime, threats to personal safety, networks of community support, and the political, ethnic, economic and religious history of a community
Macro-level	<i>References:</i> 240,951-953
Socio-economic factors	E.g. employment, inequality, conflict, poverty, economic stability, and the structure of the labour market
Cultural factors	E.g. discrimination, racism, sexism and equal opportunities
Political factors	E.g. power, agendas, laws, tariffs, policies and restrictions

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