The Restorative Power of Natural and Built Environments

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Abstract

This thesis explores the relationship between environmental affect and mental health using restorative theory as an organising framework. Environmental affect can be described as how the physical environment (home, park etc) and social context (being with a friend) influence emotion and thereby various activities and outcomes. Three types of psychological experiences are explored, theoretically grouped under the rubric "restorative": discrete (short-term) psychological restoration, instoration (longer term strengthening of internal resources) and person-environment fit conceptualised as niche environments supportive of 1) personal goals and 2) mood regulation. Mixed research methods (qualitative and quantitative) were used to elicit the affective dimensions of different settings (natural vs. built-external vs. built-internal) across several different groups within the population. A key aim was to explore whether restorative experiences would differ between settings in adults and young people with and without mental health problems.

Five studies are presented, each exploring one or more aspect of the three part restorative framework outlined above, with one additional study focusing on social restoration. Two aspects of psychological restoration are examined: firstly, mood and secondly, cognitive reflection (defined as "changes in perspective" on life tasks over time[1]) using personal project analysis (Little 1983).

Evidence of discrete restoration: the research supports existing empirical evidence linking activity in natural settings with mood restoration and adds to the evidence base by showing the benefits also extend to manageability of life tasks. New evidence is provided showing people with variable mental health differ in their potential for restoration, both in terms of the intensity of the experience and in response to the places in which the process occurs. People with poor mental health experienced more intensive restoration in a natural setting, but also responded more favourably to the urban setting than people without mental health problems. Natural settings promoted a mental equanimity[2] across individuals with variable mental health as compared to the built setting where group outcomes diverged.

[1]For simplification this is referred to as "mindset" in the research

[2] A levelling out of mood differences

Evidence of instoration; the research supports the notion that activity in green settings can sustain longer term instorative benefits in adults and young people with mental health problems including increased capacity for trust and recollection, exploratory behaviour and social cohesion.

Evidence of person-environment fit:

a. **niche environments supportive of mood regulation**: the research extends existing evidence by showing natural and built settings support the continuum of good mood as well as the negation of bad mood in young people.

b. **niche environments supportive of personal goals**: natural settings support age specific needs in young people for new experiences and community cohesion (in the form of societal projects), two dimensions supportive of well-being. Affect was found to be a significant discriminator between settings with positive affect aligned with the natural environment.

Conclusions: results are consistent with a restorative effect of landscape and suggest differing states of mental health moderate in restorative processes. The research has also shown that the built environment is potentially restorative amongst certain health groups. The affective quality of environments varies and the 'personal project' research has shown the potential impact on well-being. Items flagged for further research include firstly, the need for further evidence on the relationship between the challenge of green activity and self-esteem in poor mental health groups; and secondly, the need to identify exactly what aspects of the built environment cause restorative differences to occur (i.e. the social context v. physical).

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[3] Forests, Trees and Human Health and Wellbeing

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Key to Acronyms and Abbreviations

A	Anger variable (UWIST MACL)
COREC	Central Office for Research Ethics Committee (NHS)
CEI	Curiosity and Exploration Inventory (Kashdan et al 2004)
BIC(LL)	Bayesian Information Criterion (LL) log- likelihood
DVD	Digital Video Disc
EA	Energetic Arousal variable (UWIST MACL)
GMH	Good Mental Health
GP	General Practitioner (family doctor)
HT	Hedonic tone variable (UWSIT MACL)
ID	Identity
MHF	Mental Health Foundation
NEF	New Economics Foundation
NHS	National Health Service
NVivo	Non-Numerical Unstructured Data Indexing Searching and Theorizing
P	Personal project indicator
PMH	Poor Mental Health
QDA	Qualitative Data Analysis
SPSS	Statistical Package for the Social Sciences
TA	Tense Arousal (Stress) variable (UWIST MACL)
T1	Time 1
T2	Time 2
UNICEF	United Nations International Children's Emergency Fund (now United Nations International Children's Fund)
UWIST	University of Wales Institute of Science and Technology (MACL) Mood Adjective Checklist (Mathews et al 1990)
v	versus
WHO	World Health Organisation
YP	Young People
ZIPERS	Zuckerman's Inventory of Personal Reactions or Feelings (1977)

Common statistical abbreviations

ANOVA	Analysis of Variance
df	Degrees of freedom
F	F ratio (ANOVA test statistic)
GLM	General Linear Model
H	Kruskal-wallis test statistic
n	number in sample
ns	non-significant statistical result
NEGD	Non Equivalent Group Design
p	Statistical significance
r	correlation coefficient (Spearman's)
SD	sample standard deviation
SE	standard error
T	Wilcoxon's test statistic
U	Mann-Whitney test statistic
z	standard score
<	less than
*	denotes statistically significant results <0.05

Chapter 1: Introduction

The focus of this PhD is the emotional intersection between people and environment and the implications this has for mental health. To date, the study of space and affect has been predominantly undertaken in geography and anthropology, rather than spatial design professions; questions of emotion in the built environment have been largely neglected by traditional design methods focusing on form and function. One aim of the PhD was therefore to explore affective reactions to space, in both natural and built contexts, and to explore how this impacts on mental well-being. Since emotion operates at a largely "hidden", sub-conscious level the thesis has taken an expansive multi-methods approach combining established psychological tests with new and innovative methodologies designed to elicit the affective qualities of space. This relationship has been explored in several different groups within the population and in a variety of guises, using restorative theory as the main theoretical framework. It is known that natural landscapes can help promote physical and mental health and that people's responses vary: for example, lower socio-economic groups, elderly people, young people (YP) and higher-educated individuals report better perceived general health from the presence of neighbourhood green areas in cities than other groups (Maas et al 2006); men's potential for restoration in a residential leisure context (Sweden) is greater than women's (Hartig and Fransson 2009). But these are isolated studies and there is little empirical evidence on the different potential for restoration in specific population groups and in relation to specific mental health disorders.

The World Health Organisation (WHO) has predicted that depression will create the second greatest burden of disease by 2020, requiring cost-effective prevention and intervention strategies. Two identified low-cost strategies for improving mental health are as follows. Firstly, exercise, which has been identified as an intervention for the prevention and treatment of depression (Donaghy 2007). Owing to a substantive evidence base this strategy is being increasingly prescribed by General Practitioner's (GP) for patients with mild to moderate depression[4] (Mental Health Foundation (MHF) 2008). In response, exercise referral schemes are increasing in the UK, particularly opportunities for organised recreational walking, which forms one focus of the thesis. Secondly, contact with nature

[4] GP referral of patients to exercise programmes has increased 17% over three years.

has been identified as an intervention for promoting mental health indirectly in the form of physiological, cognitive and affective restoration. Researchers have now begun to explore the synergistic effect of these interventions (Pretty et al 2005) but to date there is little evidence of the effects of setting on mental health. This thesis therefore focuses on restorative outcomes of activity in different settings across the age spectrum in groups with varying mental health needs. By quantifying affective and cognitive outcomes and synthesising findings with qualitative data the research aims to add to the growing evidence base of nature's impact on mental health.

This chapter, firstly, reviews evidence of the relationship between landscape and mental health, secondly, it identifies current mental health issues and explores the notion of emotion as a health resource and, thirdly, it introduces the theoretical framework defining several concepts of restoration underpinning the study. Fourthly, it sets out the main research questions, defining the methodology and study framework.

1.1 Landscape and mental health

My interest in affective space grew from earlier research into the effect of interior healthcare settings on patient well-being (Dalke et al 2006). Hospital environments are possibly charged with more emotion than any other and internal ambience and atmosphere were found to aid patient recovery and improve the well-being of staff. However, in the hospitals audited as part of this research, landscape design was often an afterthought and patient access to the outdoors non-existent. Mindful of Ulrich's (1984) landmark study on the positive effects of a green view from a hospital window on patient recovery, many healthcare practitioners were keen for further evidence and design guidelines on how best to integrate landscape into healthcare settings. A particular challenge identified was in the design of secure psychiatric units where mobility outdoors is often restricted.

Historically, psychiatric medicine has drawn on landscape as an intervention in the treatment of mental illness, from as early as the 8th century. The very first psychiatric hospitals built in the Islamic world employed pioneering humanistic methods way ahead of their time; outdoor courtyards accommodated water therapy (in the form of fountains) and performance, storytelling and music therapy. In the Western world, psychiatric hospitals

were historically located in distant rural (inconspicuous) locations intentionally located away from urban areas in order to segregate mental health patients from the rest of the population. These rural locations offered scope to practice the Victorian moral concept of "taking the air", an idea believed to promote better behaviour and health. In the 19th century, exercise and farm therapy were prescribed in some of the first psychiatric hospitals in the USA. Bralleboro Retreat, Vermont (1834), was one of first psychiatric hospitals to utilise the natural landscape in treating mentally-ill patients including outdoor exercise and horticultural therapy; it was unique in incorporating a swimming pool, gymnasium, tennis courts and self-sufficient diary farm. A later example from the UK is High Royds Psychiatric Hospital, Yorkshire (1888), integrating four separate farms, a lavish ballroom, church, bakery and shops in an attempt to replicate a "real-world" environment.

The emergence of landscape as possible intervention in the treatment of mental illness was partly accidental. In 1901, due to overcrowding, the New York Asylum for the Insane was forced to set up tents on its lawn to house the overflow of psychiatric patients. Five years later, after an earthquake, mental health patients of San Francisco's Agnew Asylum and Napa State Psychiatric Hospital, California, were temporarily re-homed in outdoor tents (see fig 1.1 below). In all three examples, it was reported that this accidental "tent therapy" led to improved social interactions, improved co-operation and reduced symptoms of mental illness (Caplan, 1967, Lowry 1974). When patients were moved back into the reconstructed hospitals, behaviour and symptoms deteriorated again.

Fig 1.1: Housing of mental health patients in temporary tents, San Francisco's Agnew Asylum, 1906 (www.oac.cdlib.org)

Much of this anecdotal evidence on the benefits of being outdoors appears to have been overlooked in recent years. Current mental healthcare policy now focuses on social integration and the relocation of hospitals to city-centre locations. An example is Barrow Mental Hospital in Bristol, which relocated from a forest to an urban location in 2006; the hospital now sits opposite a supermarket and patients have reported missing the forest setting (Hospital Design, 4 January 2007). Will these new urban healthcare settings potentially impact on the effectiveness of psychiatric medicine over time? And is there a case for integrating nature into the design?

In the last 20 years a growing body of evidence suggests that experiencing nature – either passively or actively – can contribute positively to mental and physical health. Evidence of a direct epidemiological link between nature and health is limited to a handful of studies using health indicators that include: mortality (Takano et al 2002) with a particularly strong relationship to mortality from circulatory disease where stress and lack of physical activity may have causal roles (Mitchell and Popham 2008); self-reported health and symptom referral (de Vries 2003); prescriptions rates for anti-depressants (Hartig et al 2007b). Evidence of indirect health benefits (such as the recovery from stress and fatigue) is more substantive and has been directed by two complementary but distinguishable areas of research: research on restorative environments focusing on the mental-health benefits of nature and active-living research focusing on physical health and the associations of exercise (walking, cycling) with green space. Each of these research contexts is outlined in general terms below; literature specific to a particular subject of the thesis (children with behavioural problems, for instance) is reviewed within the relevant thesis chapter.

1.1.1 Research on restorative environments

In the literature, the term “restorative” is used to define psychological restoration from low mood, fatigue and stress. These are termed “indirect” health mechanisms since they promote health via intermediary mechanisms. Stress, for example, is linked with increased cardiovascular disease, anxiety disorders and depression; processes that relieve stress therefore indirectly benefit physical and mental health. This thesis is interested in the concept of emotion as an indirect health resource, discussed in Section 1.3.2. The thesis

also acknowledges that the potential effects of nature could be much greater than the research evidence has currently indicated (Health Council of the Netherlands et al 2004), including the potential to impact on personal development, social cohesion and behaviour. A secondary focus was therefore to address some of these gaps.

The dominant theory within this research field centres on the ability of nature to produce physiological, affective or cognitive recovery in the short-term, termed "discrete" restoration (Hartig 2007). Restoration itself has been defined as *"the process of recovering physiological, psychological and social resources that have been diminished in efforts to meet the demands of everyday life"* (Hartig 2007). Resources are defined as the "*capabilities that come into play when people try to meet demands"*. The notion of resource building is integral to the mental health framework guiding the thesis, a subject developed in section 1.3.1. Integral to the concept of restoration is the presence of a *negative antecedent*, that is, depletion of some resource (or capability) must have occurred in the first place, although research attention is beginning to turn to the ability of nature to maintain or regulate positive states of mind and emotion.

Restoration research is dominated by two complementary, but distinguishable, theoretical models: restoration from mental fatigue (attention restoration) (Kaplan and Kaplan 1989) and psycho-physiological stress reduction (Ulrich 1983). Firstly, the attention restoration model speculates that restoration from mental fatigue is promoted by four components: *fascination* (an effortless form of involuntary attention requiring effortless attention or curiosity), a sense of *being away* (temporary escape from one's usual setting), *extent* or scope (a sense of connectedness/being part of a larger whole) and *compatibility* with an individual's inclinations (opportunities provided for by the setting and whether they satisfy individual needs). Natural environments promote restorative experiences owing to their ability to provide these four elements, and in particular "soft" fascination[5]. On the other hand, Ulrich's psycho-physiological model posits that affective and aesthetic responses to

[5] Soft fascination occurs when there is enough interest in the surroundings to hold attention but not so much that there isn't room for reflection, with some aesthetic pleasure included. Hard fascination occurs when events or settings are intense enough to completely capture attention leaving no room for reflective thought and is associated with built, entertainment and sports settings.

the visual stimulus of a natural environment (*"preferenda")* spark a psycho-physiological response producing significant recovery from stress. There is a now a substantial body of evidence supporting nature's ability to promote psychological restoration:

(1) *cognitive* restoration (Ottosson at Grahn 2005, Hartig et al 2003a, Laumann et al 2003, Faber Taylor et al 2002, Faber Taylor et al 2001, Wells 2000, Tennesson and Cimprich 1995, Hartig et al 1991);

(2) *physiological* restoration (Pretty et al 2005, Hartig et al 2003a, Laumann et al 2003, Parsons et al 1998, Fredrickson and Levenson 1998, Ulrich et al 1991); linked to a literature showing how nature can act as a buffer against stress and improve coping resources (Ottosson and Grahn 2008, Ottosson 2007, Wells and Evans 2003);

(3) *affective* restoration (Pretty et al 2005, Hartig et al 2003a, van den Berg et al 2003, Wells and Evans 2003, Hartig et al 1996, Hartig et al 1991, Ulrich et al 1991, Ulrich 1979).

Discrete restorative experiences have been mostly explored in laboratory conditions using simulated visual imagery of urban versus (v) rural settings in student populations. Whilst this allows more control over the research, enabling greater causal claims to be made, it is questionable how generalisable findings are to real settings. There have been few quasi-experimental studies conducted in the field, one exception being Hartig et al's (2003a) study, showing the advantageous effect of walking in a natural as compared to an urban setting, on affective and physiological restoration. Research on the potential restorative effect of non-natural settings is very limited. Scopelliti and Giuliani (2004) found natural and outdoor built settings can have different restorative potential across the age spectrum; outdoor built settings were shown to be particularly important for young people. The authors suggest this is owing to different affective reactions normally associated with restoration, i.e. excitement rather than relaxation.

Evidence of cumulative restoration (the effect of repeated restorative experiences) is mostly limited to research in residential contexts such as the impact of green space in low-income housing residents in Chicago (Kuo and Sullivan 2001, Kuo 2001); or in the workplace, or health-care contexts. Ulrich's study (1984) showed the recovery rates of hospital patients

with a view of nature was greater than those with an urban view, resulting in shorter post-operative stay, reduced need for pain relief and fewer negative staff patient evaluations (Ulrich 1984). Research in this context has greater external validity involving real contexts and participants other than students, but is at greater risk from threats relating to internal validity and bias (from the process of self-selection) and limited control over the physical and social context (i.e. 'where', 'when', and 'with whom' dimensions); causal evidence is therefore difficult to infer. This throws into question the scientific quality of the research, as in the case of Ulrich's study, where it has been suggested that the introduction of new and more effective drugs over the research evaluation period may have been a factor.

A relatively recent area of restorative research is the impact of the social ecological context on restorative processes. These contexts are defined by Hartig (2007) as the higher order processes (above the individual) that affect opportunities to access and use different environments for restoration. An example is the constraining effect weather can have on restoration. Hartig et al (2007) have shown an association between the use of anti-depressants, changes in temperature and gender (usage decreased most in women as the temperature increased). Researchers are also beginning to explore the effect of social relationships in restoration. Staats and Hartig (2004) have shown that, where safety is an issue, being alone potentially constrains restoration in natural settings; where safety is not an issue, being alone potentially aids restoration. However, very little is understood about the impact of social relationships in different settings or across the age spectrum.

1.1.2 Active living research

Evidence from active living research has shown neighbourhood green space may act as a health resource in so far as it promotes walkability. Firstly, particular *types of environment* support particular types of exercise: adults with better access to green environments, such as parks, tend to be physically more active (Giles-Corti et al 2005, Björk et al 2008). Secondly, the *proximity of nearby green space* increases the likelihood of walking and thereby physical health outcomes; walkable green space is associated with increased life expectancy in older people (Takano 2002). However, the link between the *amount* of nearby green space and increased physical activity (walking and cycling) has been contested recently in research by Maas et al (2008), which found no relationship. Thirdly,

availability of green space in a local neighbourhood is associated with better-perceived overall health physical and mental health (de Vries 2003, Rappe et al 2006). Participants living in areas of high neighbourhood greenness report better mental health compared to those who perceived little greenness in their neighbourhood (Sugiyama et al 2008), suggesting the availability of green environments is likely to contribute more to mental health than physical health. Further evidence on the effect of green activity in specific populations is reviewed within Chapter 2.

The processes driving these outcomes are complex. For example, the quality of an environment may influence physical activity patterns and is inequitably distributed (Björk et al 2008). The association between health and green space may be spurious, simply because wealthier people can afford to live nearer green space, and have a better quality of living independently of this context. This has been defined as the "constraint mechanism" (Health Council for the Netherlands et al 2004). Another complexity is that associations of nature, rather than nature per se, may be the therapeutic force in restorative experiences (Korpela 2006). Disentangling these processes, together with a host of confounding variables (climate, social context), remains a singular challenge to researchers in this field.

1.1.3 Summary

To summarise, there is substantial evidence of nature's ability to promote recovery from mental fatigue, stress and bad mood. There is little causal evidence of cumulative restoration or of the impact of social ecological dimensions on restorative outcomes, although recently research has begun to address these gaps. Identified gaps specifically driving this study are:

(1) Differences in restorative outcomes amongst people with varying mental health needs. Freeman (1998) stated a need for *"more studies on individual environmental factors in specific population groups and in relation to specific psychiatric disorders"* but research in groups with poor mental health is still virtually non-existent.

(2) The impact of restoration on personal development. Kaplan and Kaplan (1989) originally hypothesised that "reflection" on life tasks was an important component of cognitive restoration, but to date, this has received little empirical attention.
(3) The role of social relationships in the restoration process.
(4) The need to research specific populations in real "lived" environments, using appropriate restorative indicators measured over longer periods of time.

1.2 Mental health issues

Key drivers in mental health policy across the age spectrum are the promotion of resilience and building of inner coping resources. The thesis was therefore interested in whether green activity in natural settings could help promote these processes. This section explores two theoretical concepts that have been linked with resilience and health resources in the literature, that is, challenge and positive affect.

1.2.1 Challenge as a health resource

In the past, mental health promotion has focused on strategies that aid psychological relaxation and reduce tension, taking the view that arousal (physiological or psychological) is harmful to health. In a controversial polemic, Patmore (2006) has argued that stress, tension and fear play an important part in transformative "peak experiences" (Maslow 1964) bringing about a buzz and thrill that has parallels with Czikzentmihalyi's (1992) concept of "flow" in which challenge is interpreted positively. Flow is an optimal form of experience achieved when a particular challenge is balanced with the level of skill someone brings to it and promotes strong positive affect, absorption and a sense of timelessness. For most of us, this type of experience can be obtained by taking part in leisure activities that challenge us in some way. Challenge, in the context of this study, is not viewed as "quick fix" for managing stress or anxiety, but the literature does point to how it can help build individual resources and capabilities offering a "*means of gradually discovering inner resources and making sense of our experiences*" (Patmore 2006).

Challenge carries the sense that the demands of the situation, though difficult, can be met. Lazarus et al (1980) suggests that one of the benefits of challenge is to act as a source of

support, suggesting "flow" can be a sustainer of coping effort and resilience. Challenge also depends on the sense of efficacy or control over the encounter. But people's perceptions of challenge vary depending upon individual resources. Conradson (2005) has shown how the experience of challenge in disabled users of green space (in a supervised rehabilitation context away from home) can positively feed back into positive management of everyday life tasks back at home. Clearly such strategies need to be handled sensitively, but if challenge can promote inner resources as Patmore (2006) claims, how might it be developed as a strategy for building resilience and coping mechanisms? This question forms a sub-theme of the thesis.

1.2.2 Emotion as a health resource

To date, research has mostly focused on associations between negative affect and illness, only recently turning to the relationship of positive affect and health. One idea being explored in the thesis is that positive affect can turn a difficult task into something more manageable, thereby increasing personal resources for coping, i.e. emotion is a mediator variable. This idea is being explored using Fredrickson's (2004) "*broaden and build*" hypothesis, which posits that positive emotion *broadens* cognition (or mindset), widening thought-action repertoires and in turn helping to build personal resources for coping in the future. The theory suggests an *upward spiral* in which positive emotions and subsequent broadened thinking influence one another reciprocally, a process that leads to improved mental well-being. In this way positive emotion *produces* good mental health as opposed to simply *signalling* or *marking* it, the traditional perspective. Empirical support for the proposition is provided by Isen et al 1987, Folkman and Lazarus 1988, Fredrickson and Branigan 2005.

Typically, negative emotions have been associated with specific action tendencies (e.g. fear and the urge to escape), and positive affect with inactivity (Friijda 1996). Fredrickson and Levenson's (1998) '*undoing*' hypothesis suggests that positive emotion dismantles the action readiness promoted by negative emotions, freeing the mind for pursuit of a wider variety of actions or experiences. This suggests positive emotions can expand an individual's options for activity. Isen et al (1987) has also suggested positive affect can

expand creative problem-solving. The relationship between affect and activity (in terms of goal thinking) is a central theme within this PhD.

A review of empirical evidence linking emotion and health has recently been published by Consedine and Moskowitz (2007) and is summarised in brief in Table 1.1 below. Positive emotion is linked via cognitive pathways to improved health behaviour; for example, in an improved ability to assimilate health information. Questions of anger and health are further addressed in Chapter 3.

Table 1.1: Summary of evidence linking health with emotion (Consedine and Moskowitz 2007)

Discrete emotion	**Intrapersonal**	**Physiological**	**Social**
Positive Affect			
Joy/Happiness	Expanded attention Openness to experience Propensity to play Cognitive flexibility and creativity Improved confidence	Improved health in samples with chronic illness Lower risks of mortality Antidote to stress	Strengthened social bonds Improved socio-economic status Marital satisfaction
Interest/Curiosity	Engagement, creativity and openness to ideas Cognitive flexibility and functioning	Lower mortality Reduced prevalence and incidence of hypertension	
Pride	Self-esteem and self-efficacy linked to improved health behaviour	Lower cardiovascular arousal Lower mortality via self-esteem construct	Improved social status and acceptance
Negative Affect			
Sadness	Poorer medical treatment adherence	Reduced energy and behavioural activity Predictor of mortality Reduced appetite	
Anger	Reduced attention Attribution of blame	High arousal/aggressive action Greater risk from cardiovascular disease Earlier mortality More frequent physician visits Greater chronic pain	Poor social relationships
Fear/Anxiety	Avoidance behaviour	High arousal/escape action Increased risk from heart disease, Asthma, arthritis Health deleterious behaviour (smoking, alcohol abuse, over-eating)	

1.3 The theoretical framework

This thesis brings together several theories from environmental psychology in order to explore affective space and its impact on health. Restorative theory forms the main organising framework for the study, together with the concept of affordances and environmental affect. Firstly, the restorative framework distinguishes between three types of psychological experience theoretically grouped under the rubric "restorative": **restoration** itself, defined in section 1.1.1, and two comparative experiences that have evolved theoretically from it - **instoration** and **person-fit** (conceptualised in terms of environments that support positive affect and personal goals). All three share a relationship with mental well-being.

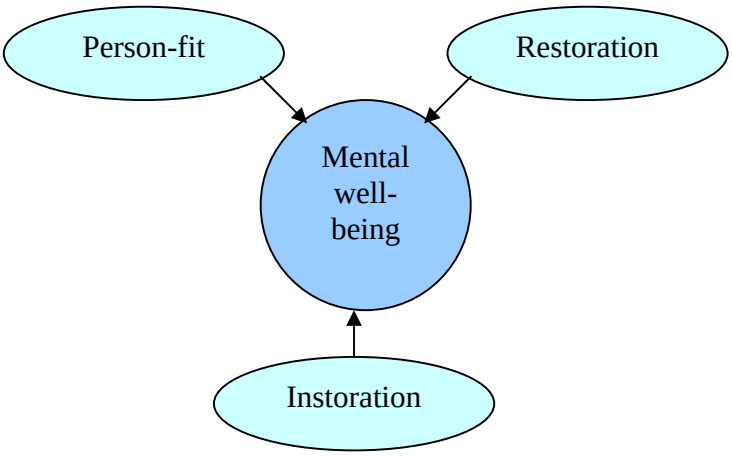


Fig 1.2: The restorative health framework

1.3.1 Instoration

This is defined as a deepening or strengthening of a capability to meet everyday demands, such as improved self-identity or self-esteem (Hartig et al 1996). The concept emerged from the original cognitive framework of restoration conceived by Kaplan and Kaplan (1989), distinguishing between "attentional recovery" and "reflection"; reflection referring to a deeper and more profound type of recovery and subsequently defined in the literature as instoration (Hartig et al 1996). There is very little empirical evidence supporting the effect of setting on this process. Herzog et al (1997) has shown settings impact on reflective process differently: settings high on hard fascination (sports settings) can

promote attentional recovery but not reflection; natural settings offering soft fascination are higher in overall restorative effectiveness. Instoration has been conceptually and empirically linked with nature in the context of community and healing gardens; horticultural activity has been shown to bring recovery from burn-out syndrome and to develop belonging and identity (Stigsdotter and Grahn 2003). Similarly, green activity has been shown to promote social cohesion and new identities in adults with mental illness (Parr 2005). But these are examples from structured contexts directed by health professionals; this PhD was therefore interested in the impact that normal, everyday activities, such as recreational walking, can have on instorative processes.

1.3.2 Person-environment fit

Korpela has extended the concept of restorative environments to include the concept of "niche" environments promoting well-being via the matching of personal needs with a particular environment (Korpela et al 2008). Person-environment fit is linked with well-being (Wallenius 1999) and with restoration via the concept of "compatibility" (see section 1.1.1). This study distinguishes between two kinds of environment supportive of person-environment fit: those that support mood regulation and those that support individual goals.

1) Niche environments supporting positive affect: emotion regulation is defined as actively coping with moods and emotional situations and has been linked theoretically with restoration (Korpela 2003). A person may employ psychological, physical, social or environmental strategies in order to regulate emotions. "*Environmental self-regulation*" refers to the process by which emotions are moderated by some external regulator found in a particular place such as sensory stimulation, visceral processes or social factors (Korpela 2002). Korpela has shown the ability of favourite places to regulate negative mood and theoretically linked this process with restoration on the basis of the shared concept of negative antecedents; people use particular places to regulate emotions after negative antecedents (e.g. stress, bad mood, quarrel with someone) from which the restorative environment or favourite place brings relief (Korpela and Ylén 2007). Korpela has speculated that "uplift" (reflecting a top-down view of wellbeing) moderates in the restorative process and has indicated favourite places are linked with the continuation of positive mood, although empirical evidence is limited (Korpela and Ylén 2007, Korpela et

al 2008). Good mood retention differs conceptually from restoration in that there is no prior negative antecedent; nor is it involuntary (as in the restorative process) but is facilitated by goal-based, motivated behaviour.

2) Niche environments supporting personal goals: This research conceptualises a niche environment as one supporting successful personal projects, affording opportunities for positive affect, and success in terms of goal manageability. This relationship was explored using the personal project system as a unit of analysis (see section 1.3.5).

1.3.3 Theory of affordances

Ideas of "affective space" were explored using Gibson's (1979) theory of affordances as a framework. An affordance typically refers to the *functional* properties an environment affords an individual for action described in terms of what is *do-able*. The features of the environment, rather than being described by form, are described by the activities they afford an individual. A tree is "climb-able", the branches "swing-able", etc. Attention has recently turned to the social affordances of environment (Clark and Uzzell 2006) but every affordance also has its own emotional colouring unique to the individual. Heft (2007) and Kyttä (2003) have touched upon the notion of affective affordances but as yet the concept remains ill-defined**.** This thesis defines an emotion affordance in terms of what opportunities the environment offer for negative or positive affect, *'how will this object, agent or event make me feel?'*. It is a 'happening' rather than a 'doing', although the feeling elicited will prompt a physical affordance: liking will elicit a desire to repeat, retain or expand an action, disliking or fear will result in retreat or removal. Physical affordances are therefore actualised via a situational evaluation of what the environment affords for pleasure or displeasure, and in this respect affordances are multi-dimensional.

The best way to describe the multiple dimensions of affordances is by way of example. In the case of the girls on the swing below (Fig 1.3), the emotional affordance is pleasure and zest, prompting the response to repeat and extend the action; the physical affordance is simply described as "swing-able" and "hang-on-able", the social affordance is to share and engage others in the action to "push me higher!".

Fig 1.3: Multiple affordances (affective, social and physical)

1.3.4 Environmental affect

Environmental affect can be described as how the physical environment (home, park etc.) and social context (being with a friend) influence emotion and thereby influence various activities and outcomes. Theory on affective space has been advanced by Russell (1988, 2003) who suggests the key to understanding people's response to the landscape is through emotion. Firstly, the affective quality of a place is a key component of the full meaning ascribed to a place. Secondly, the behaviour exhibited within a place is mediated by the emotional quality of that place: how soothing or upsetting, boring or exciting a place is will dictate our response to it. Environmental affect consists of two primary components: pleasure and arousal, subsequently described as "core affect" (Russell 2003). Russell has stripped emotion theory to a two-step concept: core affect can be attributed to no known stimuli ("free-floating") as in mood, or it can be directed via attribution to an external object, and thereby produce an emotional experience. Affective reactions to place can be described by a circumplex model of emotion (Russell 1988), defined by two orthogonal and bipolar dimensions: pleasant/unpleasant and arousing/sleepy (see Fig 4.2, Chapter 4). Affective qualities, described by an adjective, are based on a combination of these two dimensions: "exciting" therefore is a combination of arousal and pleasant. The level of core affect, its volatility and responsiveness, is relative to the individual, previous

experiences of place and the external stimuli. Discussion of the affective quality of place and use of the circumplex is advanced in Chapter 4.

1.3.5 Conceptualisations of well-being

Little (1983) has broadened the concept of well-being (defined in the literature as "flourishing") to include not only emotional, social and physical well-being but also the sense of meaning that arises from engaging in valued and rewarding personal projects[6]: "*Human flourishing is contingent on the sustainable pursuit of individuals' core projects"* (Little 2007). Core projects are the most meaningful and central projects within an individual's overall project system. "Sustainable pursuit" refers to the internal and external (physical and social) factors facilitating the successful pursuit of projects. This thesis conceptualises supportive environments as places promoting successful projects; the logical extension driving much of the research is that these places will also be heavily loaded with positive affect.

Little (1987) has often intimated that the starting point in personality psychology should be a person's prototypical transactions with the environment. The personal project system therefore provides a unit of analysis for exploring action in context, taking into account intentional, systematic and ecological contexts. Whilst the ecological and social context (the 'where' and 'with whom' dimensions) of projects are integral to the original project framework (1973), very few studies have explored the ecological context and its relationship with well-being. Personal project analysis was therefore used as an instrument to tap this relationship.

[6] The term *personal project* is used as a generic, inclusive term for life tasks, personal strivings, personal goals etc.

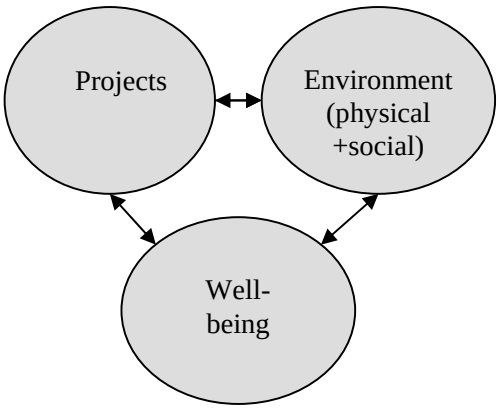


Fig 1.4: Exploring well-being and context via projects

Project pursuit is typically measured using 18 dimensions exploring what people think, feel and do in relation to their goals. Factor analysis has identified five major dimensions from the original framework (identified in consultation with Brain Little (2006) and the literature (Little 1989, 2007, Chambers 1997, Meyer et al 2004)). The first two are affective dimensions ("hot" dimensions – what we feel):

(1) positive affect (*enjoyment* from the domain of meaning);

(2) negative affect (*stress* and *challenge*[7]).

The remaining three are cognitive appraisal dimensions ("cooler" dimensions – what we think):

(3) project mastery (*efficacy* i.e. the anticipated success of achieving the project goal);

(4) project manageability (*control* and *support* (an affordance dimension));

(5) project meaning *(self-identity* (how expressive of you is this project, a dimension particularly important in young people) and how *important).*

Well-being is therefore related to projects that have meaning, are manageable, enjoyable, controllable, not too difficult or stressful and are supported. Construing projects as unattainable, not enjoyable, stressful, difficult and beyond one's control and skill level is

[7] this dimension can also be interpreted as a positive dimension, as discussed in Section 1.2.1.

indicative of depression (Meyer et al 2004, Little 2007). Of particular interest to this research is the link between positive affect and increased resources for coping. In the project literature *positive affect* has been linked with increased effectiveness in goal management, increasing internal resources and stimulating the effort necessary to turn to a difficult task into something more manageable (Lazarus et al 1980, Folkman and Lazarus 1988). Lazarus suggests that coping (in terms of goal manageability) can be generated through experiencing positive emotion. Salovey and Mayer (1990) draw similar conclusions and suggest that improved affect can help break set thinking about the future to consider a wider range of outcomes. Much of this research supports Fredrickson's (2004) hypothesis outlined in section 1.2.2.

1.4 Objectives and hypotheses

Restoration is mostly associated with relaxation in natural settings; this research was interested in replicating these findings but also in broadening the spectrum of emotions and settings under inquiry; what other affective responses are potentially restorative and how might these responses vary between settings and across different age groups?

1.4.1 Main research question

The central hypothesis of the PhD is based on current empirical evidence supporting the link between nature and restorative health: natural settings will be more conducive to affective restoration than urban settings; by extension they will also be more effective in shifting perspective on manageability of life tasks (cognitive restoration) as measured by the personal project system.

Based on "broaden and build" theory (Fredrickson 2004) it is posited that these two dimensions share an underlying relationship, so, as affect rises, perceived manageability of life-tasks will also shift in a positive direction.

1.4.2 Research sub-questions

(1) Can the challenge (physical or mental) of a natural setting increase individual resources for everyday life tasks (as measured by the challenge indicator of personal projects)? The hypothesized relationship is visualized in Fig 1.5 below.
(2) Will there be differences in restorative outcomes across adults and young people with and without mental health problems?
(3) What are the social dynamics influencing restorative processes?

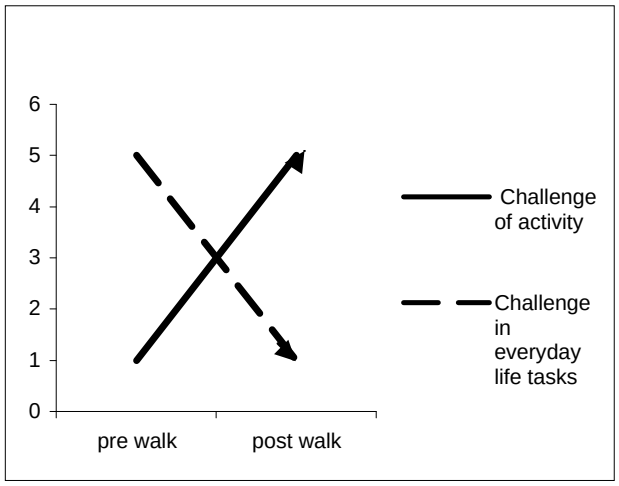


Fig 1.5: The challenge hypothesis

1.5 Methodology

1.5.1 A mixed-methods approach

An integrative, mixed-methods research paradigm forms the social science framework for the thesis, combining qualitative and quantitative methods. Although mixed methods research is a relatively new movement, mixing methods is not a new concept; triangulation (originally conceived as "multiple operationalism" by Campbell and Fiske (1959) and later defined by Denzin (1978)) formalised the practice for using multiple research methods. A full history of the movement is beyond the scope of this thesis; this section therefore simply defines the paradigm, its conceptualisation, philosophical underpinnings and advantages as a research method.

Mixed-methods research has been defined as "*an intellectual and practical synthesis based on qualitative and quantitative research, it is the third methodological research paradigm*" (Johnson et al 2007*)* arising as a response to the polarisation of the two dominant social science paradigms: constructivism and positivism. Merging these two distinctive philosophical research paradigms has been hotly debated in the social sciences as neither legitimate nor desirable. However, in recent years, some of the strongest supporters of qualitative research (Denzin, Lincoln, Guba) have made statements giving credence to mixed methods research (see Johnson et al (2007) for a review). But how can these two opposing philosophical positions be married? Most mixed methods researchers argue that pragmatism is the most useful philosophy to support mixed methods (Morgan 2007), with its focus on realism as a vital component of truth and meaning. It is an approach to knowledge that attempts to consider multiple view-points, perspectives, positions and standpoints. Pragmatism offers an epistemological justification and logic for mixing approaches and methods (see Johnson et al 2007 for a full discussion). Philosophically, it steers a middle line or partial constructivist paradigm – that is, we construct notions of truth relative to the self but there is also some physical, external structure in the world outside. A more practical issue in mixed methods research is how best to integrate methods: at what stage? Which one should come first? Should they be kept separate? In this research, mixed methods have been carried out simultaneously, although some initial qualitative research (observing, walking and talking) informed the development of the research. The rationale for this is outlined below.

Creene et al (1989) have identified five broad purposes or rationales of mixed methodological studies (cited in Johnson et al 2007): (1) *triangulation* (i.e. seeking convergence and corroboration of results from different methods studying the same phenomenon), (2) *complementarity* (i.e. seeking elaboration, enhancement, clarification of the results from one method with results from another), (3) *development* (i.e. using the results of one method to inform the other), (4) *initiation* (ie discovering paradoxes and contradictions that lead to reframing of the research question) and (5) *expansion* (i.e. exanding the breadth and range of inquiry).

A number of these themes are present in the thesis: firstly, it employs theory triangulation (using a number of perspectives to explore the research questions), methodological triangulation (use of qualitative and quantitive methods to study the research problem) and data triangulation (using a variety of samples in the study) (Jick 1979); secondly, it supports the notion of complementarity by simultaneously carrying out mixed methods (rather than allowing one to direct another); and thirdly, the research was expansive, broadening the line of enquiry in the later stages (Chapters 5 and 6) to further illuminate the restorative experience of landscape in young people. A unifying thread across the reseach is the use of the personal project system as a unit of analysis.

1.5.2 Development of the methodology

The research focused on measuring the outcomes of physical activity in a group context in natural and built (external or internal) settings. Settings were local, everyday and easily accessible rather than faraway. A wide range of participants were recruited comprising:

(1) Adults with mental health problems, recruited via specialist walking groups, n=47.
(2) Adults without mental health problems, recruited via non-specialist walking groups, n=83
(3) Young people (11-13) with and without behavioural problems, recruited via mainstream and specialist schools, n=18
(4) Young people (11-13) in general, recruited via youth clubs, n=45.

1.5.3 Quantitative methods

A two-page questionnaire (Appendix 2.1) was developed to measure outcomes of mood, self-esteem and personal project thinking pre- and post-experience of a particular setting. Criteria for selection included the need for flexible instruments, adaptable to different ages/abilities which would be speedy and easy to administer in a range of contexts. The instruments selected had all been used at least once before in this research context and are familiar measures in health and personality research with known validity and reliability.

1.5.4 Quantitative measures

1.5.4.1 Mood. A number of studies in this field have used mood scales[8]. The University of Wales Institute of Science and Technology (UWIST) Mood Adjective Checklist (MACL) (Mathews et al 1990) was selected since it is proven both within clinical research and exercise research and has been used before in this research context (Hartig et al 1996). It has validity, reliability and is easy and quick to complete. A shortened version (Appendix 2.1) was employed (Schultheiss and Brunstein 1999) (Cronbach alpha for the scale ranged from 0.75 to 0.87) measuring hedonic tone (HT), Tense Arousal (TA) (herewith defined as stress) and Energetic Arousal (EA) with Anger (A) added as a dimension for research in young people with behavioural problems.

1.5.4.2 Self-esteem. Self-esteem is a widely measured construct in social and personality research, most frequently measured using self-reports since, by definition, it is a self-referent construct (Gray-Little et al 1997). The concept of self-esteem is considered ambivalent by some (Elmer 2001) but is generally perceived to do a good job of predicting well-being (Little 2006). Kraemer (1999) suggests self-esteem is also a good indicator of resilience. One of the most widely-used instruments is the Rosenberg Self Esteem scale (1989) since it is easy to administer and has been shown to have high internal consistency and test-retest reliability, and has been used many times in exercise research (Pretty et al 2005) [9]. It taps a global evaluation of self-concept, measuring positive or negative attitudes towards self. A shortened three-item scale was used (Schnittker, 2001) (Cronbach's alpha = 0.60); this was later extended to a six-item scale since an early pilot detected no differences in self-esteem post-intervention. Since self-esteem is one of the most consistently monitored outcomes of well-being in wilderness studies, it was assumed the shortened scale was insufficiently sensitive to short-term change; however, extending it made no difference to outcomes, an interesting result discussed in the conclusions of this thesis.

[8] Profile of Mood States (POMS) (Pretty et al 2005) and Zuckerman's Inventory of Personal Reactions (ZIPERS 1977) (Hartig et al 2003).

[9] Defined by Fox (2000) and quoted in Pretty et al 2005 as "one of the best validated and most conservative methods of measuring self-esteem".

1.5.4.3 Personal projects. The personal project system was used as a unit of analysis to measure as follows. Firstly, changes in well-being and perspective of life-tasks over time and secondly, as an indicator of "niche" environments. The project system has been used once before in this research context to explore the effects of nature on life functioning and was found to be a reliable and coherent measure (Cronbach alpha of 0.81) (Kuo 2001). Participants were asked to elicit several goals and then focus on the two most important (or core projects) and rate them pre- and post-intervention on a 0 to 4 scale against the five well-being indicators identified in section 1.3.5 (efficacy, control, challenge, enjoyment and stress). In research with young people, 'support' was added as a dimension and 'challenge' was substituted for 'self-identity'. Secondly, the instrument was further utilised in order to explore the concept of "niche" environments in Chapter 5. Drawing on methods used by Wallenius (1999), respondents were asked to generate eight projects, rate them for importance and identify the 'with whom' and 'where' dimension. Projects were scored in the same manner as above.

1.5.4.4 Data Analysis. All quantitative data analysis was carried out using SPSS 14, including the Answer Tree module (regression tool) and Latent Gold from Statistical Innovations (www.statisticalinnovations.com). Where results refer to 'significance' this refers to a statistical significance of $p<0.05$ quoted as two-tailed probabilities; where hypotheses allow one-tailed probabilities these are flagged in the results.

1.5.6 Qualitative research methods

The research integrated established methods with more exploratory tools to complement and inform quantitative findings about short-term psychological restoration.

1.5.6.1 Interviews. Two types of interviews were utilised in the research. Firstly, semi-structured interviews were carried out in adults with mental health problems, with the aim of eliciting the "instorative" benefits of restoration. This data was analysed using NVivo 7, a qualitative data analysis (QDA) software programme, to identify common themes and for evidence of affective affordances. Secondly, structured interviews were carried out with young people designed to explore the affective dimension of settings and niche environments, utilising personal project analysis and direct questioning techniques. This

research aimed to broaden the affective inquiry of restorative experiences to include emotions such as excitement and trust.

1.5.6.2 Participant observation. Ethnographic methods were employed as a mechanism for exploring the affective affordances of forest settings in boys with trauma, carried out over a five-month period. Field notes were transcribed and analysed using NVivo 7.

1.5.6.3 Visual methodologies: photo/video elicitation methods provided a creative, participatory method of evaluation in a group of participants (often overlooked in social research). Visual methods were particularly effective in engaging children/young people in the research process. This research generated two accompanying Digital Video Discs (DVD) (see Chapters 3 and 4).

1.5.7 Ethics. The research was subject to approval by Heriot Watt University's School of Built Environment Research Ethics Committee and Insurance departments. Applications were made to the National Health Service (NHS) Central Office for Research Ethics Committee (COREC) to include mental health patients in the research. Information sheets were issued and signed consent was a prerequisite to participation. Where the participant was under 16, parental consent was sought, although if an activity was organised under the auspices of a school or youth club, this was not always deemed to be strictly necessary.

1.6 The PhD framework

The research generated six studies; the relationship between these studies and the restorative framework of the PhD is illustrated in the flow diagram below. Mixed methods were used (1) to measure discrete psychological restoration in adults with and without mental health problems in a variety of settings (natural, built-external, built-internal); (2) to measure instoration in adults and young people (YP) with mental health problems in natural settings; (3) to explore the concept of niche environments as supportive of personal goals and as places to regulate mood; and (4) to explore the social context of restoration across the spectrum.

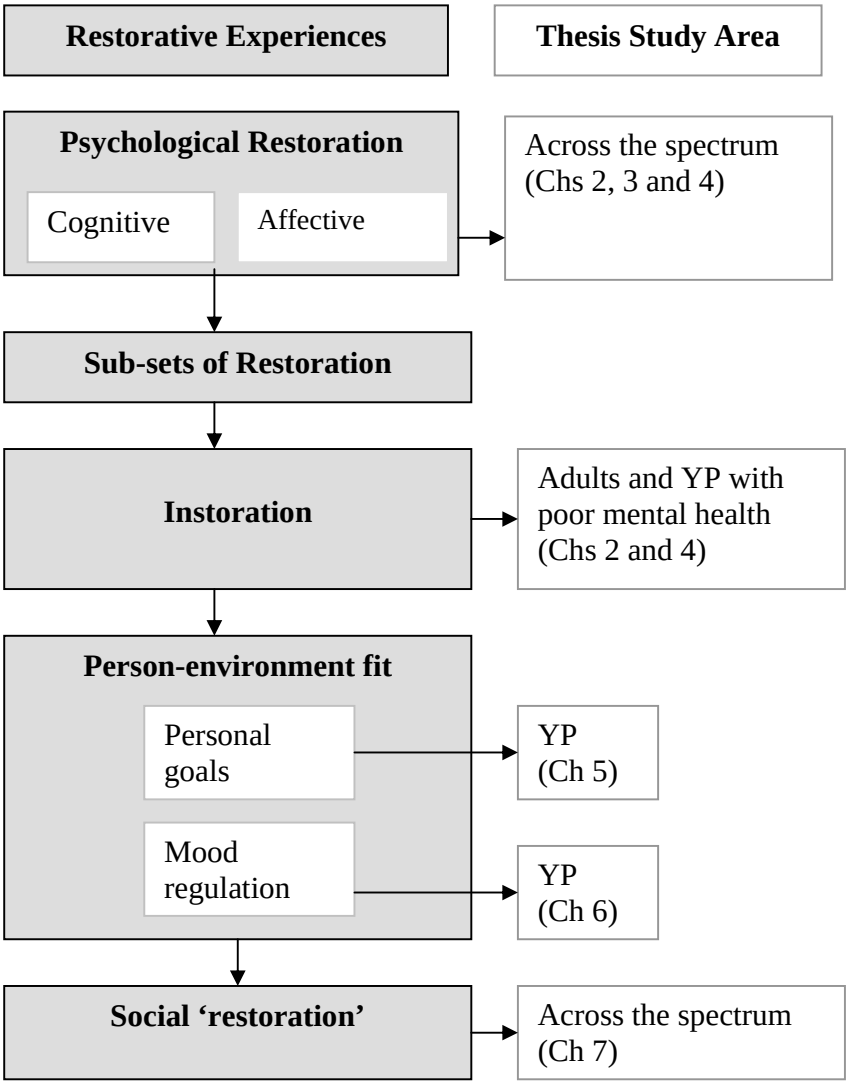


Fig 1.6: The theoretical and study framework

1.7 Summary

To summarise, this Chapter has introduced the theoretical, empirical and social science framework for the research study and defined the research questions and methodology. It now develops the discussion introduced in this Chapter by presenting the six individual studies identified above.

Chapter 2: Restorative outcomes of urban and natural settings in adults with and without mental health problems

"This is actually feeling, it's like taking a cold shower"

Participant GM

2.1 Introduction

People differ in their potential for restorative experiences but there is little evidence on the role of mental health or settings. Using the mechanism of a walk, this study explores restorative outcomes in urban versus rural settings, in adults with good and poor mental health. For the purpose of this study poor mental health is defined as having a clinically defined mental health problem (depression, anxiety, bi-polar disorder, schizophrenia or psychotic illness). This is a mixed-methods study incorporating qualitative (self-reported outcomes) and quantitative data (semi-structured interviews, visual methodology) to explore short-term and cumulative restoration. Walking in natural settings is known to improve physical and mental well-being in adults with good and poor mental health but this is the first study to explore outcomes between health groups across settings. This chapter presents three studies: the first two compare outcomes between health groups across urban and rural settings; a third study reports on outcome differences between groups in natural settings only.

2.1.1 Concepts of mental health. WHO's definition of mental health (2007) is the most commonly cited, defining good mental health as a state of well-being in which an individual recognises their own abilities, can cope with the normal stresses of life, work productively and make a contribution to their local community. There is an increasing tendency to define mental health in terms of *"flourishing"* (Keyes 2007); a state of hedonic well-being (life satisfaction and positive affect) and eudaimonic well-being (contribution to society, social integration), a theoretical model of well-being widely used in the social sciences (Keyes 1998, 2002). In recent years, promoting and maintaining good mental health – salutogenic healthcare – has gained momentum as a health strategy, as compared to pathogenic health care – finding cures and treating illness and disease (Keyes 2007). Resilience building is a core concept in salutogenic healthcare across the spectrum in both

adults and young people. This is reflected in the UK in a shift towards defining mental health in terms of *coping abilities* rather than by a particular type of mental illness, illustrated in the spectrum diagram (Fig 2.1) below. Mental health is conceptualised as a "non-static" phenomenon, in flux with external and internal forces. Adults without a clinical diagnosis ("healthy") may be coping less well than those with a clinical diagnosis who are successfully coping with the aid of medication. The impact of anxiety on one person's life may be more devastating, say, than another person's experience of schizophrenia. Paradoxically the "healthy" groups in this study may include some individuals less happy or less engaged in society than the "unhealthy" groups.

One focus of this thesis is how positive affect can help promote resilience and coping. Walking in natural settings is known to raise affect (Hartig et al 2003a) but can it shift perspective in the manageability of life-tasks? It is exploring this question in light of Fredrickson's (2004) '*broaden and build'* hypothesis, linking positive affect with broadened mindset and, in turn, increased resilience (see Chapter 1).

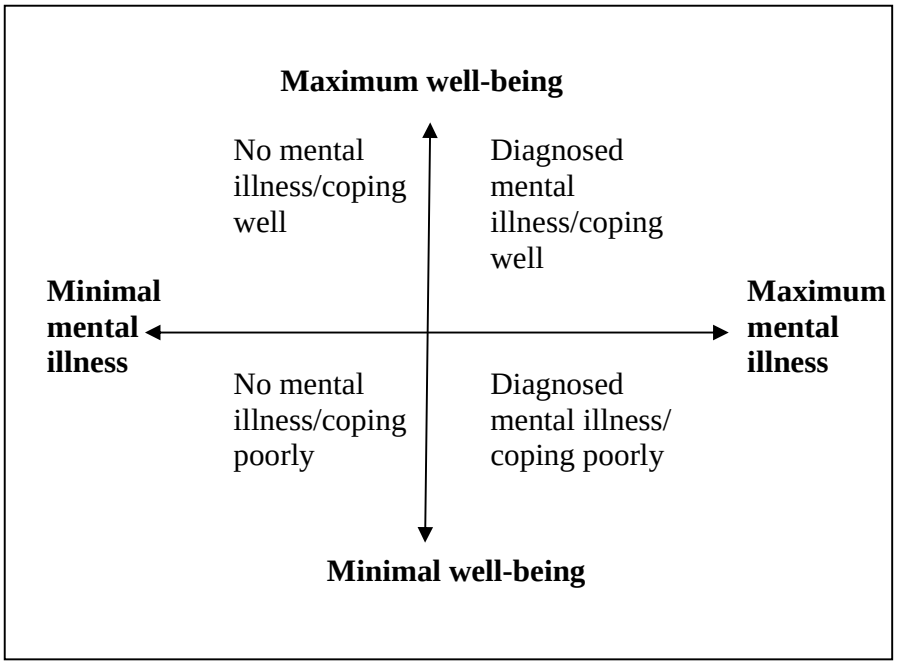


Fig 2.1: Mental health and well-being: the non- static continuum[10]

[10] Gilmarton (2007): in discussion.

2.1.2 Exercise as a treatment for depression.. There is substantial evidence to suggest exercise can prevent and help treat mild to moderate depression across the age spectrum, and work as an adjunct to treatment of more complex mental health problems such as substance abuse. Donaghy (2007) cites 11 longitudinal studies linking exercise with *protection* from depression and 15 randomised control trials providing evidence that exercise can reduce depression and is as effective as cognitive therapy. The evidence base is now so convincing that GP's are increasingly recommending exercise for patients with mild to moderate depression (referrals up from 5% to 17% in the UK in the last three years) (MHF 2008). However, there is very little evidence to suggest the effect of setting in this process.

2.1.3 Effects of exercise and setting in healthy adults: There is some evidence to suggest that adherence to an exercise programme is more successful in walking outside (home environs) as compared to exercise in a facility (Hildson and Throgood, 1996[11]) and that jogging in a stimulating green environment distracts the mind from discomfort enabling participants to jog for longer periods of time (cross country v. track) (Pennebaker and Lightner, Study 2, 1980). Walking in natural settings has been shown to be more advantageous to mood and stress in the short term as compared to urban settings. Hartig et al (2003a) exposed two randomly assigned groups of participants to a number of stressful tasks. Afterwards, one group sat in a windowless room before walking through an urban environment, whilst the second sat in a room with green outdoor views before walking through a nature reserve. At the end of the study, the second group had significantly lower blood pressure (an indicator of stress) and reported more positive mood than the first. In Japan, forest walking ("shinrin-yoku") was shown to significantly improve depression, vigour and reduce hostility when compared to a control day (no forest visit) (Morita et al 2007). In the UK two recent studies have shown the benefits of "green exercise" (the synergistic effect of exercising in green settings); in the first, green activity was shown to significantly improve self-esteem and mood in healthy adults regardless of the level of intensity, duration or type of green activity undertaken (Pretty et al 2007); in the second, viewing images of pleasant rural and urban scenes were more advantageous to self-esteem

[11] A study of 11 trials comparing forms of exercise (walking from home v. structured exercise sessions).

outcomes than unpleasant urban and rural scenes whilst running on a treadmill (Pretty et al 2005).

2.1.4 Effects of exercise and setting in adults with poor mental health. Green activity has been effectively used in therapeutic contexts as a treatment for mental illness. Grahn et al's (2006) two-year evaluation of a healing garden programme in Sweden has shown improvements in depression and "burn out" syndrome resulting in 100% improved body perception and 80% return to work amongst participants. Parr (2005) has shown how community gardening (UK) can promote social inclusion and promote new identities in people with severe and enduring mental health problems. In Australia, environmental activity ('friends of parks' groups) is linked with increased social connectedness and meaningful occupation in adults with poor mental health (Townsend 2006). Participants reported improved overall health and visited doctors less frequently (as compared to those involved with voluntary activities in different contexts). There is, however, a lack of compelling evidence in the UK of the link between green activity and improved mental health. There is only one study showing the benefits of walking in a natural setting compared with an internal retail setting in adults with poor mental health (n=20) (Peacock et al 2007); a walk in the natural setting was advantageous to outcomes of mood (anger, confusion, depression, tension) and self-esteem but not to fatigue or vigour.

Recently, research has shown the detrimental effect of an urban environment (London shopping street) on people with diagnosed psychotic disorders as compared to a brief mindfulness relaxation task (Ellett et al 2008). Exposure to the urban environment increased levels of anxiety, negative beliefs about others, jumping to conclusions and paranoia.

Recently, some research has begun to indicate that the effect of nature on restoration may be more powerful in individuals suffering from stress (Korpela et al 2008, Ottosson 2007).

2.1.5 Research questions: in the light of this evidence the following hypothesis was posited: a walk in a natural setting will be more specifically more positive in raising mood and changing perspective on life tasks than an urban setting. As a cognitive outcome, change of perspective has not been previously measured in this context but it is

theoretically linked with raised mood, a dimension known to increase in natural settings. Two sub-questions were formulated where there is currently no evidence:

- Does the state of someone's mental health impact upon the outcome?
- Does the challenge of the context positively feedback to individual coping resources (as measured via the challenge dimension of personal projects)?

2.2 Method

Participants: participants were recruited via existing walking groups for healthy adults and specific groups for adults with mental health problems, mostly in the central belt of Scotland. One group (Stirling) was set up especially for the purpose of this study. As a pilot, friends of the researcher were recruited. Healthy and non-healthy groups walked in separate groups, but on similar weeks, and were self-selected.

Ethics: signed consent was required to take part in the research. Where participants were NHS-referred to a walking programme, applications were made to COREC.

The settings: the urban setting was usually a town centre, containing 'hard' (built) fascination, and not without green elements (street trees, fringes of parks and gardens). The natural setting was forest or agricultural countryside (with woodland) accessed by mini-bus or car, several miles from the town context. Illustrations of settings can be found within each study.

The experience: participants walked as a group in either setting for approximately one hour. The walks were carried out in consecutive weeks to minimise differences in mood over time.

Design: this was quasi-experimental research using non-equivalent group design (NEGD) in Studies 2 and 3 with no randomised assignment of participants[12]. Healthy and non-healthy groups were combined to create one dataset in Study 2 (n=123).

[12] It is difficult to randomly assign patients with varying mental health problems and numbers were prohibitive.

Measures: three aspects of well-being were examined by questionnaire using validated instruments[13]; the shortened version of UWIST MACL (Mathews et al 1990) separately measuring Energy, Hedonic Tone and Stress, the Rosenberg Self-Esteem Scale (shortened version 1989), and five aspects of personal projects (enjoyment, control, efficacy, challenge and stress) as a measure of "changes in perspective" on life-tasks (Little 1983). The questionnaire (see Appendix 2.1) was administered immediately pre-walk and post-walk.

2.3 Results

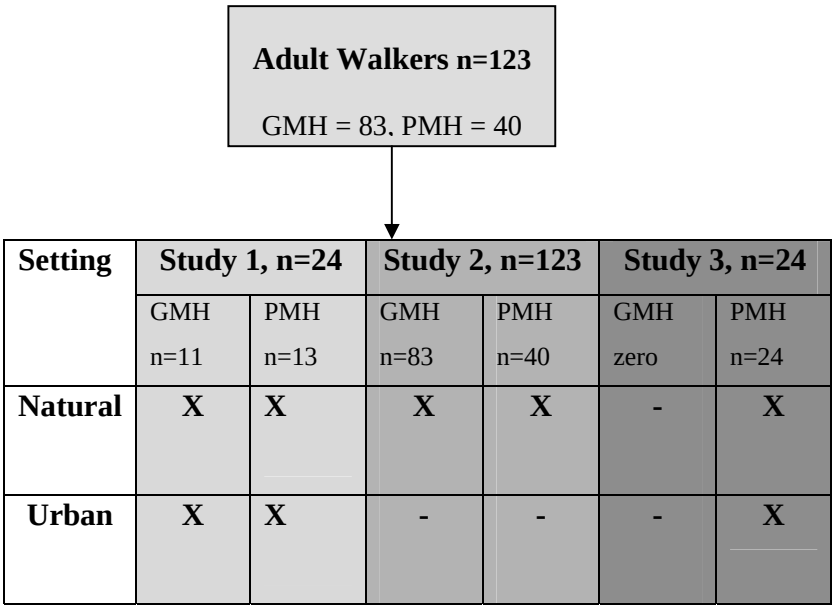
Three studies are presented. The first two compare restorative outcomes across urban and natural settings *between* adults with poor and good mental health. A third study reports on outcome differences *within* mental health groups in urban v. natural settings.

Analysis of data was carried out in SPSS 14. Since NEGD is especially susceptible to internal validity, distribution of the data was explored in depth taking into account distribution graphs, statistical parameters[14] and homogeneity tests (Levene) for the purposes of Analysis of Variance (ANOVA) between groups. Where the distribution is skewed or had kurtosis, Kirk's (1994) guideline was applied: i.e. ANOVA design will not be pathologically affected if the pattern is similar pre- and post-test. Data was explored with and without outliers[15]. Non- parametric tests are reported together with results of two-way ANOVA's factoring walk (pre to post) and setting (urban v. natural) with health group and gender as between subject factors. In reporting test results, Field's guide (2005) is followed; all significance test results are quoted as two-tailed probabilities; where hypotheses allow one-tailed probabilities these are flagged in the results.

[13] See section 1.5.4

[14] Standard Deviation (SD) (threshold of 3), skewness and kurtosis (threshold of 2.59 x Standard Error (SE)).

[15] Distribution was re-run to explore whether removing outliers made a difference. If the outlier score was not substantially different from others in the sample, it was left in so as to not alter the story (McClelland 2000). This was the pattern in most cases.



Setting	Study 1, n=24		Study 2, n=123		Study 3, n=24	
	GMH n=11	PMH n=13	GMH n=83	PMH n=40	GMH zero	PMH n=24
Natural	**X**	**X**	**X**	**X**	**-**	**X**
Urban	**X**	**X**	**-**	**-**	**-**	**X**

Fig 2.2: Study design

2.3.1 Study 1, good v. poor mental health, urban v natural, n=24

The two health groups walked separately in two environments (urban v. natural), one week apart and in similar conditions, Spring 2007. The urban setting was Stirling suburbs and town centre, incorporating leafy green roads (Fig 2.4); the natural setting was a country park, predominately forest (Fig 2.5). The walk was approximately 1-hour long in each setting.

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Fig 2.4: Urban Setting

Fig 2.5: Natural Setting

2.3.1.1 Exploratory analysis

(1) Within group. As an exploratory screening, an independent t test (Mann-Whitney) was used to explore the pre-conditions prior to the experience of either setting: in this context walker/setting were considered unique. This showed no significant differences in baseline scores between scores across the two settings *prior* to intervention.

(2) Between group. Significant differences were found between health groups pre-walk in each setting (see Tables 2.1 and 2.2 over); post-walk there were fewer differences between groups, particularly in the urban setting. The data suggests that a walk in either setting is levelling-out mood differences between groups, with the exception of challenge. Exploration of the means showed that the perception of challenge reduced in the good mental health group (GMH) (a positive outcome) but increased in the poor mental health group (PMH) (a negative outcome). This is an interesting result reflected in later results.

Table 2.1: Pre- and post-walk differences between health groups in the urban setting (Mann-Whitney test), n=24					
Variable			**Pre data GMH**		**Change data GMH**
Mood	Hedonic tone	**PMH**	p=0.001*	**PMH**	p=0.010*
	Energy		p=0.001*		p=0.029*
	Stress		p=0.005*		ns
Self-esteem			p=0.043*		ns
Projects	Enjoyment		p=0.010*		ns
	Control		ns		ns
	Stress		ns		ns
	Efficacy		p=0.007*		ns
	Challenge		ns		ns

Table 2.2: Pre- and post-walk differences between health groups in the natural setting (Mann-Whitney test), n=24					
Variable			**Pre data GMH**		**Change data GMH**
Mood	Hedonic tone	**PMH**	p=0.053	**PMH**	ns
	Energy		p=0.051		ns
	Stress		ns		ns
Self-esteem			ns		ns
Projects	Enjoyment		ns		ns
	Control		ns		ns
	Stress		ns		ns
	Efficacy		ns		ns
	Challenge		ns		p=0.012*

(3) Differences between groups

(i) **Poor mental health**: significant outcome differences pre-post test were found in three variables in the urban setting: hedonic tone, stress, enjoyment. In the natural setting significant differences were found in four variables: energy, hedonic tone, stress and the stress project indicator. Examination of the means showed both settings consistently improved well-being.

(ii) **Good mental health**: in the urban setting significant differences were found in one variable only (stress). In the natural setting significant differences were found in five variables (hedonic tone, stress, enjoyment, control and challenge). Examination of the means showed the direction was again positive. *The natural setting improved outcomes across a greater number of variables in the healthy group when compared to the urban setting, but not in the poor mental health group.*

Table 2.3: Change (pre-post) across setting by group (Wilcoxon T test), n=24

Variable		**Urban post**	**Urban pre**		**Natural post**	**Natural pre**	
			PMH	**GMH**		**PMH**	**GMH**
Mood	Hedonic tone		p=0.007*****	ns		p=0.036*	ns
	Energy		p=0.088	ns		p=0.010*	p=0.011*
	Stress		p=0.017*	p=0.038*		p=0.021*	p=0.023*
Self-esteem			ns	ns		ns	p=0.072
Projects	Enjoyment		p=0.046*	ns		ns	p=0.053
	Control		ns	ns		ns	p=0.026*
	Stress		ns	ns		p=0.039*	ns
	Efficacy		p=0.059	ns		ns	ns
	Challenge		ns	ns		ns	p=0.032*

2.3.1.2 ANOVA analysis

A series of two-way ANOVA's factoring setting (urban v. natural) and the walk (pre-post) showed significant main effects of health and setting on mood between groups. Health had a main effect on hedonic tone ($p<0.01$), stress ($p<0.01$) and energy ($p<0.01$); setting had a main effect on stress ($p<0.05$) and the efficacy project indicator ($p<0.05$).

Three significant interaction effects were found:

(1) Between setting and walk in the mood variable, energy ($p<0.05$)
(2) Between setting and health on hedonic tone ($p<0.05$), stress ($p<0.05$) and energy ($p<0.01$), and the enjoyment indicator ($p<0.05$).
(3) Between setting, walk and health on hedonic tone and energy $p<0.05$).

Assumptions for ANOVA: Since there were only two levels for each repeated measure sphericity assumptions were not a problem. Assumptions of homogeneity of variance were met (Levene's test) for all variables in the urban setting but not across all variables in the natural setting. Variance was heterogeneous post-walk in natural settings on four variables (hedonic tone, stress, vigour and efficacy). Even though this technically violates ANOVA assumptions, it has been found that ANOVA is fairly robust to this violation when the sample sizes are equal and not less than five, as was the case here. The results are therefore reported with a cautionary note. The results suggest variance between populations developed post-walk and that setting is impacting on this.

Main finding: mental health is impacting on the restorative outcomes of different settings. Adults with poor mental health benefited from a walk in either setting compared to healthy adults who benefited only from the walk in the natural setting. The effect was greatest on mood (vigour, hedonic tone and stress). This pattern reflects findings from non-parametric tests in Section 2.3.1.1. Results for the significant variables are reported below. Interaction results are reported first.

1 Hedonic tone (HT)

(i) There were significant interaction effects between setting and health (F (1,21)=7.189, p=0.014) and between setting, the walk and health (F(1,21)=7.155, p= 0.014).

(ii) There was a significant main effect of health (F(1,21)=10.106, p=0.005) and of the walk irrespective of setting (F(1, 21)=10.106, p=0.005). The effect of setting was marginal becoming significant on a one-tailed hypothesis.

Mental health affected the outcomes in both settings: outcomes for the healthy group were more consistent with restorative theory; the natural setting was advantageous over the urban. The poor mental health group benefited equally from walking in both settings.

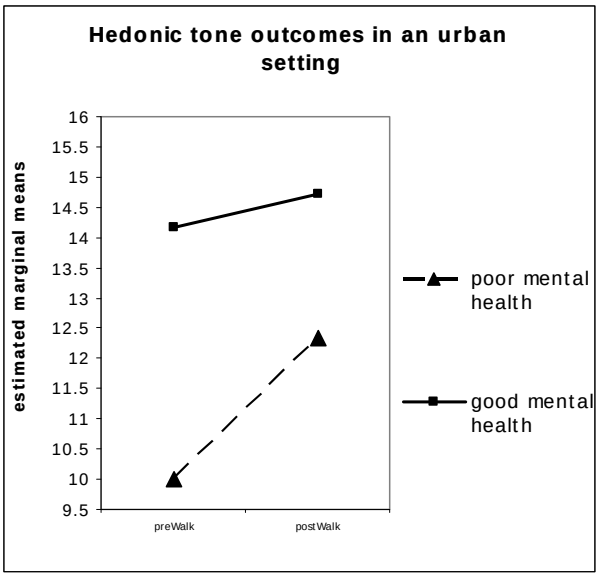


Fig 2.6

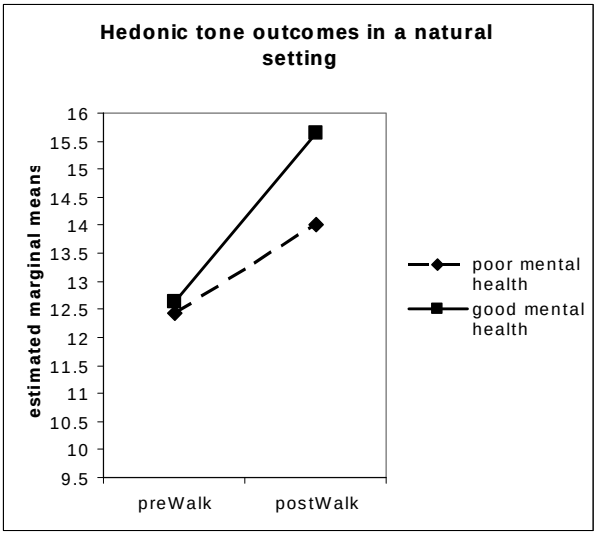


Fig 2.7

1 Stress (tense arousal)

(i) There was a significant interaction effect between setting and health (F(1,22)=5.897, p=0.024).

(ii) There was a significant main effect of setting (F(1,22)=4.681, p=0.042), of the walk (F(1,22)=42.397, p=0.000) and of health (F(1,21)=8.275, p=0.009).

Outcomes in the healthy groups were again more consistent with restorative theory, the natural setting being more advantageous to stress reduction than the urban setting. The poor mental health group benefited from a walk in both settings. Fig 2.8 shows outcomes converged in the urban setting.

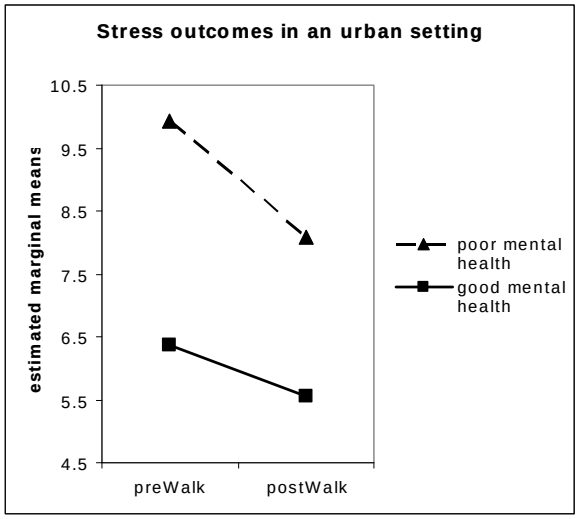


Fig 2.8

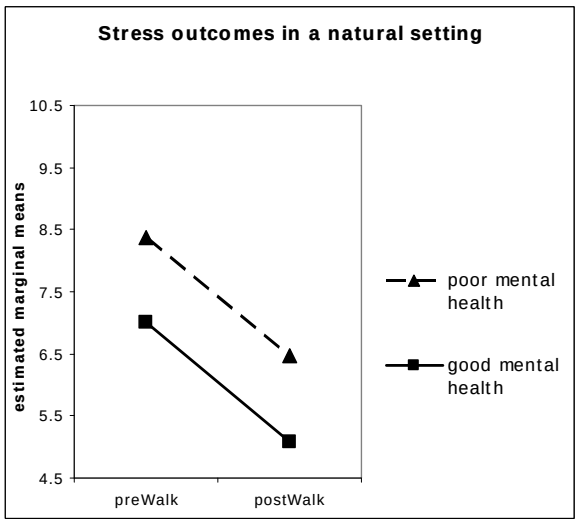


Fig 2.9

3 Energy (energetic arousal)

(i) There were significant interaction effects between setting and health ($F(1,20) = 12.63$, $p=0.002$), setting and walk ($F(1,20)=4.45$, $p= 0.048$) and setting, walk and health ($F(1,20)=4.16$, $p=0.048$).

(ii) There were significant main effects of health ($F(1,20) = 11.78$, $p= 0.003$) and of the walk ($F=5.854$, 1, 0.025); effect of setting was marginal.

Fig 2.10 shows advantageous outcomes from a walk in the urban setting in the poor mental health group, but not the healthy group. Both groups benefited equally from raised vigour in the natural setting. Patterns in the healthy group are again more consistent with restorative theory.

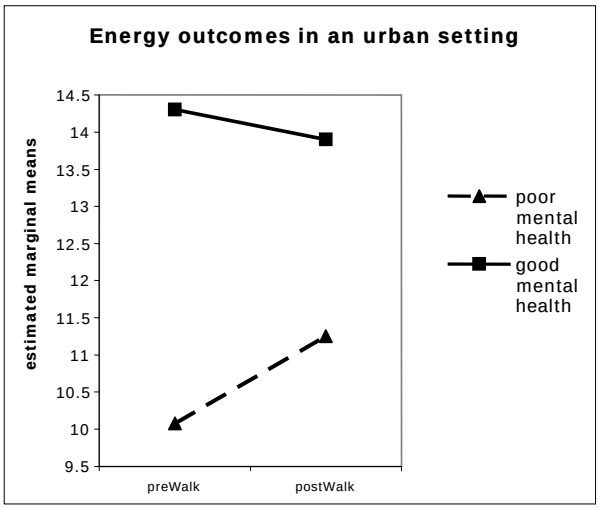


Fig 2.10

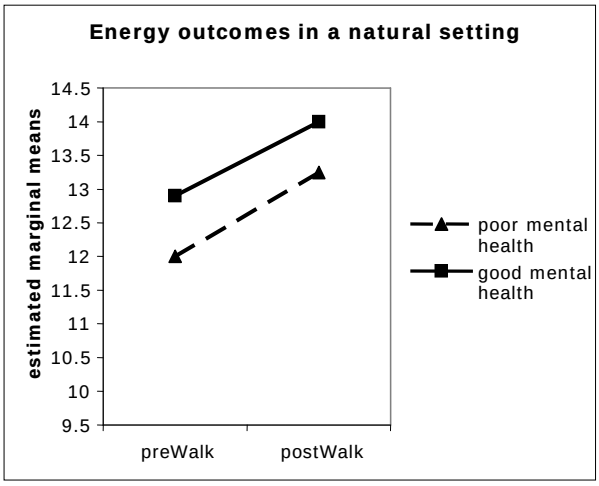


Fig 2.11

4 Enjoyment project indicator

(i) There was a significant interaction effect between setting and health ($F(1,12)=7.469$, $p= 0.018$);

(ii) There was a significant main effect of the walk only ($F(1,12)=8.798$, $p=0.012$).

Health did not affect outcomes in the urban setting in this variable; the enjoyment project indicator increased in both groups equally. This was the only measure that positively changed direction in the healthy adult group in an urban setting. Restorative patterns were therefore least consistent in this variable. Health did affect outcomes in the natural setting where the enjoyment dimension increased much more in the healthy group (reflecting the patterns found in hedonic tone).

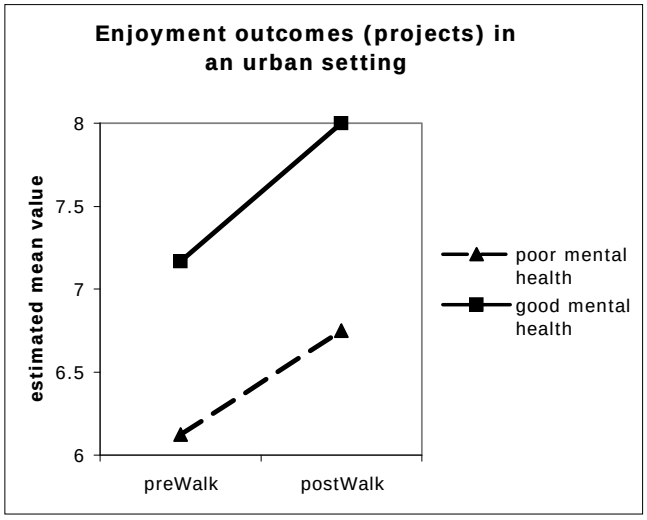


Fig 2.12

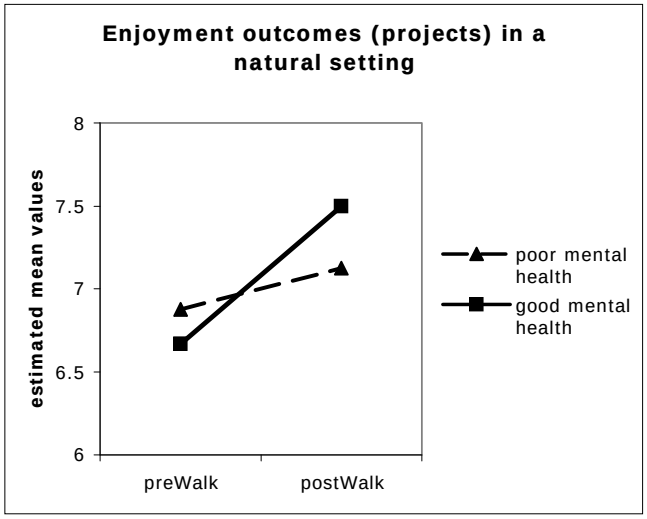


Fig 2.13

5 Efficacy project indicator

(i) There was a significant effect of setting (F (1,12)=4.839, p=0.048).

(ii) There was a marginal interaction effect between setting, walk and health (F(1,12)=3.673, p=0.079), significant on a one-tailed hypothesis.

Health is again having an effect in the urban setting; outcomes are advantageous in the poor mental health group and disadvantageous in the healthy group. The natural setting, as found elsewhere, is mutually beneficial to both groups.

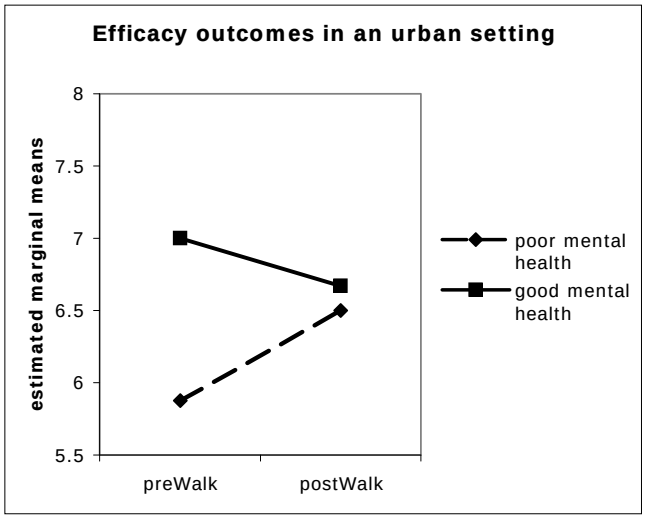


Fig 2.14

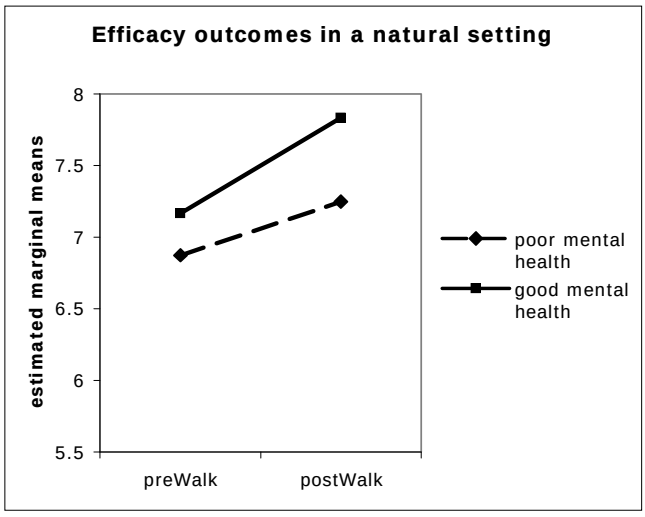


Fig 2.15

Table 2.4: Results from a 2-way ANOVA (General Linear Model (GLM)) factoring walk (pre to post) and setting (urban v. rural) with health as a between subjects factor, n=24						
	Sub-scale	**Main effect of setting** F, df, p	**Main effect of walk** F, df, p	**Main effect of health** F, df, p	**Interaction of setting x walk** F, df, p	**Interaction of setting x health** F, df, p
Mood	Hed. tone	3.83, 1, 0.064	33.62, 1, 0.000*	10.11, 1, 0.005*	**ns**	**7.19, 1, 0.014***
	Stress	4.68, 1, 0.042*	42.40, 1, 0.000*	8.28, 1, 0.009*	**ns**	**5.90, 1, 0.024***
	Energy	3.18, 1, 0.090	5.85, 1, 0.025*	11.78, 1, 0.003*	**4.45, 1, 0.048***	**12.63, 1, 0.002***
Project	Enjoyment	ns	6.33, 1, 0.020*	ns	**ns**	**6.33, 1, 0.020***
	Efficacy	4.84, 1, 0.048*	ns	ns	**ns**	**ns**

2.3.1.3 Summary Study 1

Health is affecting restorative outcomes with patterns in the healthy adult group most consistent with restorative theory. The urban setting patterns had a detrimental effect on outcomes in healthy adults and an advantageous effect in the poor mental health group. By contrast, the natural setting was mutually advantageous to both groups but to a greater extent in the healthy adult group.

2.3.2 Study 2: good v. poor mental health, natural setting (n=123)

NEGD was used to generate a larger sample primarily to explore predictors and discriminators between health groups, see Fig 2.16. Participants were recruited via established walking groups. Challenge emerged as a strong between-group difference in this study and provides the central theme in the reporting.

Study 2, n=123		
Walk	**GMH n=83**	**PMH n=40**
Natural	**X**	**X**
Urban		

Fig 2.16: Study design

2.3.2.1 Preliminary analysis

Firstly, change data across health groups was compared using Kruskal Wallis; on the pre-data *the groups significantly differed on seven out of nine measures* (see Table 2.5 below). On the change data the groups significantly differed on only two variables: hedonic tone (H(1)=4,80, p=0.028) and challenge (H(1)=10.267, p=0.001). These results suggest mood differences between groups converged after the experience of the walk, reflecting earlier findings. The degree of challenge experienced on the natural walk was marginally different between groups (H(1)=2.76, p=0.097) with 63% of the healthy group being challenged compared to just 50% in the poor mental health group. On a matched pairs test (Wilcoxon) results show the groups differed on outcomes for self-esteem and the stress and control project indicators (highlighted in blue in Table 2.6 over). The outcome for challenge shows negative change in the PMH group and positive in the GMH group.

Table 2.5: Pre- and post- walk differences in the natural setting between health group (Mann-Whitney), n=123					
Outcome		**PMH**	**Pre data GMH**	**PMH**	**Change data (pre-post) GMH**
Mood	Hedonic tone		p=0.000*		p=0.028*
	Energy		p=0.063		ns
	Stress		p=0.000*		ns
Self-esteem			p=0.000*		ns
Projects	Enjoyment		ns		ns
	Control		p=0.000*		ns
	Stress		ns		ns
	Efficacy		p=0.047*		ns
	Challenge		p=0.032*		p=0.001*

Table 2.6: Change (pre-post) in the natural setting by health group (Wilcoxon T test), n=123				
Outcome		**Natural post**	**Natural pre**	
			PMH	**GMH**
Mood	Hedonic tone		p=0.000*+	p=0.000*+
	Energy		p=0.001*+	p=0.002*+
	Stress		p=0.000*+	p=0.000*+
	Self-esteem		ns	p=0.014*+
Projects	Enjoyment		p=0.003*+	p=0.000*+
	Control		ns	p=0.022*+
	Stress		p=0.003*+	ns
	Efficacy		p=0.001*+	p=0.006*+
	Challenge		p=0.030*-	P=0.024*+

+ positive change, - negative change

2.3.2.2 ANOVA analysis

A series of one-way ANOVA's were run factoring walk (pre-post) with health as a between subjects factor. Assumptions of sphericity were met; assumptions of homogeneity were met for some but not all variables[16]. Highly significant main effects of health were found for *hedonic tone* (F(1)=19.44, p=0.000), *efficacy* (F(1)=4.04, p=0.047), *stress* (F(1)=18.46, p=0.000), *self-esteem* (F(1)=16.61, p=0.000), *control* (F (1)=18.964, p=0.000). Significant interaction effects between walk and health were found only in *challenge* (F(1)=8.90, p=0.003), illustrated in Fig 2.17 below. The interaction of walk and health was significant in hedonic tone on a one-tailed hypothesis. The groups differed much more on the challenge dimension than on mood.

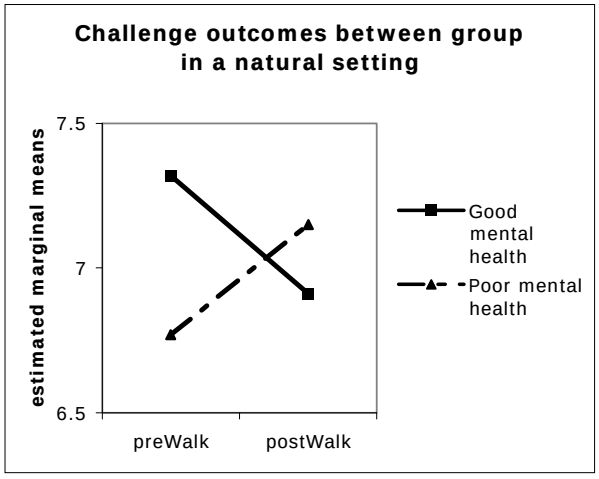


Fig 2.17

Outcomes on *challenge* were quite different between-group compared to outcomes in the other variables, which were similar across group but more advantageous in the poor mental health group (energy, stress *(*mood*)*, efficacy, stress (projects*)*). This can be seen in Fig. 2.18 below, stress (mood) below. The convergence of scores post-walk reflects findings from Study 1 but in a larger sample, the poor mental health group showed more rapid maturation rates (ie they changed more than the healthy group).

[16]Levene's test was significant in post scores for hedonic tone and challenge, but distribution of the data in these variables showed similar distribution patterns pre to post.

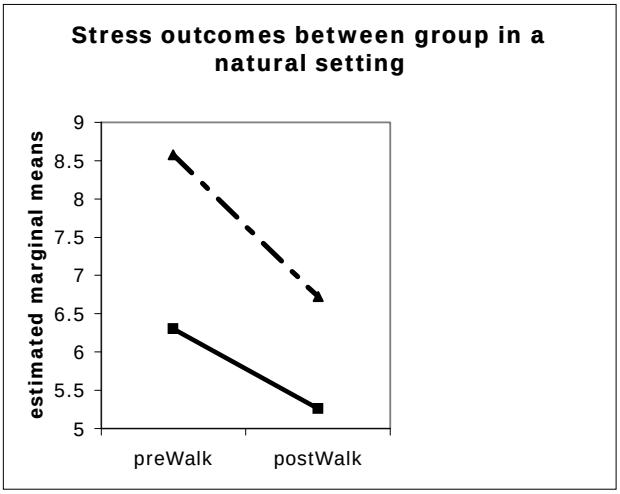


Fig 2.18

Table 2.6.1: Results from a 1-way ANOVA (GLM) factoring walk (pre to post) with health group as a between subjects factor, n=123			
Sub-scale	**Main effect of walk**	**Main effect of health**	**Interaction of walk x health (F, df, p)**
Hed. tone	p=0.000*	p=0.000*	**3.35, 1, 0.070**
Stress	p=0.000*	p=0.000*	**2.20, 1, 0.100**
Energy	p=0.000*	ns	**ns**
Self-esteem	p=0.001*	p=0.000*	**ns**
Enjoyment	p=0.000*	ns	**ns**
Efficacy	p=0.000*	ns	**2.76, 1 0.099**
Stress	p=0.021*	ns	**ns**
Control	p=0.006*	p=0.000*	**ns**
Challenge	ns	p=0.000*	**8.90, 1, 0.003***

2.3.2.3 Relationships between variables

(1) Correlations

Correlations were explored in relation to the challenge hypothesis. Was there a link between being challenged on the walk and the project challenge indicator? A significant correlation (Spearman) between the two dimensions was found in the healthy group only (r=0.195, p (1 tailed[17]) = 0.05); there was no relationship between these dimensions in the poor health group. Additional correlations are reported within the sections below to support findings.

(2) Exploratory data reduction

Sample sizes for data reduction are small by some standards (considered in Chapter 3, Section 3.3.1.2) and, whilst results should be viewed speculatively, they do show some interesting differences between groups. In each case, principal component analysis (on change data) found four components but the constituents varied between groups. In the healthy group, aspects of mood and project manageability shared underlying dimensions; energy and hedonic tone factored with efficacy; stress factored with project challenge. These results support the notion of a link between mood and mindset (Fredrickson's hypothesis). The factoring of challenge with other variables varied between groups; in the healthy group, challenge factored with stress (a pattern we might predict). In the poor mental health group, challenge factored with self-esteem (much less predictable). Could self-esteem outcomes therefore help explain why challenge outcomes significantly increased in this group over the walk? Does challenge feed into perceived inadequacies of self-esteem in poor mental health? Pre-walk self-esteem was significantly lower in the poor health group (H(1)=13.04, p=0.000); a matched pairs test (Wilcoxon) showed no significant differences post walk in this group. However, self-esteem did significantly improve in the healthy group (p=0.014). It is difficult to draw conclusions but the results suggest self-esteem and challenge share some underlying dimensions in poor mental health. The relationship was confirmed by correlations (Spearman's) showing a significant relationship between pre-self-esteem and post- challenge scores (r=0.344, p (2-tailed) =0.032).

[17] Predicted by hypothesis stated in Section 2.1.5.

Table 2.7: Factoring of change date, rotated component matrix for poor health group, n=40

Change data	Component			
	1	2	3	4
Efficacy	**.805**			
Enjoyment	.636			
Stress (mood)		-.769		
Hedonic Tone		.700		
Stress (projects)		.651		
Control			**.838**	
Energy			-.724	
Self-esteem				**-.836**
Challenge	.527			.595

Table 2.8: Factoring of change data, rotated component matrix for good health group, n=83

Change data	Component			
	1	2	3	4
Energy	.762			
Efficacy	.667			
Hedonic Tone	.638	-.534		
Stress (mood)		**.851**		
Challenge		.693		
Control			.793	
Enjoyment			.764	
Self-esteem				.791
Stress (projects)				.782

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 8 iterations.

2.3.2.4 Regression analyses

A series of regression analyses were run to see whether mood and/or project indicators could predict health group.

(1) Firstly, a binary logistic analysis showed that four variables were significant predictors of health group: challenge (change) and pre-walk (self-esteem, control and stress). The latter three variables were not significant post-walk suggesting the groups converged on these variables after the experience, reflecting results elsewhere.

(2) Significant predictors from Item (1) were explored using latent class analysis (using Latent Gold software). Similar results were found with challenge, pre-control and pre-self-esteem shown to be significant discriminators of sub-groups in a two-cluster model.

(3) Since differences between group in *hedonic tone* and *challenge* were highly significant in preliminary analysis, these variables were also explored in combination in Latent Gold, and found to be significant discriminators between sub-groups.

Each of these stages is described in more detail below.

(1) Logistic regression

Using a blocked regression, pre-walk data showed the health groups differed on control, stress and self-esteem (the pre-data was assumed to be the most established data and therefore entered first in block 1). A second block containing change data (i.e. pre-walk minus post-walk[18]) showed the health groups differing in challenge with a prediction accuracy of 80.6% (see Table 2.9 below). A multi-collinearity test showed the analysis was legitimate since the VIF (variance inflation factor) was no greater than 10 and the tolerance values were greater than 0.1.

[18] This was entered second since it is less well known data i.e. the research element.

In Block 1 the pre-data alone was 75% accurate at predicting health group. Adding the change data in Block 2 (pre- to post-walk) significantly improved the model (p=0.019). The classification Table 2.10 (below) shows the model is now 80.6% accurate at predicting health group.

Table 2.9: Results from binary logistic analysis, block 2 variables (from blocks 1 and 2) in the equation (SPSS 14 output), n=123						
	B	**SE**	**WALD**	**df**	**Sig**	**Exp(B)**
Pre-data (Block 1)						
Self-esteem	.245	.111	4.853	1	**0.028***	1.278
Control (P)	.557	.192	8.425	1	**0.004***	1.745
Stress (P)	.545	.245	4.938	1	**0.026***	1.724
Change data (Block 2)						
Challenge (P)	.746	.276	3.788	1	**0.007***	2.108

Table 2.10: Results from binary logistic analysis, Block 2 Classification table (SPSS 14 output), n=123			
	Predicted		
	PMH	**GMH**	**% Correct**
PMH	25	13	65.8
GMH	8	62	88.6
Overall %			80.6

(2) Latent class analysis

Following methods outlined by Aspinall (2007), latent class analysis was carried out to explore whether the predictor variables, identified by logistic regression analysis above, were also significant discriminators between clusters or sub-groups in the data[19].

The same four variables were entered into the cluster analysis: pre-data (control, self-esteem, and stress), change data (challenge) and health group. A two-cluster model produced the best fit (Bayesian Information Criterion BIC (LL) log- likelihood (LL) =1105.65)[20]. Mental health and challenge were significant discriminators between the two clusters ($p<0.05$), along with pre-data (control, self-esteem), but not stress. See Table 2.11 below.

[19] Latent class analysis identifies clusters or sub-groups of people who are characterised as different from another sub-group in a particular way.

[20] Various co-efficients of the model can indicate the significance of one model over another but generally the lowest BIC(LL) value is a good indicator.

Table 2.11: Significant differences between clusters for each indicator variable			
Models for indicators	Wald	p-value	R2
Mental Health: poor good	6.396	**0.011***	0.694
Challenge (p) (change data)	7.275	**0.007***	0.112
Pre-control (p)	8.388	**0.003***	0.179
Pre-stress (p)	0.036	0.85	0.000
Pre-self esteem	11.64	**0.000***	0.160

Table 2.12: Probability of indicator variable given cluster membership		
	Cluster 1 %	Cluster 2 %
Cluster Size	57	43
Mental Health: poor	1	82
good	99	18
Shift in Challenge (p): increase	10	31
no change	57	59
reduction	32	9

Table 2.12 shows the probability of an indicator variable given cluster membership. Cluster 1 membership equals 57% and 43% in Cluster 2. The values under the cluster columns are probabilities of having poor or good mental health and of shifting positively or negatively on the challenge dimension. 99% of membership in Cluster 1 fell into the good health group, with 32% of membership shifting positively on the challenge dimension. By comparison, 81% of the membership in Cluster 2 fell in the poor health group, with a 31% negative shift in the challenge dimension. Good mental health clustered with higher scores on self-esteem and control pre-walk, poor mental health with lower pre-levels of control and self-esteem (these results are not shown).

Table 2.13 (over) presents similar data but here the probabilities are inverted i.e. it shows the probabilities of being in a particular cluster given a particular indicator variable.

With good mental health the probability of being in Cluster 1 is 87% with an 82% chance of feeling less challenged on life tasks after the walk. By comparison, with poor mental health the probability of being in Cluster 2 is 99% with a 70% chance of feeling more

challenged by the prospect of life tasks post-walk. This reflects results elsewhere in the study.

Table 2.13: Probability of cluster membership given indicator variable		
	Cluster 1	Cluster 2
Overall Probability	57	43
Indicators		
Mental Health: poor	1	99
good	88	12
Shift in Challenge (p): increase	30	70
no change	56	44
reduction	82	18

(i) Mood variables (hedonic tone, stress and energy) as predictors

Since the mood variables were consistently significant between groups these were inserted into the Latent Gold model. A two-cluster model was most significant (BIC(LL) 649.96) with health, energy, hedonic tone and stress all significant predictors. (In the model the variables were re-grouped into a simple positive or negative score outcome).

Table 2.14: Significant differences between clusters for each indicator variable p<0.05			
Models for indicators	Wald	p-value	R2
Mental Health: poor	6.28	**0.012***	0.09
good			
Change data			
Energy	7.43	**0.006***	0.10
Hedonic tone	12.78	**0.003***	0.47
Stress	14.80	**0.000***	0.40

Table 2.15: Probability of indicator variable given cluster membership		
	Cluster 1 %	Cluster 2 %
Cluster Size	61	39
Mental Health: poor	55	15
good	45	85
Energy: increase (+3.12)	69	36
decrease (-1.3)	31	64
Hedonic tone: increase (+2.57)	83	13
decrease (-0.28)	17	87
Stress: increase (+0.66)	20	84
decrease (-3.02)	80	16

Table 2.15 shows poor mental health clustered with (1) and more advantageous mood changes; the healthy group clustered with (2) and less positive mood changes. Note, the decrease in scores were smaller compared to the increases (this is how Latent Gold grouped split the variables). The model suggests positive mood outcomes were greater in the poor mental health group, reflecting earlier results from ANOVA in this study (and indicative of more intense restoration). Table 2.16 inverts the scores and shows the same pattern.

Table 2.16: Probability of cluster membership given indicator variable		
	Cluster 1	Cluster 2
Overall Probability	61	39
Indicators		
Mental Health: poor	62	17
good	49	50
Energy: increase (+3.12)	74	25
decrease (-1.3)	43	57
Hedonic tone: increase (+2.57	91	08
decrease (-0.28)	23	77
Stress: energy (+0.66)	25	74
decrease (-3.02)	80	11

(ii) Hedonic tone and challenge as predictors (latent class analysis)

Since outcomes for hedonic tone and challenge were significantly different (preliminary analysis) between groups, the predictive significance of these variables was also explored in Latent Gold. A two-cluster model again produced the best fit (BIC(Ll)=619.024) with a 62% probability of being in Cluster 1 and 38% probability of being in Cluster 2. Hedonic tone (p=0.010), challenge (p=0.014) and health group (p=0.006) were all significant discriminators between the two clusters. Mental health was a clear discriminator with 89% of the good health group falling in Cluster 1, 73% of the poor health group in Cluster 2. Greater increases in challenge clustered with higher hedonic tone and poor mental health reflecting ANOVA results.

(ii) Hedonic tone and efficacy as predictors (latent class analysis)

Analysis across the thesis has shown these variables to be consistently correlated; could they also (in combination) significantly discriminate between health groups? Efficacy (p=0.026) and hedonic tone (p=0.047) were both significant discriminators in a two-cluster model, with mental health discriminating between clusters (p=0.010). Higher positive outcomes in hedonic tone clustered with higher efficacy outcomes in the poor mental health group; less positive changes with the healthy group. This lends some support to Fredrickson's hypothesis that mood and mindset are related. This relationship is supported by a highly significant correlation (Spearman's) between efficacy and hedonic tone (r=0.247, p (2=tailed)=0.008).

2.3.2.5 Summary of between health group analysis

Walking in an urban or natural setting promoted restoration in adults with poor mental health. Healthy adults behaved more consistently with restorative theory, with a walk in a natural setting more advantageous than an urban. Outcomes between groups converged in both settings, with the PMH shifting most positively. The health groups differed most in the urban setting. In the larger study (Study 2), positive change from a walk in the natural was most intense in the poor mental health group (on some but not all variables),

suggesting their restorative potential is greater. Challenge appears to be a variable on which the groups significantly differ and there is some evidence to suggest this is linked to self-esteem in the poor mental health group.

2.3.3 Study 3: poor mental health, urban v. natural, n=24

Four groups of adults with mental health problems were combined in an NEGD for the purpose of this study. The type of mental health problem varied between group but all participants were coping to a similar degree in that they shared an ability to participate in the research on more than one occasion[21]. Groups 1 and 3 were suffering from anxiety and depression, Groups 2 and 4 from various forms of psychosis, with schizophrenia forming the majority in group 4.

The urban walks took place in towns of historical interest and 'hard' fascination[22] (Fig 2.20); the walks in the rural setting were in forest settings or agricultural countryside (Fig 2.21).

Study 3, n=24		
Walk	**GMH**	**PMH n=24**
Natural	**-**	**X**
Urban	**-**	**X**

Fig 2.19: Within group design, n=24

Fig 2.20: Urban Setting

Fig 2.21: Natural Setting

[21] A total of 47 participants were recruited but only 24 walked in both an urban and natural setting; and only12 walked in three settings (urban v. water v. forest) highlighting some of the problems with working with this participant group.

[22] Culross, Edinburgh, Musselburgh and Stirling town centres.

2.3.3.1 Preliminary analysis

Firstly, data was screened to establish differences in baseline scores across the two settings *prior* to intervention (Mann Whitney, setting as grouping variable). There were no significant differences. Post-walk there were significant differences in the challenge project indicator (U=327, p=0.040, r=-0.26).

Outcome differences over walk were compared using a matched pairs test (Wilcoxon T test, Table 2.17): in the urban setting there were significant differences on mood (energy, hedonic tone, stress) and project indicators (control and efficacy). In the natural setting significant differences were found on mood (energy, hedonic tone, stress) and project indicators (enjoyment and efficacy) and on a one-tailed hypothesis differences for stress and challenge. The natural setting produced more positive change pre-post walk on six variables with the exception of challenge.

Table 2.17: Change (pre-post) across a natural setting in the poor mental health group (Wilcoxon) n=24

Pre-post Walk		Energy	Hedonic tone	Stress (mood)	Self-esteem	Enjoy-ment	Control	Stress (projects)	Efficacy	Chall-enge
Urban	p	**.012***	**.005***	**.000***	.667	.132	**.038***	.642	**.046***	.587
Natural	p	**.011***	**.000***	**.000***	.248	**.008***	.220	**.083**	**.007***	**.074**

2.3.3.2 ANOVA analysis

A series of two-way ANOVA analyses (GLM) were carried out, factoring walk (pre to post) and setting (urban v. natural) with group (4 no.) as a between subjects factor. Results showed significant interaction effects, between setting and walk, on mood and project variables. A natural setting was significantly advantageous over an urban setting in improving mood (stress and vigour) and two project indicators (efficacy and enjoyment) ($p<0.05$). Results in hedonic tone were significant on a one-tailed hypothesis. Significant interactions were present between setting and walk with gender and group ($p<0.05$): a natural setting was more effective in reducing stress in women; an urban setting significantly depressed mood in psychotic males. Assumptions of homogeneity were met for some but not all repeated variables.[23] Results for significant variables are presented below.

1 Hedonic tone

(i) The interaction effect between setting and walk was significant on a one-tailed hypothesis ($F(1,20)=3.096$, $p=0.094$): the walk in the natural environment was more advantageous over the urban.

(ii) There was a significant main effect of the walk ($F(1,23)=17.802$, $p=0.000$); the effect of setting was marginal ($F=3.146$, $df=1$, $p=0.089$).

(iii) There was no main effect of group, but group significantly interacted with setting ($F(3)=4.480$, $p= 0.015$). Outcomes in psychotic males were disadvantageous in the urban setting.

Walking in either an urban or natural setting were both advantageous to hedonic tone in adults with poor mental health, but a natural setting was more advantageous. In males suffering from psychosis the urban setting was disadvantageous.

[23] Levene's test indicated the assumption of homogeneity of variance had been violated on some post-walk variables (hedonic tone in the urban setting, enjoyment and efficacy in the natural setting).

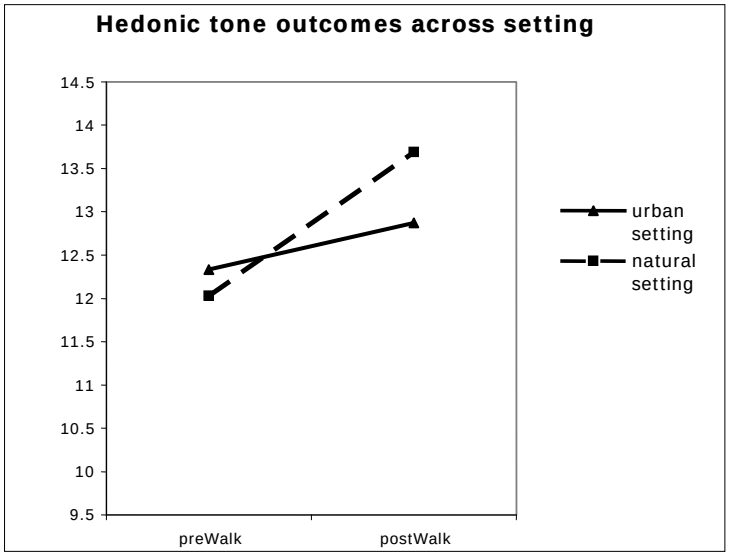


Fig 2.22

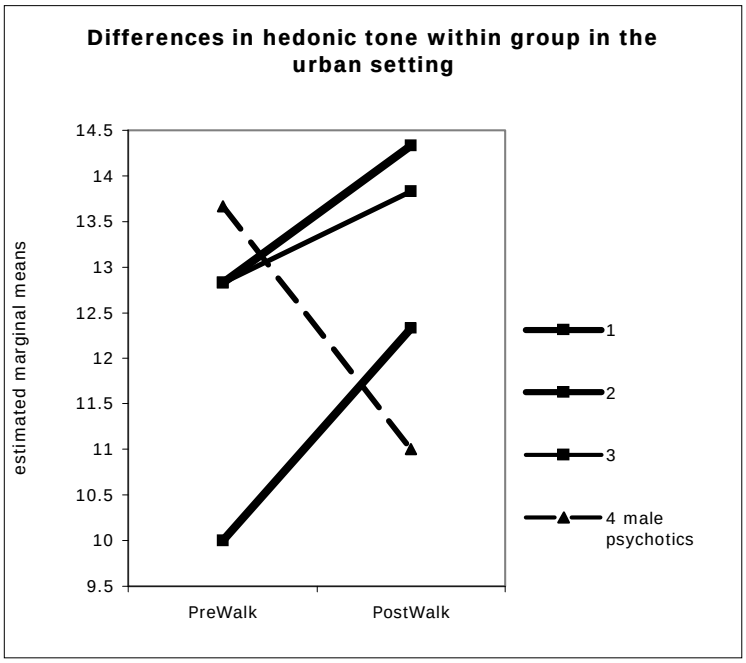


Fig 2.23

2 Stress

(i) There was a significant interaction effect of walk x setting (F(1,23)=5.740, p= 0.025).

(ii) There was a main effect of the walk (F(1,23)=30.63, p= 0.000) but not setting.

(iii)There was no main effect of gender but a significant interaction of setting and gender (F (1)=3.996. p= 0.05), and walk and gender (F(1)=4.289, p= 0.050): *the plots show women benefited more from the natural setting*.

The walk was beneficial in reducing stress in both settings but the natural setting was most advantageous and especially advantageous to women.

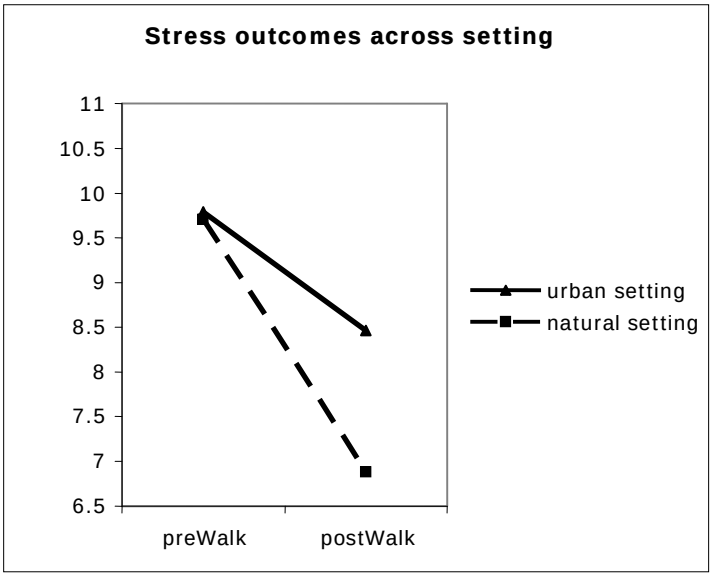


Fig 2.24

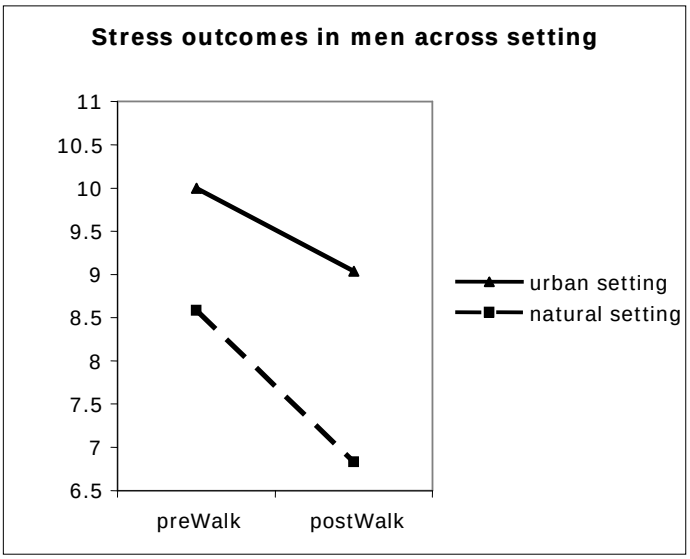


Fig 2.25

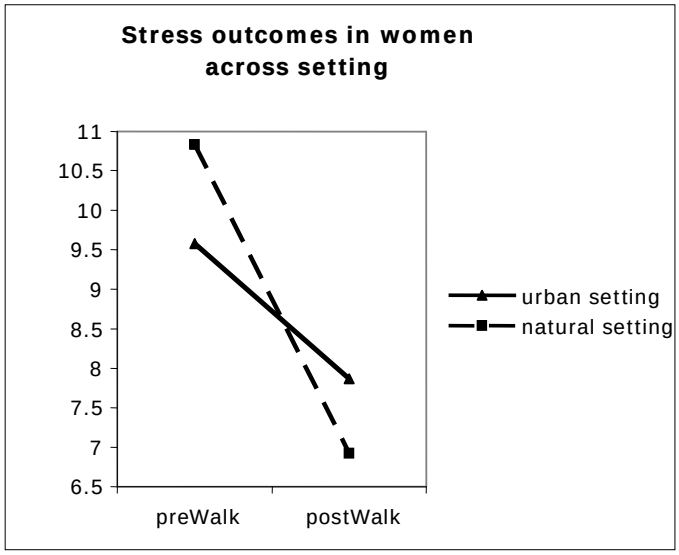


Fig 2.26

3 Vigour (energetic arousal)

(i) There was a significant interaction effect between setting x walk ($F(1,20)=4.60$, $p=0.044$).

(ii) There were main effects of setting ($F(1,20)=612.20$, $p=0.002$) and the walk ($F(1,20)=10.61$, $p= 0.004$).

*(iii)*There was a significant interaction of group with walk ($F(1,20)=4.59$, $p=0.013$). Energy matured at a greater rate in both settings in the group with depression and bi-polar.

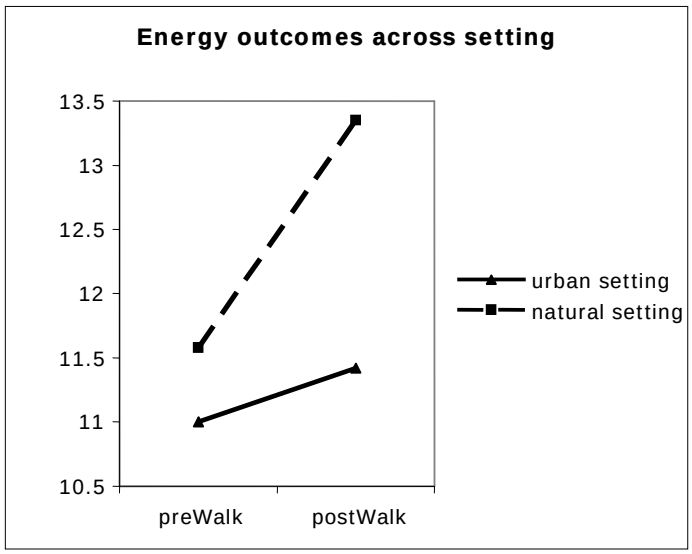


Fig 2.27

4 Enjoyment project indicator

(i) There was a significant interaction effect of walk and setting ($F(1,20)=5.031$, $p=0.036$).

(ii) There was a significant interaction effect of group and setting ($F(3,20)= 6.368$, $p=0.003$).

(iii)There were no main effects of setting or walk.

The natural setting was again more advantageous on this variable than the urban setting.

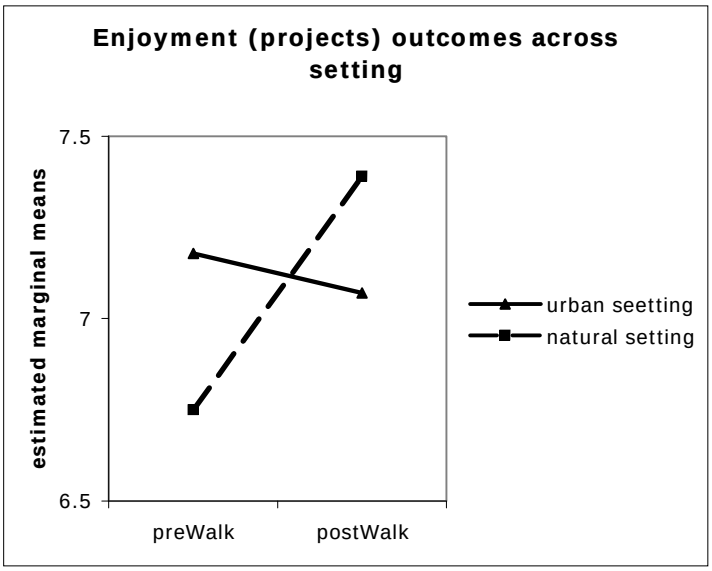


Fig 2.28

5 **Efficacy project indicator**

(i) There were significant interactions between walk and setting F(1)=4.543, p= 0.044).

(ii) There was a significant interaction between setting and group (F(3)=3.094, p=0.050).

(iii) There was a significant effect of walk (F(1)=4.543, p=0.000) but not setting.

(iv) There was no main effect of group; gender had a marginal main effect (F(1)=2.82, p= 0.10).

The effect of the walk in the natural environment was again advantageous over the urban. Outcomes converged between groups in the natural setting, whilst in the group of male psychotics the urban environment was again detrimental.

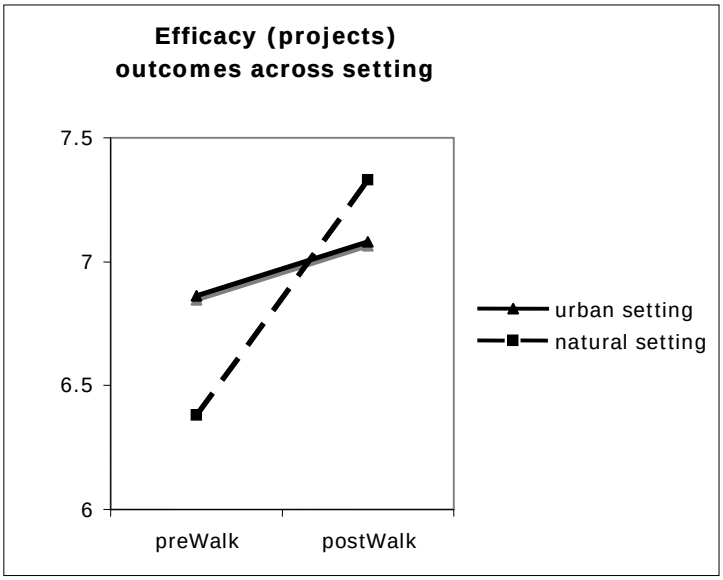


Fig 2.29

Table 2.18: Results from a 2-way ANOVA (GLM) factoring walk (pre to post) and setting (urban v. natural) with PMH group as a between subjects factor, n=24					
Sub-scale		**Main effect of setting** (F, df, p)	**Main effect of Walk** (F, df, p)	**Interaction of setting x walk** (F, df, p)	**Interaction of setting x group** (F, df, p)
Mood	Hedonic Tone	3.14, 1, 0.089	17.80, 1, 0.000*	**3,096, 1, 0.094**	**4.48, 3, 0.015***
	Stress	ns	30.63, 1, 0.000*	**5.76, 1, 0.025***	ns
	Energy	11.69, 1, 0.002*	8.32, 1, 0.008*	4.19, 1, 0.054	ns
Projects	Enjoyment	ns	4.06, 1,0.005*	**5,03, 1, 0.036***	**6.37, 1, 0.003***
	Efficacy	ns	4.54, 1, 0.000*	**4.54, 1, 0.044***	**3.09, 3, 0.05***

2.3.3.3 Differences in natural settings (n=11).

The literature suggests a preference for water over other settings; it was therefore hypothesised that a water setting would be more effective on restorative outcomes. This was explored in a small additional study with a one-way ANOVA factoring setting (on the change data), on two variables only (hedonic tone and stress), across three settings (urban v. water v. forest). Significant effects of setting where found in stress but not in hedonic tone. Outcomes between an urban setting and a water setting was significantly different (F=5.05, 1, p=0.049); outcome differences between water and forest settings where marginal (F=4.68, 1, p=0.056). The water setting was most effective in reducing stress. There was a significant interaction effect between setting and gender on stress (F=6.42 1, p=0.006). The water setting was most effective at reducing stress in women, illustrated in Fig 2.30 below. Assumptions of sphericity and homogeneity were met for ANOVA.

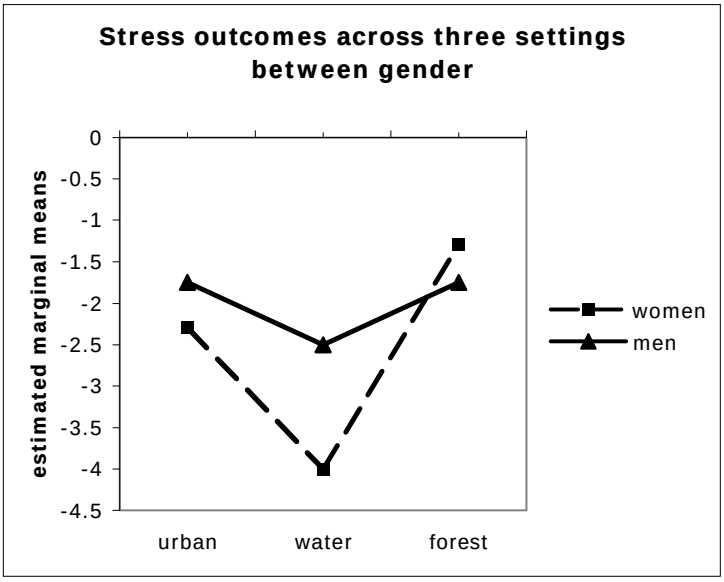


Fig 2.30

2.3.3.4 Summary Study 3

A walk in either an urban setting or natural setting was advantageous to adults with mental health problems, but the natural setting was more advantageous to mood (stress and vigour), and to project indicators (enjoyment and efficacy). The urban setting was disadvantageous to male psychotics on a number of variables (hedonic tone, stress and enjoyment, and efficacy project outcomes). The urban environment was most disadvantageous to men.

2.3.4 Study 3: qualitative results, adults with poor mental health, n=24

2.3.4.1 Semi-structured interviews

(1) Aims

Semi-structured interviews were conducted with 24 participants with mental health problems walking as part of a group within a structured programme. The main purpose of the interviews was to elicit the longer-term or *'instorative'* benefits of walking in different settings. Most of the interviews were conducted whilst walking and talking using a digital recorder. Interviews were transcribed and coded in NVivo 7 for evidence of the affective dimension of natural settings to link with themes elsewhere in the thesis. The results of this preliminary analysis appear in Appendix 2.4. Whilst this analysis was informative it didn't capture the essence of 'instoration' or the experience of walking as a group, nor did it illuminate findings from the quantitative data. The coding process was therefore repeated and data organised around the core themes outlined below. In order to grasp the extent of longer-term change in adults with poor mental health, firstly, the context of mental illness needs to be understood.

(2) The experience of mental illness

For ethical reasons participants were not asked directly about the nature of their illness, but many volunteered information about hospitalisation, the sheer desperation of their illness, acute isolation, stigmatisation and an overpowering sense of inertia.

> *"I was desperate, I was absolutely desperate … I had no structure to my day, no idea who I even was. What is life about? …. How am I going to do it? I mean how am I going to do it? Where could I go where there's a new circle of people who'd understand what this is like.*"

> *"when you're depressed your body seems to deaden down, plus the fact, I looked different …. I didn't want anyone to see me so I didn't go into town."*

"you really can't be bothered, it's lethargy with a capital L … there's days you wouldn't go out the door"

A common theme across participants was the disconnection from reality that occurs with mental illness and the closure of felt emotion: *"When you're depressed it's like there's a bit of glass between you and real life, and you know you're not right but you don't feel you can do anything. Your emotions are sort of stifled, you feel very sorry, you can't cry, you can't laugh"*.

Lack of control is another characteristic feature of mental illness; a relinquishing of responsibility to professional carers, *"I put myself in their hands"*, daily life characterised by a round of medication and clinical appointments. On hospitalisation, one participant captured the horror of the hospital environment as "*One flew over the cuckoo's nest… horrendous, absolutely totally frightening... the medication trolley rolled up in the corridor in the evening and you'd basically just go out like sheep… this could well be a prison"*. In addition to the illness itself the side effects of medication wreak havoc "*not just inside your head but inside your body as well"*. Weight gain, a constant appetite for food, sweat flushes, fatigue and agitation just some of the side effects participants have to contend with. Some have turned to alternative measures owing to frustration and the inability of the NHS to provide treatments other than medication: *"as far as I was concerned the services were not helping me, the conventional mental health services had basically told me they didn't have anything to offer"*. A number of participants expressed disillusionment with conventional therapeutic settings.

(3) Instorative benefits

(i) Awakening of felt emotion

The single most frequently-mentioned benefit from the walk experience was renewed vigour. 75% of participants described being more energised long-term. This process was described as an awakening from being emotionally and physically spent, resulting in improved vigour and motivation to get on with life-tasks, and an ability to feel emotion again:

> *"Until you get outside and start walking, you don't really know how you feel within yourself… so the walk is contact with social reality, but contact with the physical world as well. Aye definitely, touching things, seeing things… aye, even just a rainy day… this is quite refreshing. You know this is actually feeling, it's like taking a cold shower*."

> *"it makes you feel alive. And you've done something. You're keeping alive and you're seeing things outside"*.

For some, this process is linked with being on the move and the mechanics of walking as a group: *"the pace will change, or you just naturally interrupt your pace to tie your lace or whatever, let a car go by, and before you know it you've got somebody else standing next to you"*. In others, it's direct contact with the natural world that awakens the senses and promotes energy: described by one as the process of taking off your boots and paddling in water: "*that was exhilarating, to paddle across rivers, I like that, it seems to give you energy"*. Water, in this context, has a refreshing and regenerative power.

Was this process linked to renewed curiosity in the world? 50% of participants (unprompted) mentioned interest in the physical and social context as a motivator to walk. The level of detail absorbed in a single moment is encapsulated in the following description: "*the scene, the animals and birds, talking to people, answering people, the breeze, the nice breeze on an April morning, the seagulls up above. The sea's a nice green colour today. You can see the Lothian hills, the east Lothian hills, the women with their*

prams, with their babies. Taking a walk, the wee yellow hoods; people's gardens are nice and that with the tulips".

Linked with renewed vigour is an increased motivation to get on with life: *"It's given me more motivation to get out the house a bit more, rather than just sitting in the chair all day long"*. Simply having something to get up for, the routine of walking once a week, brings structure and stability where previously there has been none. This in turn promotes independence and a feeling of responsibility: *"... the penny dropped, it was like flicking a switch, that I'd put myself in their hands (the professionals) up until that point, and then I said, no enough is enough, I'm taking responsibility for myself here"*.

(ii) Recovery from depression

A cumulative increase in positive affect was reported as helping recovery from depression. Many participants referred to the synergistic benefits of walking and medication on mood, the two in combination significantly better than either alone:

> Interviewer: So what would you say was your main motivation for walking?
> Interviewee*: It makes me feel better. I started when I wasn't terribly well, and it's got me out of a depression. I think it's helped that.*
> Interviewer: So would you say it's helped as much as other forms of treatment?
> Interviewee*: Oh yes, definitely. I've been taking medication as well but this has really helped.*

Mood uplift has a longer-term transformative effect on personality: "*I felt crabby, very, very crabby, just grumpy. I don't feel that here. I feel like a completely different person"*. The process is helping form new self-identities, as found in Parr's research (2005).

(iii) Social cohesion and peer support

One of the strengths of walking in a group is the social cohesion it facilitates in people with mental health problems. 71% referred to the longer-term benefits of being with people who understood the problems associated with mental illness: "*the family dinnae understand*

because they've nay been through it. Here you meet folk with the same problems so it helps to just talk to them". For many the main motivation to keep on with a walking programme is social, *"it's the company for me rather than the actual walking"*. The opportunity to forge friendships in this context offers a lifeline for some: *"[the motivation] is friendship because that's what I lack. I haven't had one single friend I could call a friend in my whole life owing to my bi-polar"*.

A key component is peer support and trust: "*you know, there's a lot of trust within the group as well, which is really vital, you know. There is no doubt about it… I would have to say that's probably the biggest thing, that trust between us*". Talking freely is linked with the mechanics of moving and being away from a clinical environment. This opens up opportunities to talk to professionals in a different way but more importantly to talk with like-minded people: "*sometimes when someone's not great it's not a facilitator they want to talk to, it's another member*". The process of talking whilst walking has therapeutic potential but it is not "therapy", a concept some interviewees are sceptical of. This research therefore errs on the side of caution in not labelling walking as "eco-therapy" since this may deter some adults with mental health problems. What's attractive is the sheer normality of the experience and the natural dynamics that arise: "*the magic is the chemistry between the people"*. Participants were emphatic about having a preference for walking with people with similar mental health problems as opposed to walking with 'healthy' groups.

(4) Setting preferences

Participants walked in their local urban environment, and quantitative data showed this was effective in raising mood. Contrary to these findings, the qualitative data indicates that, on the contrary, participants do not want to walk in such settings: *"I really don't like town walks – particularly if it's an Alloa walk because … everyone will be looking at us, why are we all walking about in a crocodile about the town? I absolutely detest that."* Being away from their everyday environment allows mental health patients to escape stigmatisation and facilitates anonymity. Some reported feeling phobic about walking in their local environment even though findings elsewhere indicate this type of walking is beneficial. Participants stated a strong preference for walking away from home, but these need not

necessarily be rural always. What's important, as well as anonymity, is to maintain walk diversity and interest.

(5) The challenge hypothesis

The PhD has speculated on the link between challenge and personal coping. An intriguing finding from the quantitative analysis was that, contrary to expectations, adults with poor mental health found life-tasks significantly more challenging after a walk in the countryside than before and that 50% had not been challenged by the experience. The qualitative data confirms that walkers with poor metal health are not being challenged long-term: with the exception of the all male group (who undertake hill walks of more than two hours duration), not a single interviewee found the walks physically challenging, although some reported being challenged socially and motivationally. A number were clearly disaffected with the lack of physical challenge and stated a preference for being pushed further: *"the walk was too short, I didn't think it was challenging", "it was too easy"*. The quantitative data suggests patients with mental health problems are capable of being physically more challenged, particularly the men, several of whom reported physical exertion positively fed back into everyday life tasks: *"You feel more alert (afterwards), a task like reading would be easier, and a lot more fulfilling"*.

(6) Summary

Reconnecting with the physical world and social cohesion are two significant longer-term benefits of walking in natural settings for people with poor mental health, many of whom report having lost the ability to connect with or engage in life. Walking in natural settings away from home, in conjunction with medication, has the potential to significantly aid recovery from depression, grief and anxiety. The effects on more severe durable illnesses (psychosis and schizophrenia) were harder to glean from the interview process, although some participants reported reduced symptoms (e.g. hearing noises) in the natural setting. What was clear is that a high number of participants are not being challenged by the experience.

2.3.4.2 Visual methods: poor mental health group, n = 24

(1) Introduction. In an attempt to elicit the 'felt' dimensions of the landscape, a participatory photographic exercise was employed. The aim was to explore the thoughts and feelings attached to affective "cues" in the landscape, physical and social. Participants were provided with disposable cameras and invited to photograph things they found interesting, attractive or which captured their imagination in someway. They were asked to fill in a record sheet giving each photo a title and recording a brief note as to why they took the photo. Three groups took part, two on the same walk in Stirlingshire and one in East Lothian. Twenty -three participants generated 282 photographs, an average of 12 each, but writing, photographing and walking proved challenging; some participants omitted to give each photograph a title, but most recorded why they'd taken the photograph. The photographs were classified according to affective responses – fear, curiosity, aspiration, calm etc., using emotion categories from the circumplex model (Russell, see Chapter 5). In keeping with the classification system developed in Chapter 5, the emotive "cues" in the landscape were classified according to one of three independent groups, that is as valenced reactions to Objects (structures, vegetation), Agents (people, animals) or Events (moving elements such as water or sunshine) (Ortony et al 1980). To link this information back to restorative theory, the emotion categories were cross-referenced to the Kaplans' matrix of environmental restorative properties (Kaplan and Kaplan 1989):

(1) Fascination – effortless attention or curiosity
(2) Being away: getting away from it all
(3) Extent: connection with a "whole other world".
(4) Compatibility: resonance between natural setting and human inclinations

Two other categories were included from the Kaplan's preference matrix:

(5) Coherence and Legibility
(6) Complexity and Mystery[24].

[24] The Kaplans propose that people's preferred landscapes will reflect features that aid coherence (a structured scene), legibility (easy to understand and explore without getting lost) and possess mystery (hold promise of more information).

(2) Results

Results are recorded in Table 2.20 below. The most repeatedly photographed items captured a feeling of interest (78%), particularly curiosity (54%), prompting questions like "*what is that doing there?*". Interest in the landscape was mostly generated from seasonal colour (spring blossom, autumn berries), texture (of leaves, bark), the shape and form of vegetation (branch structure), built structures (stone walls, cairns, ruins) and incongruous, misplaced objects (old bath tubs). Contemplation was a significant affective dimension in this category (16%) mostly stimulated by long views to the surrounding countryside connecting participants to the wider world ("extent") and prompting recall of former life events. In addition, participants were drawn to spaces, markers and nodes that signalled the start or change in a route, stimulating feelings of anticipation (10%) and generating a sense of coherence in the landscape.

Serenity was a key affective dimension, particularly associated with water and solitary objects that stimulated feelings of calm and stillness. Agents (people) were associated with comfort: the chef of kerbside kiosk, for example, signalling an opportunity to share stories about local food suppliers. Some of the physical cues in the landscape promoted an empathic reaction, reflecting a particular mental health state, *"that tumbledown wall… it's a picture of how I'm feeling"*. In contrast, colour and movement in the landscape prompted feelings of energy and vigour, suggestive of renewed life. Negative affordances (fear) were few and far between and associated with dense, dark forest and brooding faraway hills. Core affect in most instances was positive (pleasure) with varying ranges of arousal.

These results support the Kaplans' theory that natural landscapes promote "soft fascination", a form of effortless attention which the authors suggest promotes rest and reflection. But there was also significant interest in "hard fascination", in the form of built structures, promoting cognitive interest rather than rest.

The coding of photographs has not been verified by an independent researcher but this could be easily implemented.

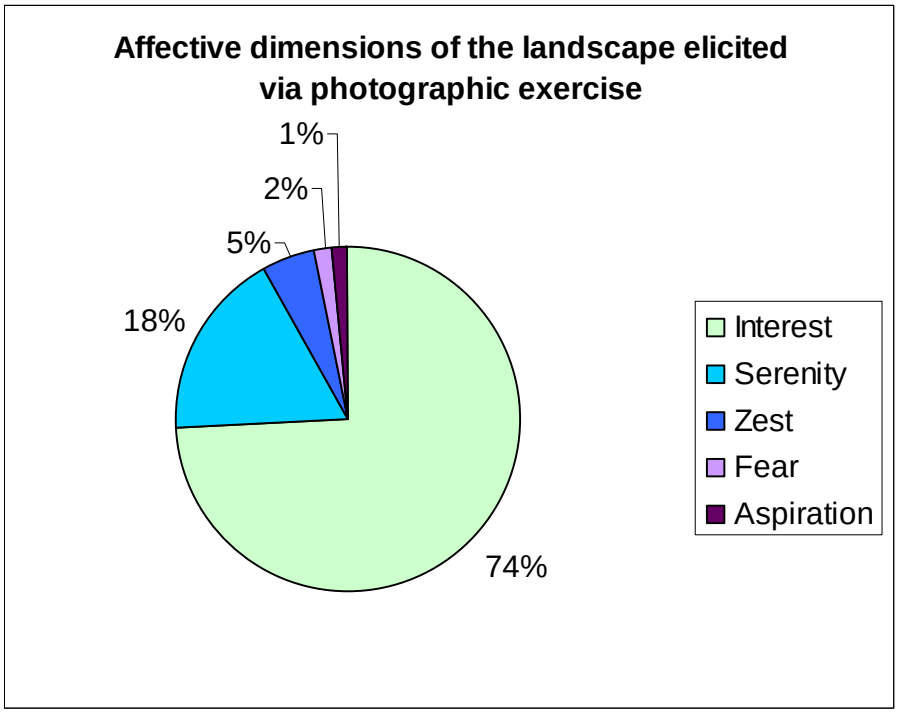


Fig 2.31

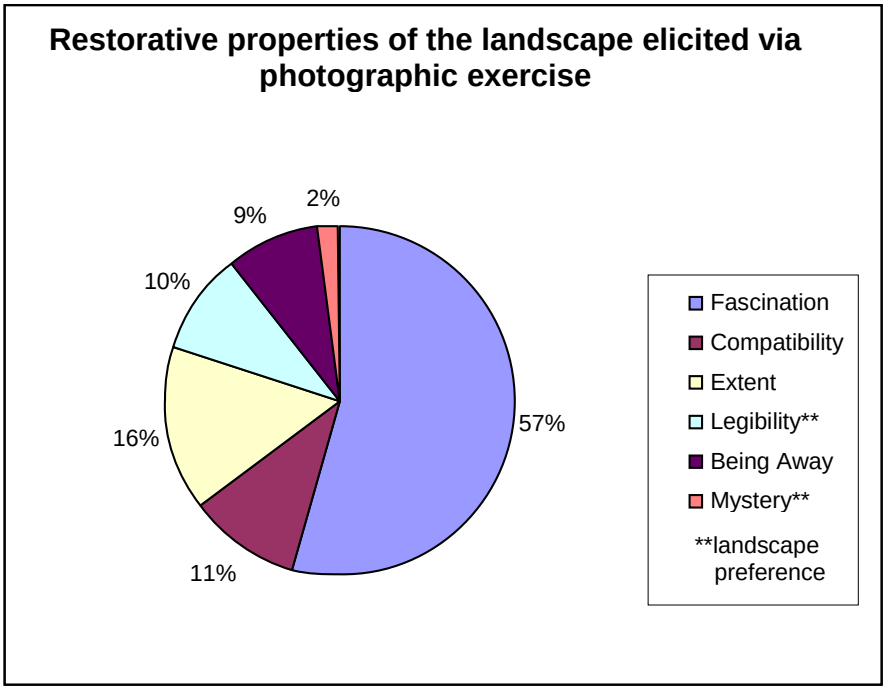


Fig 2.32

(3) Development of method

It would be interesting to explore the affective dimensions elicited via the photograph exercise in relation to the spatial composition of the walk. The walk in East Lothian promoted more contemplative reactions. Was this owing to the expansive number of views (Firth of Forth, to Traprain Law, Berwick Law and the East Lomond Hills)? By contrast, the walk in Stirlingshire (Alva Glen) was spatially more enclosed with fewer views, generating many more photographs of solitary objects and stimulating greater curiosity. Plotting these (as I have done in Chapter 5) might illuminate patterns between affect and context; for now, I'm showing the pattern in just one case study, see Table 2.21 below.

Table 2.20: Classification of photographs, n=23						
Affective dimension	**Sub-category**	**Valenced reaction to:**	**No of photos (by group)**	**Examples**	**Restorative Property**	**Total %**
Interest	Curiosity	Objects (solitary)	55 (14, 28,13)	Hawthorn tree: *"it's just sitting on itself"*, Fungi: *"it's an interesting shape*", Tree stump: *"how big was the tree?"*	Fascination	52%
		Objects and Events (sensory)	68 (17, 31, 20)	*"the frost patterns are interesting"'* *"I like the pattern and texture of the leaves"'* *"I like the dappled light and shade".*		
		Agents and Events (movement)	20 (2, 10, 8)	Tractor: "*just interesting to watch"* Roads *"the old and the new … motorways engulfing*"		
			1 (1,0,0)	Barking dogs: *"they may be working dogs?"*		
	Anticipation	Objects (wayfinding, spatial nodes)	29 (12, 11, 6)	*Path: "now we are going somewhere"* *Signage: "it's nice to be welcomed"* *"just to record where we are going"*	Legibility	10%
	Contemplation	Objects (visual)	35 (9, 20, 6)	*"just a fine view … makes you feel good to contemplate"*	Extent	16%
		Events (sensory)	1 (1,0,0)	*"the sun filtering through the trees – contemplation of sunshine is satisfying"*		
		Objects (water)	3 (0,3,0)	*Still pond: "make a wish for good luck"*		
		Objects (Spiritual contemplation)	5 (0, 4, 1)	*"The steps – the way to reach the light"* *"The trees are transient, they remind us we are just passing by"*		

Table 2.20 cont						
Affective dimension	**Sub-category**	**Valenced reaction to:**	**No of photos (by group)**	**Examples**	**Restorative Property**	**Total** %
Serenity	Calm	Event (Falling water)	15 (5,4,6)	*"I just like the water – it's nice, it's calming"*, *"it's lovely to hear the sound of running water as we leave the wood and go into the sunlight"*.	Being Away	9%
	Stillness	Objects (solitary) and Agents	10 (6, 3, 1)	Single stone: *"it is curious ... it has a stillness"* *"the sheep all sitting under the trees – they're very vague"*		
	Comfort (empathy)	Objects (solitary)	5 (0,4,1)	"the tumbledown wall, I like the tumble down feel, it's a picture of how I'm feeling"; "the prison (wall) how I feel now blocked off and left out"	Compatibility	10%
	Comfort (social)	Agents (people)	22 (2,14,6)	"the silver spoon's head chef (mobile kiosk), a comforting sight … food and people", "the group - this is what it's all about"		
Zest	Exhilaration/ refreshment	Objects and Events (moving water)	3 (plants) (0,3.0) 6 (water) (0.,3,0)	"A host of golden daffodils, a bright and cheering sight" "the rippling Tyne ... water in spate" "I'd like to dip my feet in, it's exhilarating"	Fascination	5%
	Humour/Play	Objects (incongruous)	6 (2, 2, 2)	Bunker: "*don't get bunkered in real life"* Old porcelain basin: "*What a long way to come and wash your hands"; "Let's play"* *"Someone's had a smashing time"*		
Aspiration	Hope	Objects, Agents and Events	4 (1,1,2)	*"lovely dogs .. I haven't got one. I'd like a dog"*, *"I'd like to have a house in the countryside surrounded by trees"*. *"the farmhouse, a lost way of life"*	Compatibility	1%
Fear	Apprehension	Objects	5 (1,2,2)	"*it's spooky in the woods"* *"the Black Satanic Hills"*	Mystery	2%

(4) A case study in photographs: a walk in the East Lothian countryside, April 2007	
"I'm calmer on the walk. Sometimes when I get home I see horrible letters in the box and I don't like that. Adverts lying on the floor at the back door. But on the walk it's peaceful for that moment. You feel like a Cheyenne… and there's nothing to bother you. You're on the plains. You're just walking and there's nay electricity bills, nay politician hassling you to vote for him…it's peaceful."	
Frank	**Introduction**
	Frank likes long walks; once he starts walking he says he can't stop. He recalls walking from Edinburgh northwards to the Trossachs and beyond, sleeping rough en route*: "I went 269 miles in 1992. I'd take a sleeping bag next time. I had a big coat on. That kept me warm but I took the wrong food with me. I took chocolate biscuits. You see I do things on the spur of the moment. I didny think of food much. And I had an awkward bag – it was a stupid wee sporting bag. And it snapped after a while*". Now Frank lives in sheltered housing, plays the guitar and is a member of an amateur dramatics group. He walks with a group now but says being with people makes him anxious. Rather than talk, he sings whilst he walks and has an infinite repertoire of old Scottish ballads and Burns poems.

Valenced reaction to Objects	Core Affect	Title	Response
 Solitary shotgun cartridge	Curiosity	The gamekeeper	What did he shoot today? The tiger? Tiger, tiger burning bright …I like cats.
 Stone cairn	Curiosity	The cairn that should not be there!	Maybe the stones were already in the soil? They should be on top of a hill!
Valenced reaction to Objects	**Core Affect**	**Title**	**Response**
 Solitary willow tree	Vigour	The yellow waving willow	I like the strong green of the pines to the left, the blue sky and yellows.
 Wild daffodils	Vigour (empathy)	A host of golden daffodils	*I wandered lonely as a cloud, That floats on high o'er vales and hills …* *And then my heart with pleasure fills, And dances with the daffodils.*

 Catkins	Contemplation (spiritual)	The catkin tree	Green budgies, a host of green budgies smiling and looking down on us.
 Signage	Coherence	The route	I just like reading things, in case I want to come back again, I like reading signs.
Valenced reaction to Objects	**Core Affect**	**Title**	**Response**
 Solitary buttercup	Vigour	The Lone Lass of the Spring Buttercups Starting Out	I like bright colours, even yellow in winter, it's always colourful
Valenced Reactions to Events			
 East Lomond Hills	Contemplation (recall)	The Lomond Hills	The two hills plus Ben Lomond, that makes three. I used to live just below, 1957, the Christian Brothers, it was a home for orphans.
 North Berwick Law	Contemplation (recall)	The Bonny Law	I walked there seven years ago. There's a nice atmosphere there, it's exciting … I like hills, hills are good for you, your worries all go away because you're concentrating on walking, looking at animals. I like the sounds of animals, I don't like city sounds, the sound of motors and cars.

 River Tyne	Vigour	A Nice Day for Swimming	I like to take my boots off, hang them around my neck, and paddle my feet in the water. It's invigorating, the cold water gives you more energy, it's refreshing.
Valenced reactions to Events	**Core Affect**	**Title**	**Response**
	Vigour	The White Bridge	The sound of water under the 21st century road bridge, the bonny Tyne and the whirling pools.
	Vigour	The Ship at Sea on a Spring Day	Nice colours, the different colours of the blues of the Firth, the orange of the boat

2.4 Discussion

Evidence was found to support the hypothesis posited at the start of this chapter; in both health groups the natural setting was advantageous in raising aspects of mood and changing perspective of life tasks (efficacy and enjoyment). Outcome differences between settings were statistically significant ($p<0.05$), particularly in the energy variable ($p<0.01$). But the pattern was not consistent across all variables (challenge, self-esteem, control) nor between groups.

A sub-question asked whether outcomes would be different amongst health groups; this was found to be the case. Firstly, in healthy adults, outcomes were consistent with restorative theory; walking in a natural setting was more effective in raising mood, self-esteem and perceived manageability of life tasks. In the poor mental health group outcomes were less consistent with restorative theory. A walk in the urban setting also produced beneficial outcomes but the natural setting was more effective. Self-esteem did not significantly alter in this group from a walk in either setting. Within the poor mental health group there are some parallels with Peacock et al's (2007) findings: both studies show a natural walk can significantly reduce stress in this population. However, the studies obtained different results in relation to self-esteem and vigour; this study shows that energy significantly (and consistently across two studies), increased from a walk in a natural setting, but that self-esteem did not; Peacock el al's (2007) study found the opposite pattern.

A consistent finding across the studies in this chapter is the convergence between health groups that arose post-walk in the natural setting (and, on some measures, in the urban setting); the health groups were different on many variables pre-walk but this difference dissipated after the walk (with the exception of challenge and self-esteem). The natural setting brought about greater equilibrium in mental health states. But of equal interest are the differences: why did the walk in the natural setting fail to improve self-esteem and increase the challenge dimension in adults with poor mental health? Firstly, it should be noted that pre-walk self-esteem scores were significantly lower in this group when compared to healthy adults; the finding may therefore simply indicate it is harder to shift self-esteem in adults with poor mental health. Interestingly, challenge was the

only variable to show a negative pattern in the poor health group in the natural setting. This is discussed below, in the light of the challenge hypothesis.

A second sub-question this chapter asked was in relation to challenge: would a challenging walk in a natural setting (removed from a home context) reduce the perceived challenge of everyday life tasks? Some evidence was found to support this concept; the healthy group were marginally more challenged by the walk and felt significantly less challenged by the prospect of life tasks after the walk; by contrast the poor mental health group were not challenged (a finding from both qualitative and quantitative analyses) and felt significantly more challenged by life tasks after the walk. Data reduction indicates challenge and self-esteem share some underlying dimension in adults with poor mental health. This finding leads us to speculate that self-esteem may need to significantly improve, to effect changes in coping mechanisms in adults with mental health problems, but the evidence is far from conclusive and requires further research. These relationships are complex and the discussion is further developed in Chapter 8.

Another aspect the PhD explores is the link between affect and manageability of personal projects. Here results were mixed but partly depend upon how we interpret challenge (negatively or positively). If we view challenge as a stressful concept, we would expect (based on personal project analysis) the relationship between hedonic tone and reduced challenge to be positive (i.e. as hedonic tone increases, we would expect challenge to reduce) but there were no significant correlations between the two variables. In fact, the opposite pattern was found in the poor health group: increased challenge clustered with increased hedonic tone, supporting positive constructs of challenge as defined in Section 1.2.1. On other dimensions, regression analysis showed a link between efficacy and hedonic tone; increased efficacy clustered with higher hedonic tone in the regression model, a relationships supported further by data reduction and correlations showing significant relationships between these variables (echoing patterns elsewhere in the PhD).

An interesting dimension not anticipated by the research was the emergence (via the qualitative and visual components) of curiosity as a key response to the landscape (and one argument for a mixed-methods approach). Curiosity has been identified as an important but neglected process in the pursuit of well-being by Kashdan and Steger

(2007). Since this theme consistently emerged across studies within the PhD, the discussion is developed more fully in the conclusions (Chapter 8). Curiosity is different from the effortless engagement of Kaplans' concept of fascination that brings rest. Curiosity promotes exploratory activity and is theoretically linked with anticipatory coping (Lazarus et al 1980) and increased resourcefulness, competence and personal growth (Kashdan et al 2004). Of particular relevance to this chapter is the theoretical link between absorption ('flow') and curiosity. Did curiosity vary between health groups and did this affect challenge outcomes? Did giving participants a camera promote more curiosity than typical? Was curiosity greater in the natural setting than the urban? These relationships could be easily explored in further research by integrating a measure of curiosity in the quantitative component (Curiosity and Exploration Inventory (CEI), (Kashdan et al 2004).

Non-intrusive clinical settings are known to be effective therapeutic environments for the treatment of mental illness, facilitating a re-connection with the real world (Prouty et al 2002). The qualitative component of this study suggests that natural settings have much to offer, in terms of facilitating reconnection to the physical and social world, and may be particularly important for depressed people who have lost the ability to connect or engage in life. This research also adds to the evidence base, that urban high streets have a negative impact on people with diagnosed psychotic disorders (Ellet et al 2008), but recommends further research in a larger sample. The challenge in this research will be to identify what elements of the urban environment cause the negative effects. However, to call walking in natural settings, by contrast, "therapy" is potentially a mistake that may deter mental health patients, fatigued with therapeutic contexts, from engaging in the activity. It is the normality of the experience that appears to be important.

Outcomes in adults with poor mental health were triangulated across methods (Table 2.21 below), lending support to the main hypothesis, that walking in natural settings raises mood and shifts perspective on the manageability of life tasks. Additional outcomes on curiosity and the lack of challenge were supported from findings in two methods.

Table 2.21: Triangulation of findings across methods			
Outcomes	Quantitative	Qualitative	Visual
Increased mood	√	√	√
Improved coping	√	√	✖
Curiosity	✖	√	√
Lack of challenge	√	√	✖

2.5 Limitations

The major limitation of this study is in the use of Non Equivalent Group Design, presenting threats of internal validity. As a caution to this, a range of non-parametric statistical tests were employed in conjunction with ANOVA analysis. Levene's test indicated that the assumptions of ANOVA had been violated on some repeated measures variables (post-walk), but in line with Fields (2005), the results are reported to enable others to judge, and elsewhere in the literature there is a consensus that providing sample sizes are equal (and not less than five) the analysis is legitimate. Data was carefully screened using other tests and additional rules for messy data applied (Kirk 1994). The only variable in which distribution was an identified problem was hedonic tone. This data could be transformed but Fields (2005) indicates "*this has very little effect*". Since findings were consistent across other analyses the pattern is reinforced. Lack of randomisation is another limitation in the study, but this is difficult to achieve in adults with varying mental health problems. In future, this could be addressed by recruiting and randomising one single group, with a particular diagnosed condition. A control group (i.e. a group who did not walk in either setting) would have strengthened the study but obtaining equivalent numbers of adults with mental health problems engaged in group activity indoors proved impossible to source.

A strength of the study is in ecological validity. Research was carried out in the field using populations other than students (the trend in restorative research to-date). In this respect the research is based in the real-world contexts in which people live. This real-world context, however, poses problems in developing future research; one problem being the recruitment of sufficient adults with mental health problems to generate causal evidence of the link between nature and improved mental health. The evidence base is therefore likely to grow slowly, using small participant numbers as in this study. This need not be a barrier, providing the effects are statistically significant or "large" (Mitchell 2008).

2.6 Conclusions

In healthy adults, this study has shown walking in natural settings has the potential to promote and maintain good mental health (salutogenic healthcare) in the short-term; further research is required on cumulative benefits. In adults with poor mental health, walking in natural settings has the potential to improve mental health in both the short and long-term. Defining the activity as a "treatment" is problematic, but in combination with medication, it has a synergistic effect that can aid recovery from depression, and reconnect mental health patients with the outside world. The challenge dimension of the activity requires careful attention in terms of developing outdoor recreational policy for adults with poor mental health. Based upon preferences, more specialist walking groups and walks further afield from home are required to meet the needs of this health group. The effect of the urban setting needs to be re-tested in this group, to establish whether it can also be advantageous in promoting good mental health. This study suggests, contrary to preferences, that this may be possible.

Chapter 3: Restorative outcomes of forest settings in young people with good and poor behaviour.

Chapter 2 has shown how natural settings can promote well-being in adults with good and poor mental health problems. This chapter explores whether natural settings can produce similar outcomes in young people and whether these differ amongst adolescents with good and poor mental health, defined here, as being with or without a significant behavioural problem. This is a mixed-methods study using quantitative and qualitative research methods, including participatory video, to explore the psychological complexities of young people's relationship with place. A forest outdoor activity programme (as opposed to a walk), forms the mechanism for this study, with the experience of the forest setting directly compared to an internal school setting.

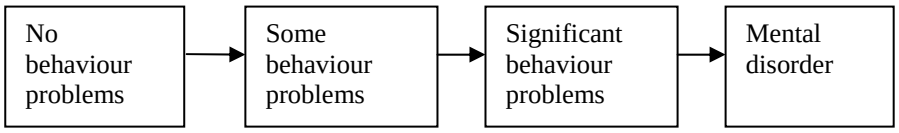
3.1 Introduction

3.1.1 Young people and well-being

UK children have the lowest levels of well-being in the developed world, ranked bottom in a league table of 21 industrialised countries in a report by United Nations International Children' Fund (UNICEF) (2007), based on 40 indicators of children's well-being, including poverty, family relationships and health (aged 11, 13, 15). Well-being has been shown to fall as children get older, dropping substantially in secondary schools. Exactly why this happens is not fully understood: a fall off in curiosity and interest, particularly amongst girls, is one reason cited (New Economics Foundation (NEF) 2004). In developing the UK strategy for *"Every child matters"*, NEF (2006) has suggested that natural environments can help promote mental well-being in young

people but there is relatively little empirical evidence supporting this link. This research therefore explored whether forest settings could offer psychological benefits to adolescents with varying emotional needs.

The number of children in the UK with troubled behaviour is increasing with a 13% rise in school suspensions (45,000) in 2005 (MHF 2008). There is no generally agreed definition of the term '*behaviour problem'*. For the purpose of this study, it is defined as 'unacceptable' or 'abnormal' behaviour, that is perceived as different or at odds with social expectations or accepted 'norms' that will vary culturally (DfES 2003). The most common behaviour problems form two broad categories: internalised behaviour problems (emotional disturbance or distress, withdrawal) and externalised behaviour problems (disruptive or antisocial behaviour that includes attention deficit disorder, hyperactivity and excessive aggression). The different degrees of behaviour are represented as a continuum, illustrated in the flow chart below (adapted from Buchanan and Ritchie 2004):



The PhD explored mood outcomes across this spectrum: in this Chapter it is evaluating outcomes in the first and third categories, which for simplicity are referred to as "good" and "poor" behaviour; no derisive labeling is intended. The following chapter explores outcomes in the "mental disorder" category where behavioural problems have become so severe, that they have resulted in the removal of a young person to a specialist care setting. Firstly, what evidence is there to suggest nature can support mental well-being in children and young people?

3.1.2 The effect of natural settings on well-being in children and young people

Cognitive benefits: there is some evidence to suggest nature supports healthy cognitive development in children**.** Wells (2000) has shown improved concentration in children (age 7-12) from playing in natural settings. Faber Taylor et al (2001, 2004, 2008) have shown a reduction in the symptom severity of attention deficit hyperactivity disorder (ADHD) in young people after engaging in activities in green, natural open space. Symptoms were significantly reduced in a green outdoor setting as compared with the

school setting or the built environment and these findings were consistent across a wide age span of children and young people .

Stress relief: Milligan and Bingley (2007) have shown the potential of woodlands to reduce stress and anxiety in young people (aged 16-21). The authors' suggest that the potential therapeutic qualities of woodland are partly shaped by childhood experiences, reflecting other research linking positive environmental experiences in adulthood to those experienced in earlier childhood (Ward Thompson et al 2004, Korpela 2008). Wells and Evans (2003) have shown how living near to nature can bolster resilience and stress mechanisms in children. Research on stress-relief has to-date focused on qualitative methodologies.

Affective benefits: nearby nature has been shown to reduce psychological distress, anxiety and depression in children (age 7-12) (Faber Taylor et al 2002, Wells and Evans 2000, 2003). However, forest settings can also raise anxiety levels in young people, caused in part by media scare-mongering, parental fears and scary myths, but also from the spatial characteristics of woods that can cause claustrophobia (Milligan and Bingley 2007). Young peoples' affective relationship with landscape is shown to be complex.

Personal developmental benefits: only one study in adults has linked improved personal effectiveness at life tasks with nearby everyday green settings and attention restoration (Kuo 2001). Improved self-discipline in children (aged 7-12) has been linked to the amount of green space visible from high-rise public housing in Chicago (Faber Taylor et al 2002). In girls, improvements in self-discipline measures (i.e. concentration, inhibition of impulsive behaviour and delay of gratification) were all associated with larger extents of available green views from apartment windows; the outcomes in boys were less clear. This research suggests that self-control may be mediated by restorative processes and is the only research to hint at gender differences in the effects of near-by nature on children.

Behavioural benefits: Kuo and Sullivan (2001b) have shown the potential for attention restoration to promote less aggressive behaviour. Levels of aggression and violence were significantly lower in individuals living in greener surroundings. Lack of nature significantly predicted levels of mental fatigue, which in turn predicted aggression. This research has shown how a restorative process can lead to a behavioural outcome

and reduce anger and hostility. A similar study (Kuo and Sullivan 2001a) has shown a link between greener settings and reduced reports of crime. These findings are striking, because they suggest that the extent of exposure to nature need only be relatively slight, for a discernable effect to occur. Much of the research above has been carried out in deprived, inner-city areas and suggests that nearby nature may play a more significant role in the well-being of children from poor socio-economic backgrounds.

Further evidence of the link between nature and behavioural outcomes in young people is provided in the evaluations of outdoor or "wilderness" programmes, mostly carried out in the US and Australia. These interventions have been shown to significantly reduce the severity of behaviour in young people: promoting reduced recidivism (Sveen and Denholm 1993; Barrett and Greenaway 1995; West and Crompton 1999; Pearson 1991 cited in Ward Thompson 2006); improved social relationships (Russell, Hendee and Phillips-Miller 2000, cited in Ward Thomspon 2006); and reduced rates of substance abuse (Benett et al 1998). Outdoor activity programmes have also been shown to consistently improve self-efficacy and self-esteem in young people, two dimensions linked in the literature with successful management of personal goals. Ward Thompson et al (2006) suggest that contact with wild adventure space impacts on aspects of psychological well-being in young people (e.g. self-perception and self-esteem, confidence, autonomy, coping), as well as on interpersonal skills (e.g. communication, teamwork, social efficacy). Russell and Hendee (1999) have suggested the setting itself (naturalness, solitude, remoteness) is vital in youth at risk, in terms of leaving a culture of habits and peers behind. However, providing direct causal evidence of the effect of structured outdoor activity programmes on health and behaviour is problematic, owing to the difficulty in separating out the environmental experience from the programme activities and identity/personalities driving them: "*most of the effects seem plausibly attributable to the programme activities rather than the wilderness setting*" (Faber Taylor and Kuo 2006).

In summary, there is relatively little empirical evidence supporting a direct causal link between improved health and natural settings in young people. Faber Taylor & Kuo (2006) conclude that whilst existing research provides *suggestive* evidence of positive relationships between natural environment interaction and children's well-being, most studies suffer from methodological limitations including an overreliance on self-reported outcomes. A major gap in research is how nature can help meet age-specific

developmental needs in young people. Personal self-identity is known to be a key developmental need for 12-15 year olds (Erikson 1959) and forms a theme in this and subsequent chapters.

3.1.3 The effect of anger on health and anti-social behaviour

Anger was added as a mood outcome in this study (and the next) since it was perceived to be particularly salient to young people with behaviour problems. Whilst there is much less evidence on the link between anger and health in children and adolescents, in a recent review, Kerr and Schneider (2008) document substantial evidence linking anger with a number of negative outcomes in young people. High levels of anger are associated with problematic interpersonal relationships, mental ill health (depression and suicide) and reduced physical health (cardiovascular disease, cancer, poor diet, obesity and greater risks of drug and alcohol consumption). Gender differences were found, with boys more likely to overtly express anger (anger-out) resulting in externalised behaviour problems; girls are more likely to repress anger (anger-in), resulting in internalised behaviour problems.

Research on anger has mostly focused on negative outcomes (violence, aggression, hostility) but a number of theorists have linked anger with a propensity to change and improved energy (see Mahon et al (2000) for a full review of the literature). Izard (1993) has theorised that anger induces a sense of vigour, mobilising energy for action, postulating that "*we may never feel stronger or more invigorated than when we are really angry*". Izard (1993) further suggests that the relationship of vigour to anger is greater than that associated with any other emotion. Testing this proposition in early adolescents, Mahon et al (2000) found the opposite: trait anger[25] reduced vigour. State anger[26] was positively related to vigour, but when the influence of trait anger on state anger was controlled for the connection vanished.

A number of theorists have also linked anger with the propensity to change (Novaco 1976, Gayline 1984, Lerner 1985, Travis 1982). Freeberg (1982) has shown that adolescents who are able to express anger also have the ability to think more flexibly

[25] trait anger (a general propensity to be angry)
[26] state anger (a temporary state varying in intensity)

about changing their lives. Change is perceived in the context of this research as something positive and constructive. This proposition was also tested by Mahon et al (2000) and the opposite found: higher trait anger reduced adolescents' ability to change opinions or seek out new experiences. In summary, theories supporting the notion that anger can positively benefit health are yet to be proven by empirical research.

Anger is associated with stress in the literature, via depression. The link between depression and antisocial behaviour is now widely recognised (see Rowe et al 2006 for a review). Anti-social behaviour can result in consequences such as school failures, exclusion and discordant relationships with peers and family, precisely the type of stressful life experiences known to increase the risk of depression. Young people with behavioural problems are much more likely to experience adverse life events and be at greater risk from depressed mood.

This study was therefore interested in the relationships between anger and other mood variables (energy, stress and hedonic tone). Firstly, it hypothesised natural settings will be specifically more positive in raising mood and changing perspective on personal projects than the internal built environment. Secondly, this research asked two sub-questions:

(1) will outcomes differ between groups of young people with and without behavioural problems, and can forest settings offer particular therapeutic benefits to young people with behavioural problems?
(2) will the social dynamics of the setting impact on the outcomes?

3.2 Methods

3.2.1 Participants and procedures

Ten young people participated in this research, aged 11-13, attending an inner-city school in Glasgow. The ratio of boys to girls was 6:4. The young people had been especially selected to take part in a pilot study of a 12-week forest school[27] programme that took part in a local urban forest each week (November 2007 to March 2008). Five of the group had no behavioural problem and five had a significant behavioural problem

[27] An outdoor activity programme developed by the Forestry Commission, providing opportunities for structured and unstructured woodland activities, and used mostly in the UK in younger age groups (pre-11) to build confidence and self-esteem www.foresteducation.org

which included anti-social behaviour (school exclusions), attention difficulties and psychological distress[28]. Written and verbal information about the project was presented to parents and pupils, and signed consent was required to take part in the research.

The five pupils with good behaviour were participating in the John Muir Award; this suggests this group have a greater interest in the natural environment, have been more frequently exposed to it (through award activities) and might therefore (based on the literature) have a greater likelihood of exhibiting restorative outcomes.

3.2.2 The experience measured

The effect of a day at forest school on mood was directly compared with the experience of a typical school day. The forest experience was of urban fringe woodland, not especially rich in woodland quality, adjacent to a major motorway and suffering from litter and vandalism. Site conditions were often wet, cold and very muddy. The pupils travelled by minibus to the site on a weekly basis. The school setting was a state senior school located in an area of high deprivation in Glasgow. A forest activity experience was chosen over walking, since walking is not a popular activity amongst this age group, and it made sense to focus on appropriate recreational policy for young people.

3.2.3 Quantitative measures

The instruments used were identical to those used with adults, with the addition of anger as a mood variable, and self-identity as a project indicator, defined in this context as "typical self". A few other amendments were made owing to the age and poor attention span of some of the sample; some mood adjectives (UWIST MACL) were changed after consultation with paediatricians and professionals in the field, who felt a few would be difficult to interpret (eg 'sluggish' was changed to 'tired'). The project scale was shortened, asking the young people to generate just one project (see Appendix 3.1). The young people completed the questionnaire pre and post a day's experience in the school or the forest (repeated twice in the same setting and herewith referred to as forest1 and forest2) (see Fig 3.1 over).

[28] Originally the group comprised 12 young people, but two individuals dropped out during the course of the research, one from each behaviour group.

Young people (age 11-13), n=10		
Setting	**Health Group**	
	GMH (6)	**PMH (4)**
School	X	X
Forest Time 1	X	X
Forest Time 2	X	X

Fig 3.1: Study design

3.2.4 Qualitative Measures

This comprised of observation by staff, feedback from parents and participatory video techniques with the young people designed to tease out other underlying dimensions affecting the experience of the forest setting.

3.3 Results

3.3.1 Quantitative results

Results are presented in four parts. Firstly, preliminary analysis explored whether outcomes were different between settings. This identified some significant differences in a number of mood variables, particularly anger and hedonic tone. Secondly, data reduction was carried out to identify underlying constructs amongst the variables, which showed some project variables to be of interest. Thirdly, to compare the after-effects of the forest activities with those in the school setting, a series of two-way repeated measures ANOVA's were carried out, with behaviour as a between-subjects factor. This analysis was carried out on mood variables only and findings were further supported by correlations. Finally, relationships between variables were explored using correlations and pictorial regression, illustrating the hierarchical relationship between variables, and their significance as discriminators of setting. A summary of results appears in Section 3.8.

3.3.1.1 Preliminary analysis

Non-parametric tests were employed where possible, since distribution patterns amongst some variables (stress), showed some non-normative patterns. However, assumptions of homogeneity of variance and sphericity for ANOVA analysis were met. As an exploratory screening, independent t tests (Krsukal Wallis, Mann Whitney[29]) were used to explore the pre-conditions, prior to the experience of either setting. The child/setting was considered as unique in this context (confirmed by no correlations) in order to identify important variables for main analysis. These tests showed no significant differences in baseline scores across the two settings *prior* to intervention. Post intervention outcomes for anger ($H(2)=9.96$, $p=0.007$) and hedonic tone ($H(2)=9.34$, $p=0.009$) were significantly different between the forest and school settings. A matched pairs test (Wilcoxon) then explored the differences on change data for each variable, firstly between school v. forest1 and again for school v. forest2.

[29] Mann-Whitney was used to screen data across the two settings (school and forest) and Kruskal Wallis across the three settings (school, forest1 and forest2).

(1) Within group differences. Results showed significant anger differences between the school and forest1 setting (z=-2.108, p=0.035) and (on a one-tailed hypothesis[30]), significant differences between school and forest2 (z=-1.873, p=0.03). Secondly, *hedonic tone outcomes were significantly different* between school and forest1 (on a one-tailed hypothesis, z=-1.825, p=0.034), and also significantly different between school and forest2 (z=-2.375, p=0.018). Energy outcomes were *ns* between the school setting 1 and forest1 setting, but significant between school and forest2 (one-tailed hypothesis, z=-1.880, p=0.060). Outcome differences for stress, self-esteem and the five project dimensions were *ns* between settings. The means (Table 3.1 below) show some interesting patterns: firstly, more consistent positive changes in the forest setting; and secondly, over time, the ability of the forest setting to promote restoration increased. For example, for anger, stress and hedonic tone, the means show that positive change increased with exposure to the forest. Change was most significant in the school setting, a pattern confirmed by other analysis.

[30] All tests report p significance on two-tailed probabilities, except where hypothesis allowed one-tailed probability.

Table 3.1: Change (pre to post) across setting by health group (Wilcoxon), n=10						
Dependent Variable		**Setting**	**T1** **Mean, SD**	**T2** **Mean, SD**	**Change pre-post**	
MOOD	**Hedonic Tone (HT)**				**GMH**	**PMH**
		School	15.00, 1.41	11.56, 2.40	0.04*	0.10
		Forest 1	14.10, 1.85	13.40, 1.89	0.10	ns
		Forest 2	11.90, 3.72	12.56, 2.55	ns	ns
	Anger	School	2.33, 0.71	5.00, 1.73	0.04*	0.03*
		Forest 1	3.50, 1.89	3.30, 1.96	ns	ns
		Forest 2	3.56, 1.34	3.10, 1.59	ns	ns
	Tense Arousal (TA)	School	7.0, 2.87	7.78, 3.59	ns	ns
		Forest 1	7.9, 2.28	7.8, 3.39	ns	0.10
		Forest 2	10.5, 3.63	9.0, 3.04	ns	ns
	Energetic Arousal (EA)	School	13.56, 1.88	10.56, 3.09	0.04*	ns
		Forest 1	13.00, 1.56	11.60, 1.95	0.06	ns
		Forest 2	13.00, 1.00	12.00, 2.29	ns	ns
SELF-ESTEEM		School	13.67, 2.12	13.11, 2.15	ns	
		Forest 1	13.50, 2.01	13.80, 2.2		
		Forest 2	12.89, 1.9	12.67, 2.12		
PROJECTS	**PROJECTS Enjoyment**	School	3.78, 0.44	3.78, 0.44	ns	
		Forest 1	3.90, 0.32	3.78, 0.44		
		Forest 2	3.89, 0.33	3.90, 0.32		
	Control	School	3.22, 0.71	3.22, 1.09	ns	
		Forest 1	3.50, 0.71	3.60, 0.70		
		Forest 2	3.22, 0.83	3.56, 0.53		
	Stress	School	3.00, 0.87	3.22, 0.83	ns	ns
		Forest 1	3.30, 0.68	3.00, 1.05	0.08	ns
		Forest 2	2.78, 1.20	2.67, 0.87	ns	ns
	Support	School	3.56, 1.01	3.44, 0.29	ns	
		Forest 1	3.40, 0.97	3.80, 0.42		
		Forest 2	3.33, 0.87	3.33, 0.24		
	Efficacy	School	3.89, 0.33	3.78, 0.44	ns	
		Forest 1	3.80, 0.42	3.90, 0.32		
		Forest 2	3.67, 0.50	3.78, 0.44		
	Self-identity ("typical-self")	School	3.00, 0.71	3.11, 0.78	ns	
		Forest 1	2.70, 1.06	2.60, 1.35		
		Forest 2	2.44, 1.01	2.78, 1.30		

(2) Between group difference. Outcomes between behaviour groups were explored across mood variables and significant differences in energy, stress and anger were found. These results are reported in Section 3.3.1.3. Gender differences across mood variables were *ns*.

3.3.1.2 Exploring constructs in the data

Exploratory data reduction (factor analysis) was carried out to explore underlying constructs in the data. The minimum sample size needed to conduct factor analysis has been much debated; the recommended ratio of sample size to number of variables ranges from 2:1 through to 20:1. Others argue (Guadagnoli and Velicer 1988 cited in Fields 2005), that if a factor has four or more loadings greater than 0.6 it is reliable, regardless of sample size. Fields (2005) suggests that if all communalities are above 0.6 then small samples (less than 100) may be perfectly adequate. The factor loadings carried out in this analysis were mostly above 0.6 but the sample size is nevertheless very small, n=10, and results should therefore be viewed as speculative.

Firstly, the pre-test results were factored and then the change data (pre-post). Pre-test results factored into three components; change data consistently factored into four components, suggesting greater cognitive complexity (i.e. more components in the solution) after the experience compared with before. Post-test data was also factored and results are incorporated overleaf where similar patterns were found.

Table 3.2: Factoring of pre-test data rotated component matrix, n=10

	Component		
	1	2	3
% of variance	29.3	17.3	11.4
Pre Self-Esteem	.732		
Pre Energetic Arousal	.649		
Pre Project Enjoyment	.623		
Pre Project Control	.611		
Pre Anger	-.548		
Pre Project Stress	. 518		
Pre Project Efficacy	.502		
Pre Hedonic Tone		**.831**	
Pre Stress		-.796	
Pre Project ID			**.886**
Pre Project Support			.769

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Rotation converged in 5 iterations.
Project dimensions are shown in italics.

(1) Pre-test results: the variables fell into patterns as expected. Pre intervention anger was negatively factored with self-esteem, energy, enjoyment, control and efficacy, and positively factored with project stress. Hedonic tone and stress were negatively factored, and self-identity and support were positively factored. Dimensions with particularly high factor loadings (above 0.800) are flagged in bold type, with self-identity having a high factor loading. See Table 3.2.

(2) Change data: the factoring of change data (see Table 3.3), showed that positive dimensions were again grouped in component 2, that project dimensions factor into components 1 and 4, with enjoyment factored with self-identity (as we would expect), and stress negatively factored with manageability (control and efficacy). Anger is negatively factored with self-esteem. The patterns were replicated in a post-intervention rotation (not reported here), with identity emerging as a core construct (factor loading 0 .897) factored with stress.

In summary, factoring the variables produced similar results; aspects of project manageability were negatively associated with low mood and positively associated with good mood, self-esteem and energy. Identity was associated positively with stress, support and enjoyment and consistently had high factor loadings, suggesting it warranted further analysis[31]. Underlying constructs of the four emergent components appear to be project manageability, negative affect (repeatedly associated with self-esteem), positive affect and self-identity.

Table 3.3: Factoring of change data (pre-post), rotated component matrix , n=10

	Component			
	1	2	3	4
% variance	26.9	17.5	14.2	9.8
Theme	Manageability	Positivity	Negativity	Identity
Project stress	.743			
Project efficacy	.681			
Project control	.677			
Tense arousal	-.632			
Energetic arousal		**.832**		
Hedonic Tone		**.814**		
Project support			.764	
Self-esteem			.729	
Anger			-.721	
Project Enjoyment				**.824**
Project Identity				.720

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 7 iterations.
Project variables in italics.

[31] Post-test factoring revealed a number of other project variables with high factor loadings (control, enjoyment) and self-esteem.

3.3.1.3 Effects of setting on mood

Two-way ANOVA's (GLM) were carried out factoring setting (school v. forest) with behaviour as a between group factor. This analysis was carried out on the change data (the difference pre to post). Assumptions of ANOVA (Mauchley's test of sphericity, Levene's test of homogeneity) were met. Results are presented separately per variable. There were no main or interaction effects of gender.

(1) Anger

(i) There was a significant main effect of setting: this difference was significant between school and forest1 ($F(1,8) = 7.65$, $p=0.024$), marginal between school and forest2 ($F(1, 7)=5.11$, $p=0.058$).

(ii) *There was a significant main effect of behaviour*: this difference was significant between school and forest1 ($F(1,7)=5.97$, $p=0.044$), between school and forest2 ($F(1,6)=6.06$, $p=0.049$).

(iii) *When behaviour was added as a between-subjects factor the difference between settings increased in significance*: between school and forest1 setting ($F(1,7)=14.82$, $p=0.006$), between school and forest 2 (which became significant) ($F(1,6)=7.46$, $p=0.034$).

(iv) *There were no significant interaction effects between setting and behaviour*: the result was marginal between school and forest1 ($F(1, 7) =4.57$, $p=0.070$), *ns* elsewhere.

The difference (post) between groups in the school setting was significant (Mann-Whitney $U=1.5$, $p=0.048$)

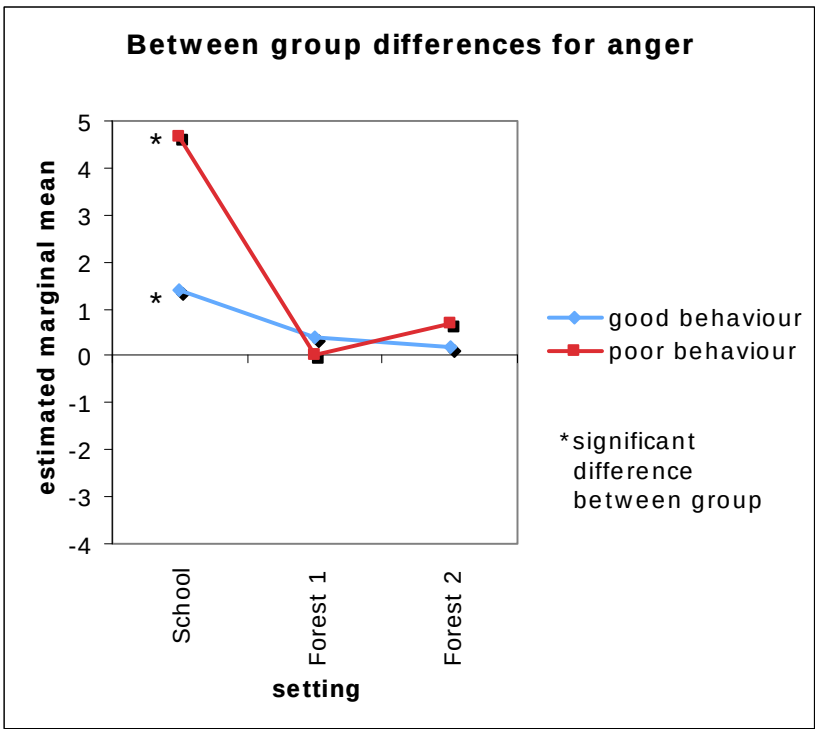


Fig 3.2

Summary: anger. The forest setting had a positive outcome on anger within group but the effect was greater in young people with behavioural problems. Differences between-group were greatest in the school setting, which had a more detrimental effect in the poor behaviour group. This difference was statistically significant ($p<0.05$). Setting and behaviour had more of an effect on anger independently than in combination (i.e. there are no interaction effects).

(2) Hedonic Tone

(i) *There were significant main effects of setting*: this difference was marginal between the school and forest1 setting ($F(1,8)=4.79$, $p=0.060$), highly significant between school and forest2 ($F(1, 7)=14.19$, $p=0.007$) .

(ii) *There were no significant main effects of behaviour.*

(iii) *When behaviour was added as a between-subjects factor the main effect of setting there was no change between school and forest1 sett*ing (($F1,7$)=4.85, p=0.063), and reduced significance between school and forest2 setting ($F(1,6)=13.53$, $p=0.010$. Adding behaviour had less of an effect in hedonic tone than on anger.

(iv) *There were no significant interaction effects between setting and behaviour.*

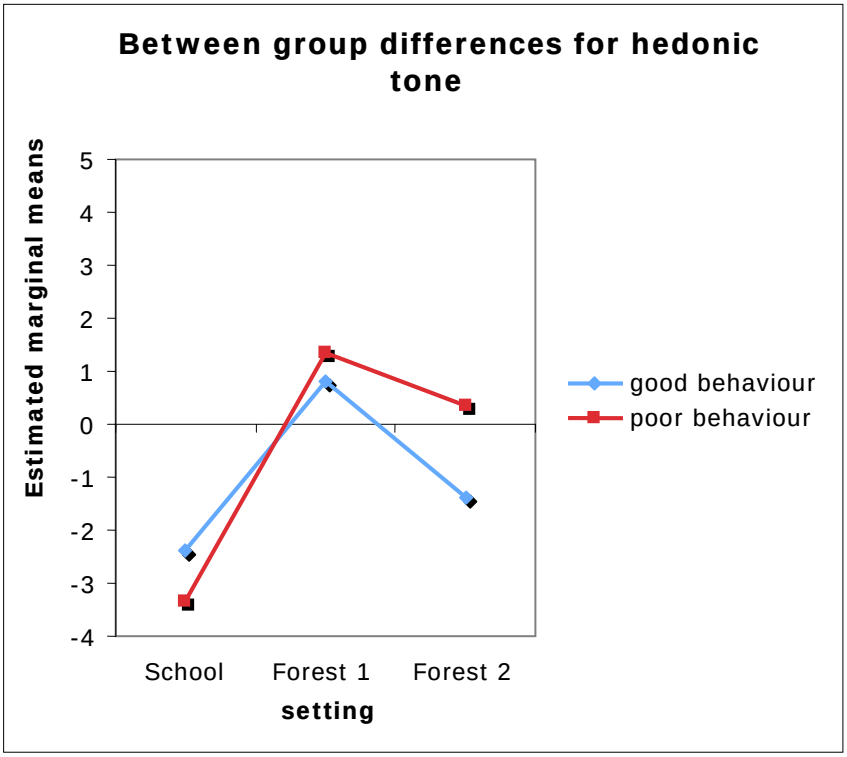


Fig 3.3

Summary: hedonic tone. The forest setting improved hedonic tone; the school setting had a negative effect. Between-group patterns were similar (there were no significant differences in either setting): the main difference was in forest2 setting which depressed hedonic tone in the good behaviour group. This was an interesting result, supported by findings from the qualitative research, showing this group felt anxious being with disruptive peers. The forest setting benefited the poor behavioural group more; the school setting was least beneficial to this group but the differences between groups in each setting were *ns*. Behaviour had less of an effect on this variable than it did on anger.

(3) Stress (tense arousal)

1. *There were significant interaction effects between setting and behaviour*: the result was significant between the school and forest1 setting (F(1, 7)=6.25, p=0.041; results where *ns* elsewhere.
2. *There were no significant main effects of setting or behaviour.*

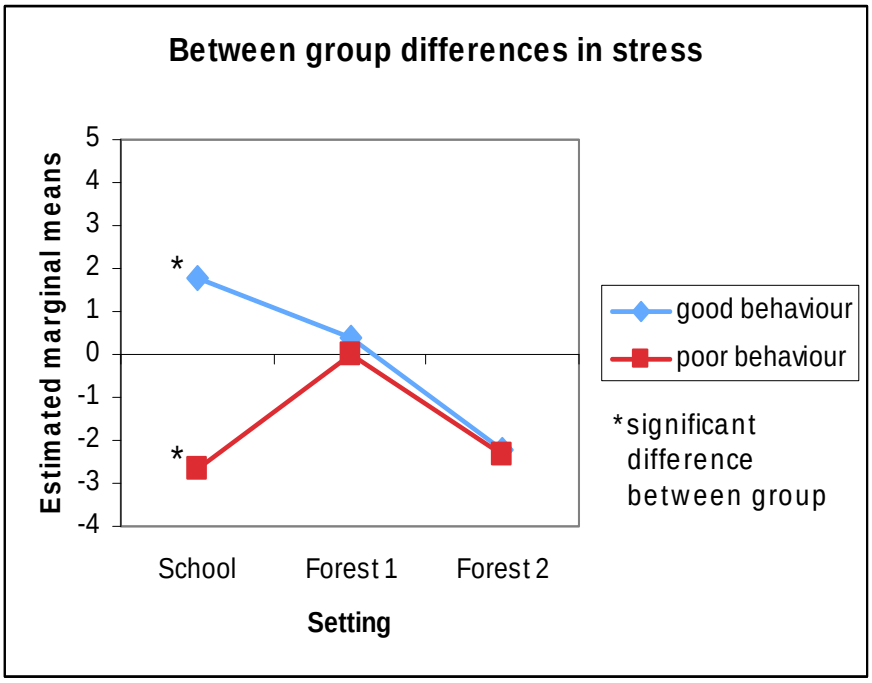


Fig 3.4

Summary: stress. The combined effect of setting and behaviour on stress was greater than the effect of either variable individually. Independently, setting and behaviour did not have an effect on stress. In the school setting, the between-group difference was marginal (Mann-Whitney U=2.0, p=0.70) and outcome results were at opposite ends of the spectrum: stress increased in the good behaviour group and fell in the poor behaviour group (pre mean= 9.33, post mean =6.67). This was a surprising result given that school anger levels were significantly higher in the poor behaviour group. The forest setting consistently reduced stress in the good behaviour group and the pattern suggests this benefit increases with time. The effect was more random in the poor behaviour group; the result suggests that the school setting was as good, if not better, than the forest setting at reducing stress levels. Later, discussion of this result suggests that the lack of challenge may be a contributory factor.

(4) Energy

There were no significant main effects of setting, behaviour or interaction effects. Setting and behaviour had least effect on vigour. The main effect of setting was marginal between the school and forest2 ($F(1,7)=4.49$, $p=0.072$). Adding behaviour as a between-group factor again increased the effect of setting but not to a statistically significant degree. Between groups the outcomes were significantly different in the forest1 setting (Mann Whitney $U=3.0$, $p=0.05$). This is an interesting result, because outcomes on the other three variables show a convergence of results between-group in the forest setting; here the groups diverge. Possible reasons for this are discussed in Section 4.

When interpreting energy outcomes in adults (Chapter 2), an increase in energy was perceived as a good outcome. However, in this context, was increased energy a good outcome in young people after a day in the forest or school? If the subjects had been sufficiently stretched, mentally and physically, shouldn't they be tired? Energy fell in the good behaviour group, but less so in the forest setting. Energy did not fall at the same rate in the poor behaviour group in either setting, although rates did converge in forest2. Were the poor behaviour group sufficiently exerted or challenged? The qualitative analysis suggests they were not.

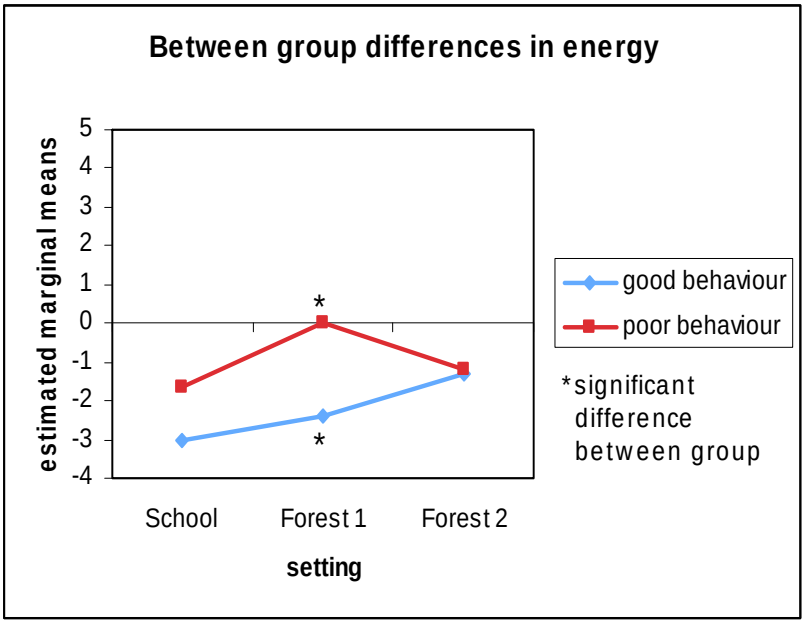


Fig 3.5

(5) Summary of mood outcomes

Results within the good behaviour group were consistent with restorative outcomes: the forest increased energy and reduced stress and anger and, over time, the outcome improved (the pattern was upwards). Hedonic tone also improved in the forest setting, but the pattern was not consistent in this variable, suggesting other underlying factors were at play. Overall, we can conclude the forest setting was beneficial over the school setting in young people with good behaviour.

In the poor behaviour group, patterns were less consistent: the forest setting was beneficial to anger and hedonic tone when compared with school; outcomes were significantly different on these variables when compared with the good behaviour group, and suggests that forest settings could be used therapeutically to improve well-being in young people with behavioural problems. However, outcomes were not consistent across all mood variables; results for energy and stress show erratic patterns and suggest a degree of frustration with the forest environment; behaviour had less of an impact on hedonic tone. The qualitative analysis explored this in more detail.

Table 3.4: Summary of 2-way ANOVA's showing significant results for each mood variable, n=10

Mood variable	Main effect of setting	Main effect of behaviour	Interaction effect: setting x behaviour
Anger	√	√	✖
Hedonic Tone	√	✖	✖
Stress	✖	✖	√
Energy	✖	✖	✖

3.3.1.4 Effects of setting on other variables

Setting did not have a significant impact on self-esteem and project indicators, but the patterns show positive change in the forest; self-esteem reduced after the school experience and increased after the forest experience. Perceptions of project control, efficacy and support also increased after the forest experience and decreased in the school setting. The pattern for stress (mood) and stress (project outcome) is illustrated in the box plots below (within group). These two variables were significantly correlated (r=-0.441, p=0.019); in both variables, stress increased in school and decreased in the forest setting. This suggests mood shares a relationship with reflection on life tasks.

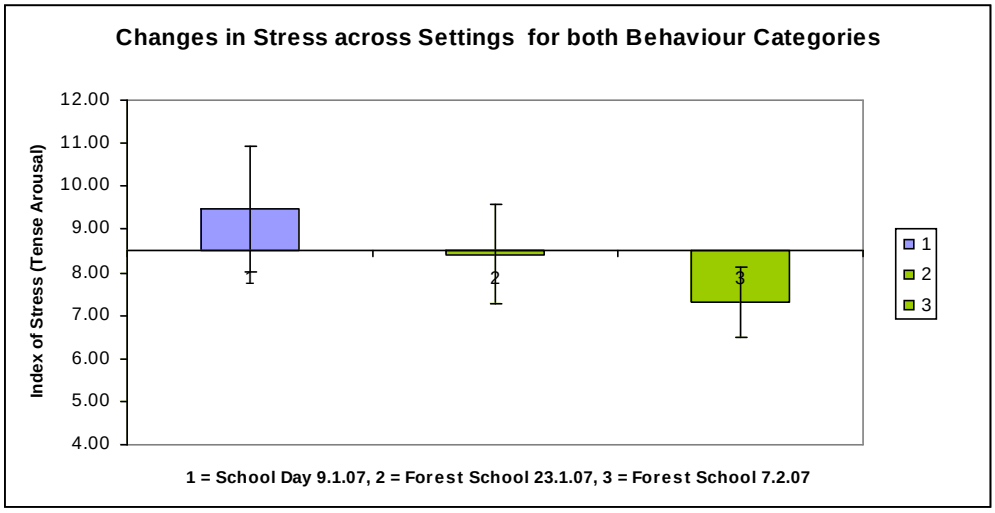


Fig 3.6

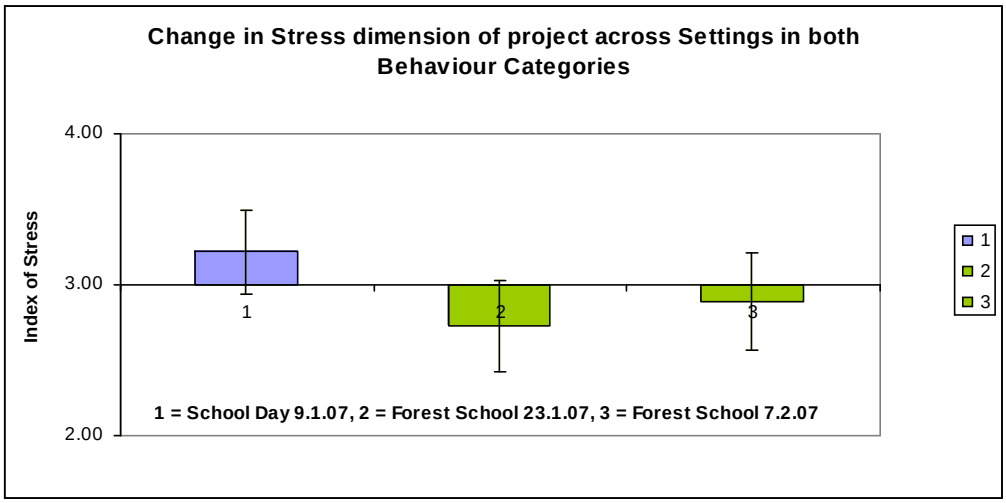


Fig 3.7

3.3.1.5 Relationships between variables

Bi-variate (Pearson's) and partial correlations were run to further explore relationships between variables, setting and behaviour.

(1) Correlations (bivariate) between mood variables[32]: patterns were as expected: hedonic tone and energy were positively correlated (r=0.594, p=0.001); hedonic tone was negatively associated with anger (r=-0.536, p=0.003) and stress (r=-0.419, p=0.027). Self-esteem did not correlate with any variable; associations between anger and stress were not related, which partly supports findings from the ANOVAs. Project dimensions correlated as expected: for example, efficacy and control were positively associated (r=0.484, p=0.009). The thesis was interested in associations between cognitive reflection and mood; correlations replicate research elsewhere showing a negative relationship between efficacy and stress (r=-0.505, p=0.006) and also between support and anger (r=-0.394, p=0.038); so as stress increased efficacy reduced, and as anger increased perceptions of support diminished. Positive correlations were found between hedonic tone and efficacy (r=0.411, p=0.030).

(**2) Correlations (bivariate and partial) between selective mood variables, setting and behaviour.**

Patterns further reinforced ANOVA analysis.

(i) Anger

Change data (pre-post) was positively correlated to setting (r=0.498, p=0.007, r=0.22). The r2 value shows that 22% of the variance in changes to anger can be accounted for (but not necessarily causally explained) by setting; this still leaves 78% of variance unaccounted for. Relationships between change data and behaviour were *ns* but when explored by individual setting, the change data for the school setting positively correlated with behaviour: (r=-0.699, p=0.036, r2=0.84) suggesting 84% of the variance here is accounted for by behaviour. These results reinforce ANOVA findings, showing significant main effects of setting and behaviour on anger.

[32] Carried out on the change data (pre to post experience).

Bi-variate correlations showed no significant relationships between pre- and post-anger and setting. When controlling for setting (partial correlation) the relationship between pre- and post-anger became significant (r=.463, p=0.015, r2=.68); the relationship between the pre- and post-data therefore increased in significance when the effect of setting was taken away; the unique variance explained by changes in anger without setting is 68%.

Bi-variate correlations showed no significant relationships between pre- and post-anger and behaviour. When controlling for behaviour (partial correlation), the relationship between the two variables became even less significant; the unique variance explained by changes in anger without behaviour was 58%. The partial correlations suggest behaviour had more of an effect on anger outcomes than setting, reinforcing outcomes from the ANOVA on this variable.

In an attempt to control for the effects of possible group variance in mood-state prior to the experiment, partial correlations were carried out, controlling for pre-anger. The relationship between setting and the change data remained significant (r=0.446, p=0.020). This was repeated, correlating setting and post-anger controlling for pre-anger; the relationship became significant when pre-anger was removed (r=-0.446, p=0.020). Both results suggest that, when pre differences in group were taken into account, the relationship between setting and post-anger outcomes remains significant.

(ii) Hedonic tone

As was the case with anger, change data (pre-post) was positively correlated to setting (r=0.572, p=0.001, r2=0.0.33). The r2 value indicates 33% of the variance in changes to hedonic tone can be accounted for (but not necessarily causally explained) by setting. Relationships between change data and behaviour were *ns*, reinforcing ANOVA findings. Relationships between change data within individual settings were also *ns*.

Partial correlations were also carried out on hedonic tone, controlling for setting, behaviour and pre-data. Bi-variate correlations showed no significant relationships between pre- and post-hedonic tone, but a significant relationship between setting and pre-data (r=-0.514, p=0.005). When controlling for setting (partial correlation), the

relationship between pre- and post-data remained *ns*, although the significance increased to a marginal level ($p<0.1$), a similar pattern to anger.

When controlling for behaviour the relationship between the pre- and post-data remained *ns*; removing the effect of behaviour made no difference to the relationship, reinforcing ANOVA findings that behaviour had less of an effect on hedonic tone than in anger.

Pre-data was strongly correlated to change data in this variable ($r=0.723$, $p=0.000$). In an attempt to control for the effects of possible variance prior to the experiment, partial correlations were carried out controlling for pre-data, correlating change data with setting; the relationship became *ns* suggesting the pre-data is making a significant contribution to the relationship between setting and outcomes.

3.3.1.6 Pictorial regression using AnswerTree

Using methods outlined by Aspinall (2007), SPSS 'AnswerTree' was used to explore whether anger can act as a discriminator between settings. AnswerTree is a form of pictorial regression producing a hierarchical tree structure and is ideal for non-parametric data. The tree analysis is an attempt to predict which setting a child is in from the difference in anger scales before and after a day's experience in either the school (the reds in the tree) or forest (the greens) settings. The tree is grown step-by-step and allows different variables to be introduced into the tree structure and their impact assessed on the predictive value of the tree. The target variable (in this case setting) appears at the top of the tree with the predictor variables arranged at a series of levels below it. Those at the top of the tree, near the target variable, are the most significant discriminators of the target variable, those lower down are less important. Firstly, an attempt was made to predict two settings (school and forest), illustrated in Fig 3.8; secondly, an attempt was made to predict three settings (school and forest1 and forest2) illustrated in Fig 3.9. The model does not take into account differences in behaviour.

(1) Predicting two settings

Step 0: the top box shows the number of participants in setting 1 (red =school) and in setting 2 (green=forest1 + forest2). The proportion of red: green is significant ($p<0.05$).

Step 1: the tree grows one level and shows the best overall predictor of being in one of these settings is anger, split at the optimal discrimination point of -0.1. A shift in anger greater than -0.1 (the right of the tree) is a more positive outcome than a shift of less than -0.1 (the left of the tree). The tree shows the majority of reds (school) fall on the left; the majority of greens (forest setting) on the right. We now have 8 reds who scored less than -0.1 and 1 who scored more than -0.1. Anger is therefore shown to be the best discriminator of setting.

Step 2: growing the tree another level shows the second best discriminator of setting is stress (tense arousal); the pattern is the same with the greens falling on the right (the most positive outcome, in this case a shift of greater than -0.1), the reds falling on the left (the least positive outcome). Both splits in the tree are significant and the model is 83% accurate with a standard error of 0.07.

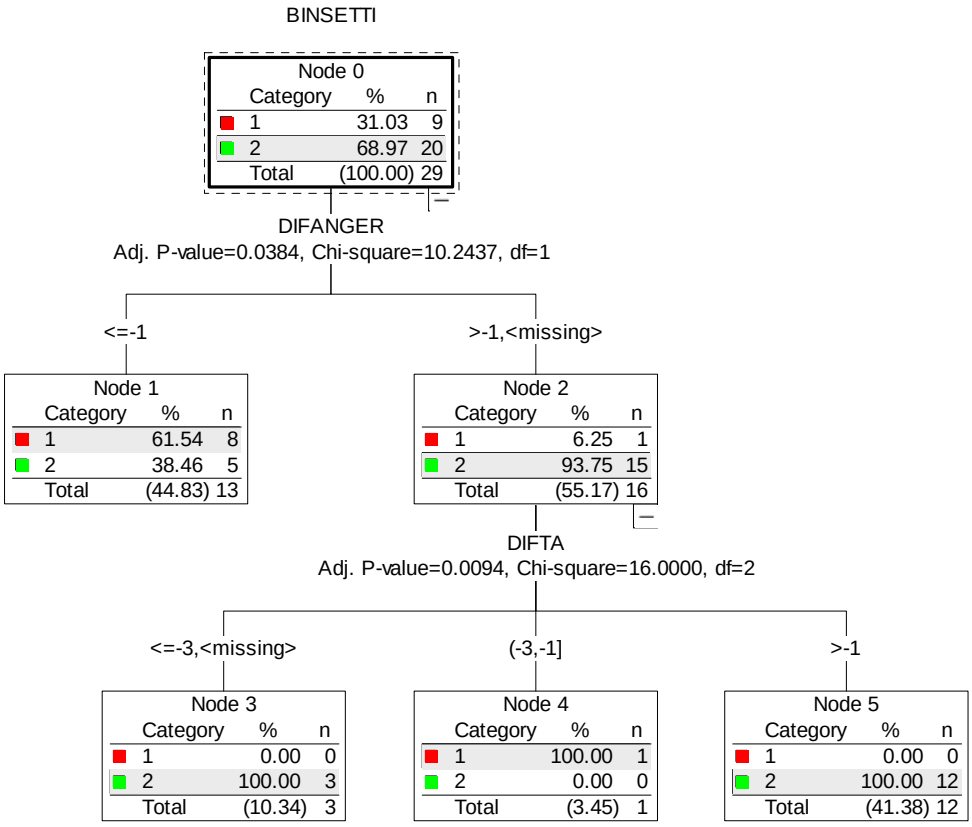


Fig 3.8: First level of answer tree regression showing anger as key variable

When hedonic tone was introduced into the tree at a third level, it was also shown to be a significant discriminator between settings ($p<0.05$).

(2) Predicting 3 settings: the tree produced similar patterns at the first two stages: the two main predictors of setting are now stress and anger followed by energetic arousal at

a third level. The highest percentage of reds continues to fall on the left of each branch (scores <0.05) but the pattern is reversed at the third branch (at energetic arousal) with 87.5% of the reds in node 3 falling on the right (>0.05) showing greater energy shifts than those in the forest settings, and mirroring results from the ANOVA. This model is 77% accurate with a standard error of 0.009.

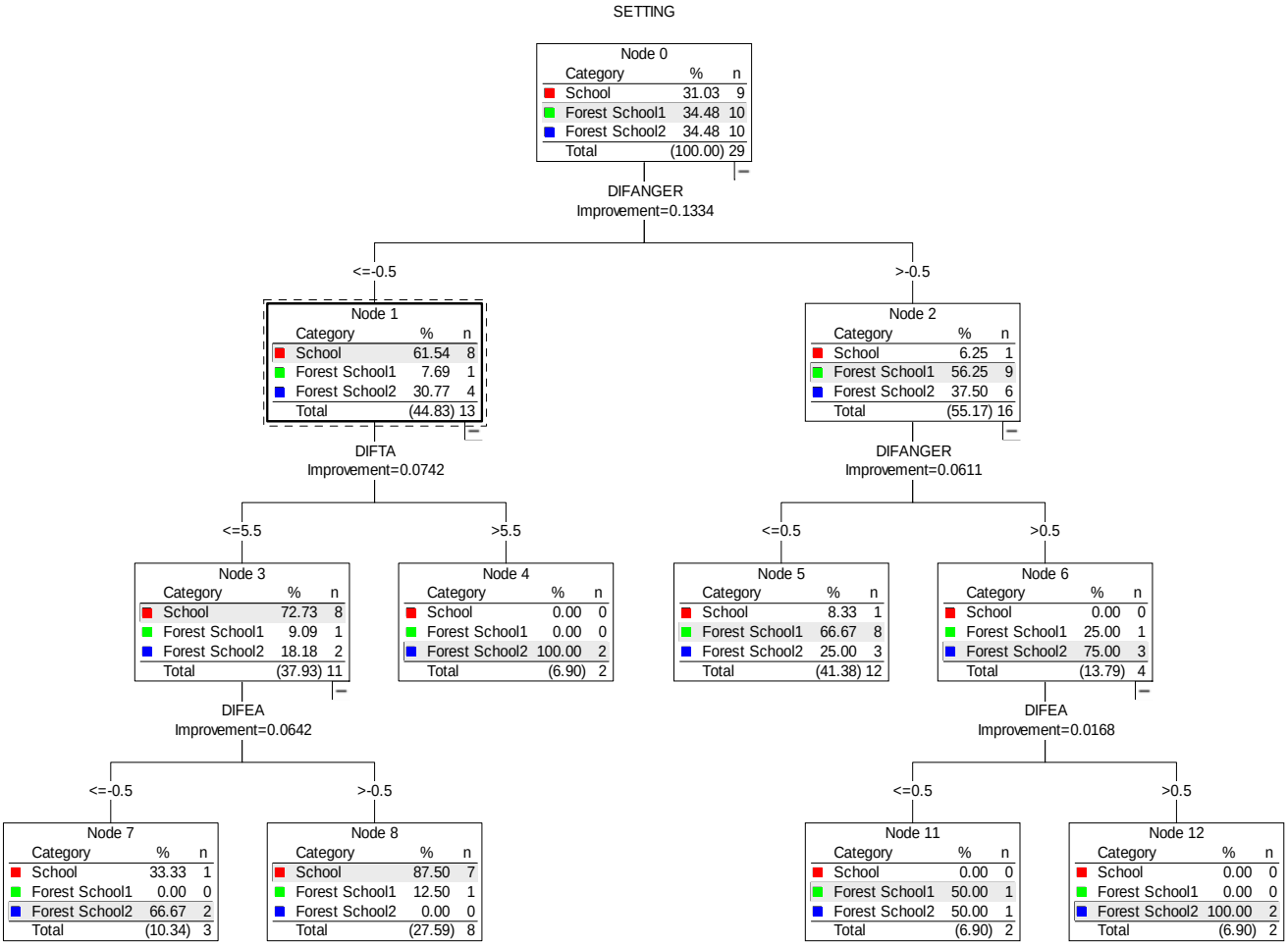


Fig 3.9: Second level of answer tree regression showing stress and anger as key variables

3.3.1.7 Summary of quantitative results

(1) The forest setting had most effect on reducing anger: this variable was the best predictor of settings (school v. forest).
(2) Behaviour had the greatest effect on anger outcomes: the poor behaviour group benefited the most.
(3) The forest setting significantly improved hedonic tone. Behaviour had less of an effect on this variable.
(4) In combination, setting and behaviour had most effect on stress but patterns were not consistent between groups. There was no relationship between anger and stress outcomes.
(5) Personal identity appeared consistently as a key component in data reduction with high factor values.

3.3.2 Qualitative results

3.3.2.1 Video analysis (read in conjunction with DVD 1)

Participatory video methods were utilised to tease out underlying social and psychological factors influencing the outcomes of the forest experience. On three occasions a "video diary" room was set up in the forest, originally intended to offer a private space in which individuals could talk about the forest experience. This process did not proceed as planned; introducing the video 'box' generated so much excitement that opportunities for solo conversation became impossible; participants simply would not leave one another alone. The strategy was swiftly changed and instead the young people were asked to work as a television crew acting as interviewer, interviewee and camera person. They were given complete freedom in selecting a location for the video 'box' (they chose to do this away from the main hub of the forest camp and ingeniously utilised the trunk of a large yew tree to support a tarpaulin shelter (Fig 3.11) and, on one occasion, constructed a tripod which was left behind one day (Fig 3.10). They were mostly left unsupervised. Signed consent was a requirement of taking part and permission was later granted to show the film to academic audiences. A DVD of edited material was presented to staff, pupils and parents of the school in spring 2007. Personal names are retained since they are important to the storyline (individualism is a

strong theme) but the identity of the school is concealed. The video material was transcribed, analysed and edited to form the storyline below.

Fig 3.10: Constructing a tripod for the video camera

Fig 3.11: The video box

(1) The story: The DVD aims to capture three different stories within the group:

1. **the 1st year boys** (Brian1, Aaron, Paul, Brian2) with no behavioural problems but for whom peer behaviour is a real issue; this is expressed both verbally and physically through facial expressions (dropped eyes, raised eyebrows, body tension (looking around, cowering in the presence of aggressive peers) and intimidation. This group generated their own private label for the 2nd year boys, the "*monsters*".
2. **the girls** (1st and 2nd year, Jennifer, Katie and Sarah) for whom the forest experience is mostly positive; they are diplomatic about peer behaviour, preferring not to directly answer questions about it on camera, "*do I have to answer that?*". On

occasions they even rise to defend the behaviour of the 2nd year boys: *"they're bullies"* (Brian), *"no they're not!"* (Katie). Interactive comments between the girls captured on camera show an authority, sense of co-operation and commitment to getting the task completed: *"you've got to answer it!"* (i.e. the question), *"don't talk in that funny voice", "when your videoing your supposed to be nice to people!"* There's also an attempt to control behaviour, for example, when Jamie attempts to throw something at Dominic, Katie retorts "*that would be bad Jamie!"* The girls are generally supportive of the boys with behaviour problems. Sarah, withdrawn and non-communicative most of the time, assumes quite a different persona behind the video camera, discussed in more depth below. For Sarah, in particular, the challenge is not getting along with the 2nd year boys but the 1st year boys ,who frequently tease her: "*the challenge is to make Sarah laugh"* (Brian1).

3. **The 2nd year boys** (Jamie, Dominic, Michael) with behavioural problems, who reported benefits from the social and physical context, supporting the quantitative analysis. Repeatedly Jamie says, *"I like the friendship"* and refers to spatially enjoying the "*full forest"*. There's also a recognition that working in teams and various tasks keeps them out of trouble. On occasions the DVD captures their frustrations resulting in disruptive behaviour (banging on the tarpaulin, throwing things).

A fourth group, staff on-site, comprised two forest rangers and two members of school staff from the behavioural and social services units. How did this presence influence outcomes? As noted in the introduction, it's difficult to separate out the effects of the personalities on-site from the effects of the environment. School staff on-site did not always appear to be enjoying the forest experience, an observation supported by video footage (not shown for tactical reasons), and there were some tensions between staff that may have influenced outcomes.

The DVD begins with an overview of the site filmed by Aaron (1st year boy) and conveys the context of forest school. Its lunchtime so there's not a lot of activity. Agents "off screen" (i.e. interviewing or passing comment) are illustrated using stills since they are as important to those "on screen" being interviewed. Overall, the video material captures the very individual character of responses to the forest.

(2) Emergent themes: "Ask the questions then, ask the questions you fool!" (Jamie)

The pupils generated their own sets of questions for the task: some chose to write the questions down beforehand on a clipboard, others ad-libbed as the interview proceeded. The types of questions to emerge were quite telling and indicate two key issues underlying the experience: the social context and the question of challenge. Four themes emerged, as discussed below:

(i) The social ecological context: an influential factor repeatedly referenced:

"What do you think of your group?"
"Would you like to change your group?"
"Whose your best friend?"
"What do you think about the behaviour?"
"Do you like the people you're working with?"
"What do you think of the set of people?"

The responses indicate that being with peers with behavioural problems was a real problem for some in the group, particularly the 1st year younger boys, some of whom were bullied: *"I don't like the 2nd year boys, they are bullies"* (Brian1), *"what's challenging is trying to get along with the 2nd year boys" (*Brian2). This may partly explain why hedonic tone scores (Section 3.4.2) dropped within this group in the forest setting. In their responses the girls and the 2nd year boys generally appreciated being mixed up: *"I'll remember the team work because you know, even if someone annoys you at school, you get to, you work together at forest school so you make – you get better friends with everyone".* (Jennifer)

Fig 3.12: The social hub

(ii) **Challenge** was the second most frequently asked question: *"do you need more of a challenge?", "Question number 3 for £3000, what's challenging about forest school?"*. The replies again show mixed responses across the groups; the 1st year boys often perceived this question as relating to peers, "*do you mean the people?"* (Brian1). The boys felt sufficiently but not over challenged by the tasks: *"No, I'm just used to it" (*Aaron). The girls were more ambiguous in their response, "*I don't know"* (Katie), and the 2nd year boys reported on occasions not being challenged enough, "*aye, probably not*" (Michael). This response may account for the differing scores in energy between groups and suggests it may take more to tire out young people with poor behaviour.

(iii) **Positive affordances**: "*There goes big Jennifer falling down the hill***"** (Brian):

This study was interested in capturing emotional affordances (see Chapter 1 and 4 for theoretical discussion) offered by the forest setting, best encapsulated on camera by Jennifer, completely at ease in her environment, rolling in either mud or grass. She loved "*everything"* about the forest, "*I don't ever want it ever to stop, I like it too much"*. Describing her favourite place in the forest, she gestures contemplatively towards a series of small undulating terraces: "*Probably up here, just where the hills are…"*. Her sense of delight in the forest setting is beautifully captured by her peers on film on a number of occasions.

The sense of space and freedom is a dimension that was of special relevance to the boys with behaviour problems, best captured by Jamie, who gestures pleasingly around him to indicate his appreciation of "*the full forest"*. These boys spread further afield, showed more ambition to explore and were allowed the freedom to do so. Perhaps because they travelled further afield, this group resourced more manmade materials (old shopping trolleys, oil drums, old chairs) for their activities.

For the 1st year boys, making fires, structures, swords and spears was the main pleasure, showing curiosity and fascination with the forest environment and using natural raw materials as the basis for many games. There's still a delight in this age group in pretending to be warriors, "*make it like voodoo! Cool!"*

(Brian1) and they interacted with the forest raw materials more than any other group.

(iv) **New personas** *"I'm getting videoed! I'm getting videoed! C'mon!"* (Jamie): Behaviour often changed on camera: in some, personality traits (extroversion) intensified; more introverted personalities tended to come out of their shells (Sarah and Paul). The biggest shift was in Sarah, frequently withdrawn and uncommunicative, who behind camera became vocal, confident and assertive when acting as interviewer (she did not want to be interviewed). The change in personality was dramatic: she began to predict responses and tells the others what to say: *"say you like everything apart from the groups", "say you like being out of school";* and she takes an assertive stance with unco-operative peers, *"I'm in charge, you're supposed to ask questions and be nice to Dominique",* and sometimes showed out-of-character aggression *"shut your mouth Paul"*. Paul, shy and quiet, also came out of his shell with a video camera in hand, relishing the opportunity to film the 2nd year boys getting into trouble: *"watch out, I'm getting a brilliant view here!"* (Paul).

Brian, a 1st year boy, assumed a comic persona on screen, mimicking the comments of staff: *"forest school is challenging…"* but the tone shifts dramatically when asked about peer behaviour, denoting how serious an issue this is for him. The more extrovert personalities become even more gregarious on screen, enjoying the banter and the opportunity to show off *("stop filming me"* Jennifer to Brian1, egging him on to do precisely that). There was a lot of humour exchanged between the girls and the boys but notably none at all between the 1st year and the 2nd year boys.

In summary, the video material supports some of the quantitative findings and suggests that the social context is heavily influencing mood outcomes, particularly in the young people without behavioural problems. Left alone with this task the conversations that developed were quite different, and far more revealing than those conducted in the presence of adults. Further discussion on the benefits of the method can be found in Chapter 8 (Section 8.5.3).

3.3.2.2 Feedback from staff and parents

Staff feedback reported improvements in pupils' self-confidence, self-esteem and in attendance, but this was not quantified. Parents (n=9) were asked to report back on changes in behaviour (Appendix 3.2) and reported improvements in communication, confidence, initiative, mood, co-operation and increased awareness of the outdoor environment. Whilst this information is limited it does help support findings.

3.4 Discussion

What evidence is there from this study to link natural settings with restorative outcomes in young people? Firstly on mood: the quantitative research provides strong evidence that forest settings can help stabilise mood in young people with and without behaviour problems. By contrast, the internal school setting consistently depressed mood outcomes in both groups (anger and hedonic tone). These findings are consistent with results in adults (Chapters 2) and, since improved mood is empirically linked with better health, this can be construed as a positive outcome of the forest experience.

Secondly, on cognition, there was no significant evidence from the study to suggest that natural settings can produce changes in the ability to think more positively about life tasks; although there were positive shifts in the cognitive project dimensions these were *ns* (with the exception of project stess). Since there is a substantial body of empirical evidence linking nature with improved cognition it's possible the scale was at fault here (utilising just one project as a monitor). Exploratory data reduction supports the notion that manageability of projects (efficacy, support, control) and self-identity are core underlying constructs, supported also by the high factor loadings of these dimensions; however, this analysis was carried out on a small sample and findings should be treated speculatively.

It was anticipated that forest settings would increase self-esteem, since this is one of the most consistently monitored outcomes of adolescent well-being in the wilderness and outdoor activity evaluations. It was surprising therefore to find outcomes for self-esteem were *ns*, although the shift in scores was in the expected direction (levels went down in school and up in the forest). Shifting self-esteem and cognition in young

people may therefore take longer than this experience allowed for. The lack of *ns* findings here replicates outcomes on self-esteem in research with adults (chapter 2).
One of the most serious consequences of behavioural problems is the detrimental effect that they can have on young people's achievement later in life. The link in the UK between criminality and anti-social behaviour is now so significant, that forensic experts have recently proposed a DNA database be kept of primary school children with behavioural problems (The Observer, March 16, 2008). This chapter was therefore interested in the potential of forest activity for reversing these trends, and whether raised mood can generate better behaviour.

In the literature, depressed mood is strongly associated with anti-social behaviour. This is supported by significant correlations in the study linking low mood with higher anger levels. Hedonic tone was negatively correlated with anger, suggesting sadness is associated with higher anger levels. There is no significant evidence to suggest that anger is linked to improved vigour in terms of correlation analysis, although mean scores show that anger reduced and vigour improved in the poor behaviour group, in the forest setting.

An interesting outcome was the effect of setting on stress in the poor behaviour group. The school setting reduced stress more than the natural setting. Was the reduction in stress owing to a greater expenditure of anger in the school setting as compared to the forest? Is this a positive outcome of "anger-out"? Was the rise in stress in the forest an indication of a greater degree of challenge in the forest? These are all interesting questions, warranting further research, exploring the relationship of challenge, stress and anger.

Also of interest was the divergence in energy between groups in the forest setting (where outcomes on the other three variables converged). When interpreting energy outcomes in adults (chapter 2) an increase in energy was perceived as a good outcome. However, in this context is increased vigour a good outcome in young people with poor behaviour after a day in the forest or school? Had subjects been sufficiently stretched mentally and physically we could reasonably expect energy to be depleted in both settings. This was the pattern in the good behaviour group but not in the poor behaviour group, where energy depletion was not as great in either setting (although rates do converge in the forest2 setting). This suggests that the poor behaviour group is not

being sufficiently exerted or challenged in either setting, a finding supported by the qualitative analysis.

Perhaps the greatest cause for concern, emerging from the study, is the effect the school setting had on anger and hedonic tone. Forest settings stabilised these variables: seen in isolation the restorative outcomes of the forest were not very significant, but in comparison with young people's everyday setting the results have much more impact. However, any link between improved mood and improved behaviour cannot be causally proven by this study. Outcomes for vigour and stress were less consistent, and suggest that young people with behavioural problems may need to be challenged in different ways than their better behaved peers.

A major qualitative finding was the improvement in attendance in pupils with behavioural issues, but this was not quantified. Owing to time constraints, staff were reluctant to engage in a quantifiable evaluation procedures (a pattern replicated in the next chapter); working with young people with behavioural problems places huge demands on teaching staff, and developing research in this field needs to consider these contextual issues.

Finally, this chapter was interested in how the social dynamics of the setting impact on outcomes. The video footage shows that the social dynamics of the group were problematic, and possibly accounts for differences in mood outcomes between groups. The problem this research presents in terms of making policy recommendations is whether or not to mix groups of pupils with and without behavioural problems: would outcomes for the 1st year boys have been more positive if they had been in the forest without disruptive peers? This group had an environmental bias and we might have expected restorative outcomes (on hedonic tone for example) to be greater. Would the positive outcomes in the 2nd year boys have been less significant if they had not had the opportunity to integrate with peers with positive behaviour? The data suggests young people with poor behaviour benefited from interacting with their better behaved peers. But mixed groups place strain on staff: the leading forest ranger conceded the behaviour had been challenging at times, and whilst outcomes for the poor behaviour group look promising, this study flags the need for high staff-to-pupil ratios and specialist training in managing behaviour. School staff felt that exposure to disruptive

peers in the forest had been detrimental to some individuals and the outcomes for the pilot do not look promising (i.e. it's unlikely to be repeated).

This would be unfortunate, since this study shows promising outcomes, but the research needs to be replicated. Observational analysis (not utilised in the main body of results) over the ten-week period showed that taking young people outside of the normal school setting can help change perceptions and re-build relationships with staff and peers. Young people who could not get along with each other learnt to do so; staff began to re-appraise character, and confidence and self-esteem visibly grew. One helpful outcome is that mixing genders seems favourable: there were no significant differences between girls and boys and the qualitative research showed the diplomatic role the girls played in easing tensions between the boys.

3.5 Limitations

There are a number of limitations to this study; firstly, this is a small sample (n=10) and much of the analysis was exploratory. The social context could not be controlled-for between settings (i.e. staffing, peer grouping and the type of activity in school would have been quite different). There was no comparable video footage in the internal built environment and leaving the young people to film alone produced a large amount of unusable footage. A major constraint of working with young people with short attention spans is the range of psychological scales that can be used. Problems with the shortened project and self-esteem scales were flagged earlier; however, the shortened mood scale employed did denote significant statistical changes between groups and setting.

These are problems that could be resolved relatively simply with further research; a bigger problem in this field of research, is how to separate out the effects of the programme activities and personalities involved, from the effects of the setting. Did the social context have more of an impact than the programme activity or physical context? Separating out these effects is difficult but a mixed methodology helps by reinforcing findings. A next step in taking this research forward would be to integrate more finely-tuned observational measures (as developed in Chapter 4) with video analysis and self-reported outcomes. The support of school staff is also required to further longitudinal research on behaviour outcomes (school attendance, socialization and learning, for

example). Longitudinal analysis would also identify whether the anxieties of being with disruptive peers reduce with time, in young people without behaviour problems. Some of the data suggests that this might be the case.

On issues of bias, the young people were provided with information about the research, but seemed to quickly forget what it was all about, on occasions asking why they were completing a questionnaire. The video diary experience was possibly biased by adult discussion about forest school, indirectly influencing the questions that were composed (e.g. by suggesting forest school offered opportunities to be challenged etc.).

3.6 Conclusions

This research shows natural settings can stabilize mood outcomes in young people with and without behavioural problems. Read in conjunction with research linking reduced mood with anti-social behaviour, results suggest interventions that take young people away from school settings hold much promise for improving behaviour. Future research in this field needs to explore methods that will help forge this link more directly.

On method, the participatory video methods developed here were effective at teasing out additional psychological and social ecological factors underlying the forest experience. Operating outside the adult domain, this element of research really did get to the heart of some complex issues on-site, which otherwise might not have emerged, particularly in relation to bullying, and empowering individuals who otherwise might not have had a voice.

Chapter 4: "Walking on Sunshine, WHOA!"[33]: restorative outcomes of forest settings in boys with extreme behavioural problems

This chapter explores the potential of forest environments to promote restoration in young adults with severe behavioural problems. It is a mixed method study capturing short-term mood outcomes in different settings (replicating methods in Chapter 3) and using participatory video and ethnographic methods to capture longer-term behavioural changes. This chapter also explores positive and negative affective reactions to setting developing the concept of emotional affordances introduced in Chapter 1. The main idea driving this Chapter is that the environment is emotionally "value" laden with emotive responses, as well as being physically laden with potential opportunities for action. The goal was to tease out these "felt" qualities and explore how this relates to restorative outcomes. Owing to the lack of empirical research in this field this analysis was exploratory and underwent several stages.

[33] A forest song.

4.1 Introduction

4.1.1 Developing a framework for analysis

The aim was to establish a simple theoretical framework that would allow observed affective reactions to the forest setting to be accurately structured and mapped. The sheer diversity and complexity in emotion theory did not permit any simple overarching theoretical framework. Instead, the study draws on two established theoretical models that seemed best to fit the purpose: firstly, the concept of "core affect" (Russell 1988); and secondly, a cognitive model of emotion that structures emotions according to valenced reactions to Events, Agents and Objects (Ortony et al 1988).

Core affect has a simple two-dimensional structure that defines emotion as a state of pleasure or displeasure that is either arousing or quieting (Russell 1988, 1997, 2003). Core affect can be *free floating* (analogous with mood and having no object) or *directed via attribution* to an object and thereby producing an emotional experience. To qualify as a bona fide emotion, an emotion has to be directed at an object of some sort. Emotion theorists appear to agree that emotion has four constituent components (Parkinson and Colman 1995): appraisal (a cognitive evaluation of a situation), arousal (bodily change), expression (via body and voice) and motivated action. Different theorists assign priority to different components and the sequence in which they occur. The two primitives in Russell's framework are core affect (the feeling within) and the affective quality (a property of the object), directed via attribution to an object, highlighted in the model over (Fig 4.1). These components do not necessarily operate in sequence or all together. This framework is explored in depth in Section 4.3.2.2 in one observed affective reaction to the forest setting, anger; elsewhere the framework has been simplified for analytical purposes.

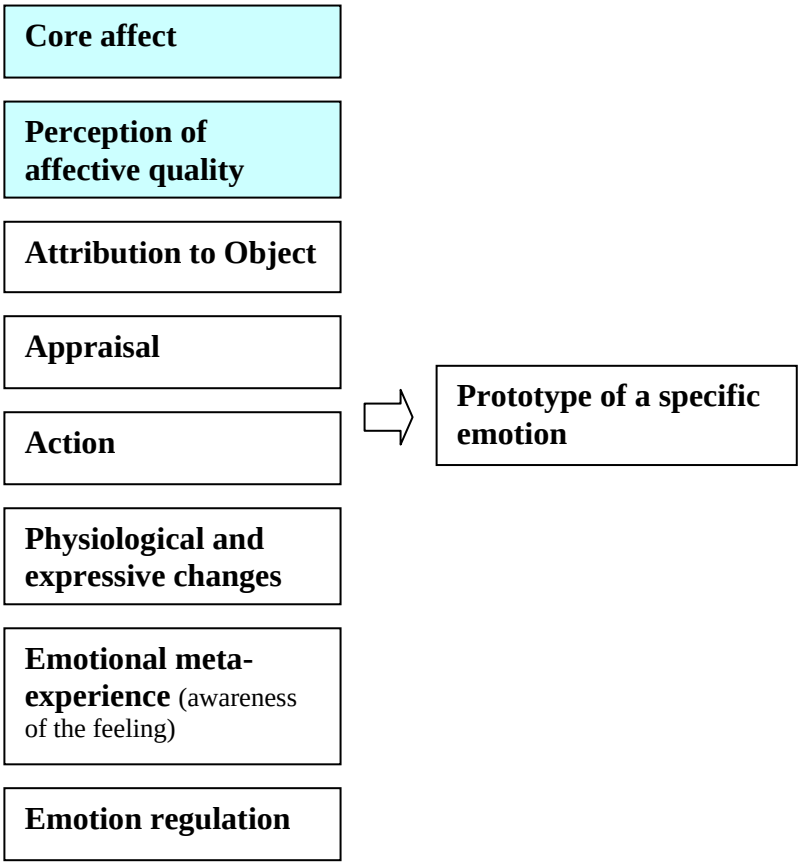


Fig 4.1: Components of an emotional episode[34] in Russell's (2003) framework

The aim was to source a structure of emotion that took account of affective reactions to the social context, as well as the physical (i.e. not just objects). Ortony et al's (1980) three-dimensional model seemed appropriate here, in which emotion is structured according to one of three types: a valenced reaction to either an Event, Agent, or Object. Emotions are represented as one of three independent groups based on the nature of their cognitive origins and how an individual construes the world. Events are simply people's construal of things that happen, Objects are defined as *qua* objects, and Agents (which may be people, institutions or inanimate objects) as the cause or contributor of an event. The three underlying emotions in the model are: *desirability* in response to Events, (pleasure, displeasure); *appealingness* in relation to Objects (like or dislike) and *approval* (or disapproval) in response to the actions of Agents. The simplicity of the structure has some parallels with the concept of core affect since reactions are construed as either desirable or undesirable.

[34] An event that sufficiently fits a prototype to count as an instance of that emotion.

Another tool employed in the developing framework is the circumplex model, a circular two-dimensional "map" of the mental space of emotions (Schlosber 1954, Plutchik & Conte 1997, Russell 1988). The relationship between emotions is characterised by *similarity* or *bi-polarity*: joy v. sorrow, anger v. fear, acceptance v. disgust, surprise v. expectancy. Russell's circumplex model of core affect has two axes: an axis of displeasure/pleasure (horizontal axis) and an axis of low/high arousal (vertical axis) (Fig 4.2). In the preliminary analysis field note observations were categorised using emotion categories from the circumplex. In stage two, experiences were scored for pleasure/arousal (on a scale of -4 to +4) and mapped using techniques outlined by Russell (2003).

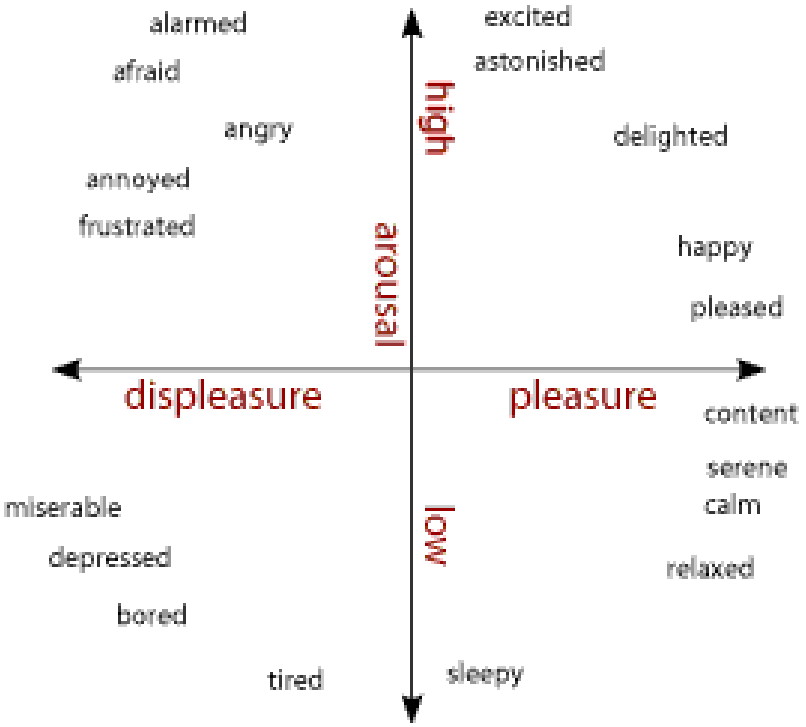


Fig. 4.2 Russell's (1988) circumplex model of emotion

4.1.2 The question of curiosity

Since curiosity (or interest) is a potential indicator of restoration and well-being, was it theoretically legitimate to explore this dimension within the context of emotion? What counts as a basic emotion is contentious amongst psychologists and whilst emotion theorists (in the Western world) appear to have reached some consensus on basic

emotions such as fear[35], interest as an emotion type is a fuzzier concept[36]. However, interest appears within circumplex models (defined as *anticipation*) and seems to fit established criteria for defining emotions in that it takes an object of some form. A person will have a positive or negative reaction to that object, and the reaction probably won't last long (Parkinson and Colman 1995). On this basis it was included as an emotion category.

4.1.3 Research Aims

Based on outcomes from Chapter 3 and developing themes within the PhD, the following questions were formulated:

(1) Can a forest setting promote discrete restorative experiences in young people with extreme behaviour problems?
(2) What evidence is there that forest settings are helping meet the unique needs of boys suffering from trauma and how helpful is the forest experience as an intervention in the rehabilitation process?
(3) Is there any evidence to suggest, as Fredrickson (2004) claims, that an improvement in mood is accompanied by an increase in behavioural options?

4.2 Methods

4.2.1 Participants and procedures

The study was carried out between February and June 2007. Eight boys participated in the research (aged 10-12) from two classes (P6 and P7) of a specialist school, providing day and residential care, for boys suffering from severe trauma and behavioural problems. Consent to take part was agreed verbally between participant and researcher and reiterated over the five-month period. As a thank-you a voucher was offered on completion of the fieldwork period. Owing to the sensitivity of photographing or videoing these young people, visual methods were participatory only, i.e. they filmed themselves or each other. On occasions they specifically asked the researcher to film them.

[35] Nine out of 14 emotion theorists included fear as a basic emotion in a study by Ortony and Turner (1991) cited by Parkinson and Coman (1995).
[36] Only three out of 14 emotion theorists included Interest as a basic emotion in the same study.

4.2.2 The setting

The school is located in a 19th century baronial castle situated in 100 acres of ancient forest, in the countryside beyond Glasgow. The setting is extremely remote with a long drive from the main road up to the school. Class sizes are small (maximum of five); once a week each class attends a forest school (9.30am to 12.30pm) located in the school grounds and led by two staff members.

The quantitative component of this research was carried out in the school and forest setting. The ethnographic component and participatory visual methods were carried out in the forest setting only. Occasionally there were also opportunities to observe the classroom setting.

4.2.3 Quantitative measures

Owing to the lack of behavioural control within the group it was not known how the quantitative strand of this study would develop. An interactive computer questionnaire was developed using the same validated instrument (UWIST MACL as described in Section 3.2.3) to explore mood outcomes (anger, energy, stress and hedonic tone) pre- and post-experience of two different settings (school v. forest). The questionnaire was administered in the setting via a laptop on two successive occasions, one week apart, pre and post a three hour period in each setting. For simplicity (and owing to *ns* results on the project dimensions in Chapter 3) this aspect was excluded from the study. It was anticipated, in keeping with Chapter 3, the forest setting would be more advantageous to mood than the school setting.

Young people (age 10-12) n=8	
	PMH
School	X
Forest	X

Fig 4.3: Study design

4.2.4 Ethnographic methods

Over a five-month period, 24 visits where made in school term-time. The aim was to explore whether affective responses to the forest would change with experience, familiarity and season. The setting provided an ideal observational context, since the behaviour was often of an extreme nature, making the emotional dimension very visible.

Owing to the sensitivity of the context, recording observations on-site with a notebook, camera or video camera was not appropriate. Field notes were based on "*aide memoirs*" dictated into a tape immediately after the experience, later transcribed and structured around contexts, events and reflections using techniques developed by Carspecken (1996).

Field note analysis went through a number of exploratory stages:

(1) Stage 1: observations were coded in NVivo 7 using eight emotion categories from the circumplex model. This was helpful in gauging the ratio of positive to negative affective reactions on-site. The components of varying emotional experiences were further explored and catalogued using Russell's framework (1988).
(2) Stage 2: using three individual case studies, affective reactions were scored for pleasure/arousal and mapped spatially (i.e. where they physically occurred on-site) and on the circumplex map. This exercise was carried out twice, using data collected in February (Time 1) and May (Time 2), the aim being to indicate changes in patterns over time. Z scores were calculated in order to compare individual outcomes for mood with the group mean[37].

The methodology is possibly contentious for a number of reasons. Firstly, the analysis and scoring of experiences is subjective, based upon the researcher's interpretation of verbal and physical reactions to Events, Agents and Objects on site. The analysis has not been cross-checked by an independent verifier. The cognitive component of the analysis is a "best guess" as to how an individual construed a particular situation; it is

[37] The z scores define whether an individual scores more than 2 standard deviations from the group mean for a mood measure.

therefore not necessarily accurate, but is included to help "fill in the picture" of an experience. Secondly, the coding of field notes might be perceived as quantifying or dehumanising qualitative data. "Assembly" of data is a perhaps a better word to describe this process than "counting" (Johnson and Johnson 1990). The numerical data generated from the analysis was simply deposited in a series of "categorical buckets" for further analysis and remains qualitative data. Charmaz's (2000) argument for constructivist grounded theory supports this notion.

4.2.5 Participatory visual methodologies

Participatory video techniques were employed to explore individual responses to the forest environment. Participants were asked to record their experience during one session of forest school. They were given some simple directions on how to use the camera but no directions on what, where or whom to film. Owing to the lack of behavioural control in some individuals, the quality of output was extremely varied; the resulting output was edited to form a short DVD supporting the main themes of the Chapter. Information about what was personally significant in the forest setting was cross-checked against the observational data to reiterate findings (Table 4.11, Section 4.3.3).

4.3 Results

4.3.1 Qualitative

4.3.1.1 Preliminary Analysis

Distribution was explored on the change data (pre to post); patterns could be considered normative with the exception of hedonic tone[38]; standard deviations were high on occasion (Table 4.2 over). Assumptions of sphericity were met for the ANOVA analysis. Levene's Test for homogeneity was not computed since only one group was under analysis. Outliers are reported under the results for each variable.

Firstly, data was screened to establish if there were any differences in baseline scores across the two settings prior to intervention: this showed no significant differences. A matched pairs test (Wilcoxon) was then carried out comparing mean results pre- to post-experience in each setting. In the school setting there was one significant difference only in Hedonic tone, which decreased ($z=-2.121$, $p=0.034$). In the forest setting there were significant differences on three variables: Hedonic tone ($z=-2.041$, $p=0.041$), Stress ($z=-2.214$, $p=0.027$) and Energy ($z=-2.242$, $p=0.025$); the result for Anger was marginal ($z=-1.903$, $p=0.057$). The means show (Table 4.2 over) that the movement was in a positive direction.

4.3.1.2 Effects of setting on mood

Two-way repeated measures ANOVAs were carried out factoring setting (school versus forest) and time (pre- and post-experience). Significant interaction effects were found for Hedonic tone, Stress and Energy; the result was marginal in Anger. See Table 4.2. Following Fields (2005), priority is given to reporting significant interaction effects. In the analysis below, patterns are compared to results for young people with behavioural problems in mainstream education.

[38] Variables met criteria for skewness and kurtosis (less than 2.59 x SE) with the exception of Hedonic Tone which was kurtotic.

Table 4.2: Results from a two-way ANOVA (GLM) factoring time (pre to post) and setting (school v forest), n=8				
Subscale	**Setting**	**T1** **Mean, SD**	**T2** **Mean, SD**	**Interaction Effect Setting x Time** ***F, df, P***
Hedonic tone +	School Forest	14.25, 2.10 12.00, 2.82	11.76, 2.47 15.14, 1.57	**9.45, 1, 0.022*,**
Anger -	School Forest	2.5, 1.41 4.86, 2.6	3.25, 1.98 2.29, 0.48	6, 1, 0.063
Stress -	School Forest	7.0, 2.3 8.86, 2.79	8.50, 3.38 4.86, 1.57	**55.147, 1, 0.000***
Energetic arousal +	School Forest	13.75, 2.7 11.43, 2.5	13.75, 1.98 15.14, 1.57	**25.5, 1, 0.002***

+the higher the score the better the condition; - the lower the score the better the condition

(1) Anger

The interaction effect between setting and time was marginal, but on a one-tailed hypothesis[39] this result becomes significant ($p<0.05$). Anger rose in school and fell in the forest setting. There were no main effects of setting or time. There was one outlier, which when removed, reduced the significance of the interaction effect. Outcomes for anger reflected the patterns found in mainstream education, but the outcome differences between settings were less significant. The specialist school internal setting had less of an effect on anger than the mainstream educational setting.

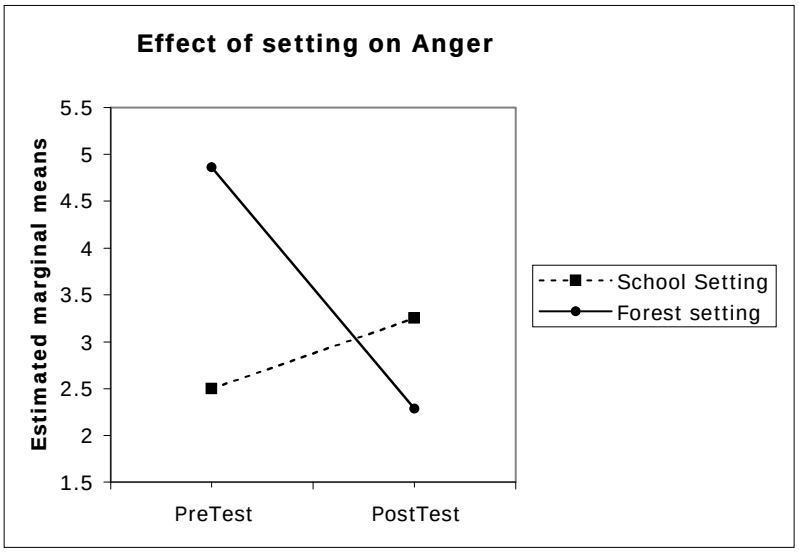


Fig 4.4

[39] A viable hypothesis based on results in Chapter 3; we could reasonably expect anger to reduce in the natural setting and increase in the school setting.

(2) Hedonic tone

There was a significant interaction effect of setting and time; hedonic tone increased in the forest setting and decreased in the school setting. One outlier was removed and the significance increased (F=13, df =1, p=0.015). The pattern was similar to that found in the mainstream school.

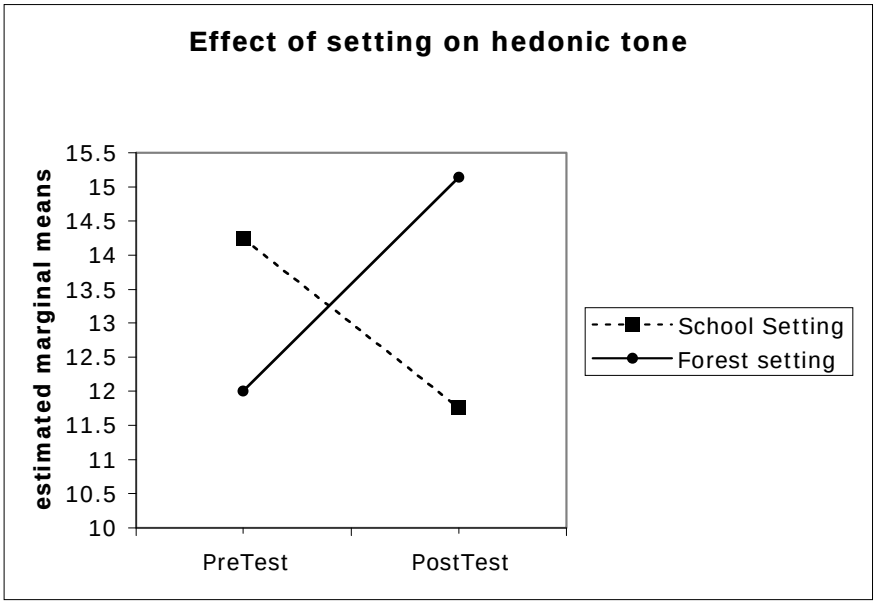


Fig 4.5

(3) Stress

The interaction effect between setting and time was highly significant (p=0.000); the school setting increased stress; the forest setting reduced stress. This outcome was much more significant than in the mainstream school and more consistent with restorative theory.

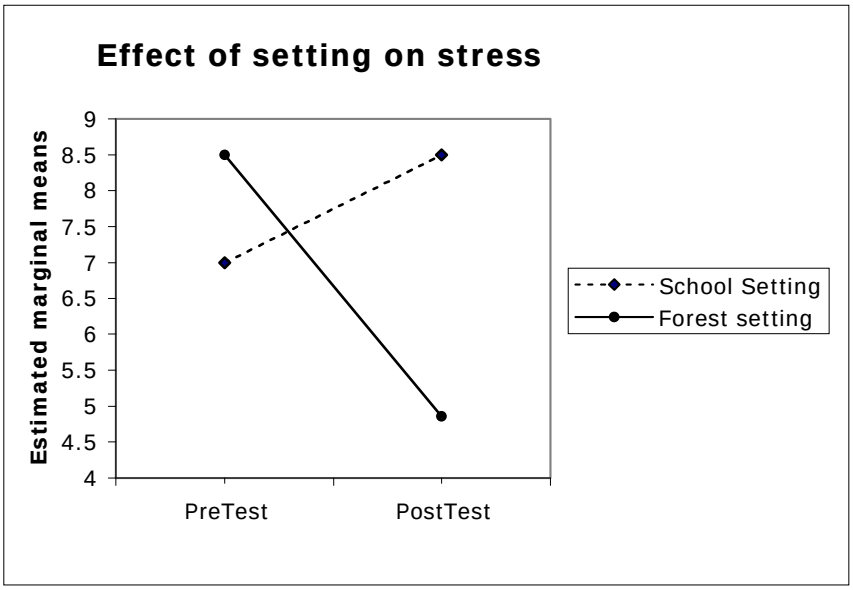


Fig 4.6

(4) Energy

The interaction effect between setting and time was again highly significant (p=0.002); energy increased in the forest, and decreased in school; as with stress, the pattern was more typically restorative than that found in the mainstream school. As discussed in Chapter 3, vigour can be interpreted differently, however, since fatigue is a particular problem in this group of subjects (sleeping patterns are erratic and pupils are often tired at the start of the day) the forest outcome should be construed as positive.

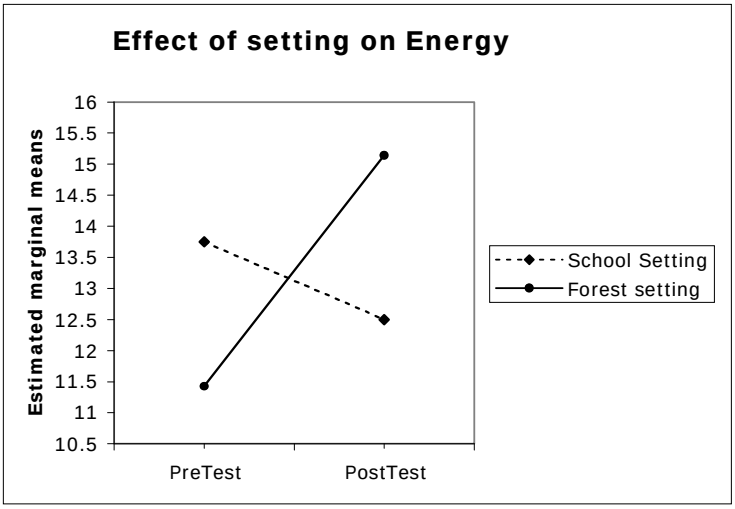


Fig 4.7

Summary: the forest setting improved outcomes on all four mood variables, and patterns were more consistent with restorative theory than in the mainstream school, particularly on stress and vigour. The specialist setting had less of a detrimental effect on anger than the mainstream school, a positive outcome in this context.

4.3.2 Ethnographic results

4.3.2.1 Preliminary analysis

Observations in the forest setting were coded in NVivo 7 (a software too for qualitative analysis) using the emotion categories from the circumplex model. Preliminary analysis did not take into account time, a dimension explored in the second stage. Observations in the school setting were also coded using the same framework; because this was not carried out with the same frequency, a direct comparison with the results below is not legitimate (it could however be shown over one day in time). Results are shown in Table 4.3 and in a series of figures below.

Table 4.3: Spectrum of observed affective reactions in the forest (number of recorded observations in brackets)

PRIMARY EMOTION	INTENSITY	TERTIARY EMOTION
Anger (62)	Rage (20) Annoyance/Provocation (42)	
Disgust (35)	Loathing/Indignation (13) Boredom (22)	
Sadness (28)	Upset (8) Glum/Lethargic (14)	-Isolation (6)
Surprise (15)	Amazement (9) Distraction (6)	
Fear (38)	Terror (9) Apprehension//Tension (29)	
Trust (195)	Admiration/Affection (176) Respect/Courtesy (19)	-Sharing (81) -Protecting (15) -Revelation (46) -Touch (34)
Joy (182)	Happiness (95) Serenity (87)	-Joviality/Zest (81) -Performance (30) -Triumph (14) -Calm/Content (38) -Comfort/Coziness (49)
Anticipation (145)	Interest (Curiosity)(135) Vigilance (10)	-Exploration (31) -Absorption (42) -Wonder (32)

Fig 4.8 below shows that the forest setting prompted many more positive affective reactions than negative. The low frequency of negative reactions suggests that the forest setting has much to offer in terms of behaviour control; there were few recorded outbursts of anger (9%). Consistent with restorative theory, fascination (anticipation) featured highly in the forest setting (21%); a new finding was the sense of ease (trust) that natural settings promoted, discussed further in Section 4.4.

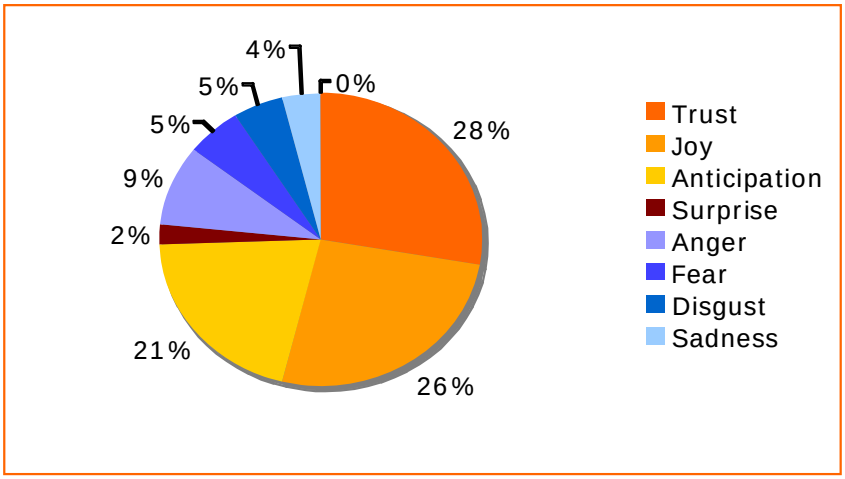


Fig 4.8: Observed spectrum of affective reactions to the forest setting

This study was particularly interested in evidence of exploration and curiosity as indicators of well-being and personal development in young people. The range of emotions classified under this category (anticipation) fell into one of four sub-categories (exploration, absorption, wonder and vigilance). This spectrum is illustrated in Fig 4.9 below.

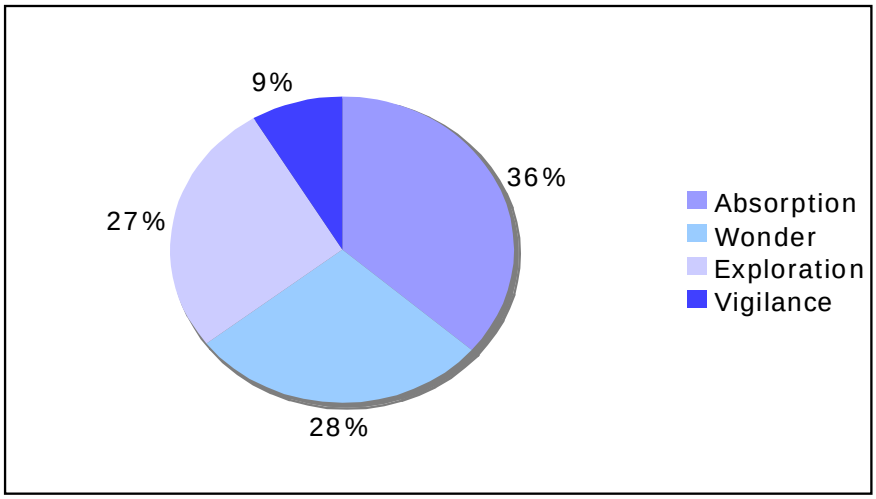


Fig 4.9: Observed spectrum of anticipatory affective reactions to the forest setting

In order to capture something of the essence of the affective experience, condensed representations or "*vignettes*" of experience were developed using components from Russell's (2003) framework. This generated a substantial catalogue of material. An example from each emotion category is illustrated in Table 4.4 over. Since emotions do not necessarily fall into prototypical categories, this approach was problematic, as shown in the analysis of anger, Section 4.3.2.1 below.

Table 4.4	**Components of negative and positive affective reactions to forest settings**				
Emotion category	**Core Affect**	**Primary Stimulus**	**Cognitive component ("best guess")**	**Expression/behaviour**	**Outcome**
Anger (Rage)	Dis-pleasure High Arousal	Object (a tree stump, a beetle), a previous Event	Attribution of blame: *"I'm going to destroy this beetle's home … It's all <u>his</u> fault – he's to blame*."	Geographic mapping of a location analogous to own home. Ferocious attack with an axe; *"All these homes are going to be destroyed! ...There goes the school – the children will be happy today!"* Mutilation of the beetle.	Satisfaction, anger-out
Anger (Annoyance)	Dis-pleasure Arousal	Object: under-growth and brambles	This is difficult and uncomfortable	Stumbling, tripping, throwing a tantrum, reiterative demands, break down: *"I can't walk! I can't walk! I need help! I need help! J, J, J!"*	Exaggeration, Irritation
Disgust (Loathing)	Dis-pleasure Arousal	A rule (Agent), an aerosol can (Object)	Desire to provoke and command supremacy amongst peers, "*Watch this!"*	Throws can into the fire, stands back, waits. Glee. Denial of the danger.	Satisfaction Attention Removal
Disgust (Boredom)	Dis-pleasure Arousal	Object: a tool	What can I do now?	Wanton destruction of structures, cutting, sawing, frenzied activity, glee. Repeat	Satisfaction Attention
Fear (Terror)	Dis-pleasure Arousal	Object: a bee	This could sting	Cower, flee, clutch hat, seek refuge	Retreat
Fear (Apprehen-sion)	Dis-pleasure, Arousal	Object: a swing	This doesn't feel comfortable	Caution, awkwardness, push off with legs, pull torso forward, swing, repeat.	Retention, Satisfaction
Surprise (Wonder)	Pleasure Arousal	Object: A giant hare	*Run, Rabbit Run!* (a game) assumes real life significance for a moment: *"It's real!"*	Jump for joy, squeal with delight, enlightened facial expression.	Joy and Hope
Surprise (Distraction)	Pleasure Arousal	An Event, arrival of police	What's happened?	Advance forward, inquire, communicate, be courteous	Curiosity
Trust (Affection)	Pleasure Quieting	An agent (person)	Desire for warmth	Approach, wrap arms around C, squeeze, hold tight. Retain.	Comfort
Trust (Courtesy)	Pleasure Quieting	Object (swing) plus peers (Agents)	Watch before attempting something new	Wait a turn, co-operate, push a peer, have a go.	Conviviality and Calm
Joy (Happiness)	Pleasure High Arousal	An Event: (potential foster visit), an Object (the willow dome)	*"Let's have a party!"*	An imaginative game: tidy the house and garden (rake, cut, clear), make a fire, prepare some food ("*turn the sausages over, get the kettle on*"), sing and skip. Repeat and expand.	Conviviality
Joy (Serenity)	Pleasure Quieting	An object (the fire)	This is cozy, I'll stay here a little while.	Rub hands together, toast them, gaze at the flames, be still. Retain.	Comfort *"It makes me feel warm"*
Anticipation (Vigilance)	Pleasure Arousal	The temperature	*"Someone's got to keep this fire going!"* and the need to stay warm	Vigour, splitting logs, stacking, quality control, sifting, rejecting inappropriate material, repeat, cognitive associations ("*it looks like a burial chamber*")	Satisfaction and Pride, *"that's my best fire yet!"*
Anticipation (Curiosity)	Pleasure Arousal	An object: Frog spawn	*"Is this alive? How will it react if ….?*	Pulverise, squash, squeeze, throw, burn, laughter and zeal.	Mastery and Control

4.3.2.2 An analysis of anger-out

Fig 4.10: Conquering the bracken

The above (Table 4.4) classification is an over-simplification of the complex processes involved in an emotional experience. In order to convey something of the complexity of the process, one affective reaction, anger, was explored in more depth using Russell's (2003) framework. Occasionally the components of an emotional experience form a prototypical pattern (as in fear and flight) but often the story is non-prototypical. The example discussed here, a game of beating down the forest bracken, doesn't fit the prototype *anger*. The boy repeatedly picks up a stick and brings it down upon the bracken. This is primarily a pleasurable activity (being continually repeated), producing elation (triumph), but still the behaviour is analogous to anger (destruction). Core affect (anger) is probably already present before the event and is diffused via the action. In this example, core affect is operating within an *imaginary* event: the bracken is analogous to a powerful giant that needs to be overcome, *"bigger than me, bigger even than you!"* The *unconscious* cause motivating the behaviour may lie in a real life event and a desire to reap revenge: *"Take that! How do you like that!"*. Core affect responds to a flow of simultaneous events, past and present, and is being influenced by the background environment, both physical (midges, heat) and the social (an agent, the researcher). Each stimulus is priming memories and associations impinging on core affect at the same time. The object (the bracken) has different affective qualities simultaneously present: it is both giant to be conquered (challenge) and an obstructive material that gets in the way (irritation). Perception of affective quality also comes from interacting with the object. The boy is clearly having fun with the object; the

object then becomes coded in the memory as “object of fun” and the behaviour is repeated constantly.

To summarise, the boy sources a material that corresponds in affective quality to his feeling state: the core affect is both negative *(anger*) and positive (*exhilaration*). The boy is feeling enthused and energetic (core affect of pleasure and arousal) as well as expressing anger. The emotional experience is therefore not prototypical. Two themes emerge: the mental state is directed at something fictional (the giant) and there is a matching of feeling (mood congruency) between boy and object. The example chosen here is one of healthy anger (a working-out anger that doesn’t harm an individual), as compared to problem anger (a deeper feeling of loathing or irritation with some object, person or event). The forest environment is supporting a healthy therapeutic experience (anger-out). What’s remarkable is that it is entirely self-directed by the boy. The experience is summarised in Table 4.5 over, based on Russell’s (2003) framework (note that the components do not necessarily proceed in the sequence shown).

Table 4.5: Components of an affective reaction (anger) based on Russell's (2003) framework of emotion.	
Stimuli	External: bracken (main object) plus a large stick, an agent, some midges. Internal: possibly a negative event from the past
Core affect	Pleasure-displeasure: high arousal
Affective quality of the Object	The bracken is negatively associated with someone powerful: a giant *"bigger than me, bigger even than you!"*
Attribution to Object	Hitting the Object will bring pleasure
Appraisal	The goal plan: destroy, inflict pain, eliminate. *"Take that, see how that feels!"*
Action	Beat down the object repeatedly, advance forwards
Expression	Raised voice, intent facial expression, muscle tension, verbal and physical force, "AAGGH!", bringing the stick down. Repeat and advance.
Meta-experience[40]	Not perceivable
Emotion regulation	Therapeutic release of tension, anger-out.

[40] The meta-experience is the conscious experience of perceiving an emotion, i.e. the awareness of being angry.

4.3.2.3 Secondary analysis

A case study approach was used to map changes in emotional experience and to explore patterns of change, over time, in three individuals over several months. To develop the storyline, personal reflections and quantitative results are threaded through each study. The three individuals selected were chosen because they displayed different trait personalities[41]: neuroticism (anxious, angry or depressed) and openness (creativity and exploration).

Case Study 1

Table 4.6: D's spectrum of observed affective reactions *key reaction	
***Anger**	6
***Joy**	6
Disgust	1
***Anticipation**	7
***Trust**	10
Fear	4
Surprise	1
Sadness	1

(1) Overview D. was prone to histrionic behaviour and full-blown temper tantrums about seemingly nothing. He showed signs of neuroticism and delusion imagining, for example, a limb was not functioning. On other occasions he was co-operative and good-humoured. Physically unco-ordinated, he found the physical forest terrain difficult and initially was ill-at-ease in this environment.

(2) Change in behaviour over time

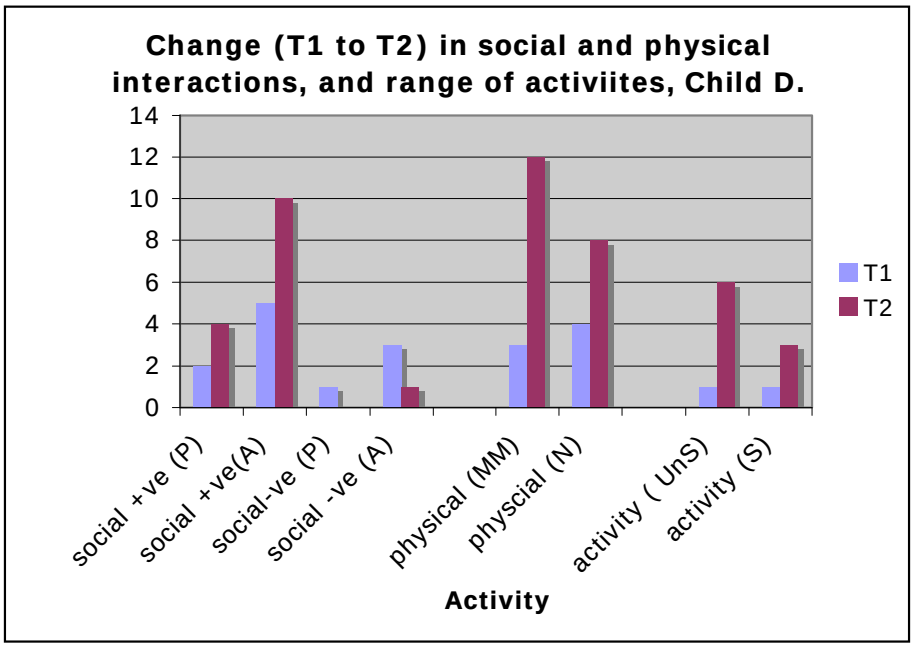
Observed changes included improved co-ordination, self-confidence and social cohesion with staff and peers. Changes in emotional behaviour included the ability to positively reminisce about life events (trust), develop imaginative games (creativity) and explore the full forest (interest). This pattern was reflected in recorded observations on site (see Table 4.6 above). D's z scores for anger, hedonic tone, stress and energy were within the group range (z=<2.0) in both school and forest settings. In the short term, D's energy increased in the forest setting.

[41] Based on a five-factor trait model these were: openness, conscientiousness, extroversion, agreeableness, neuroticism (OCEAN).

In developing the ethnographic analysis, two methods were explored in order to show changes over time. Firstly, observations were coded for evidence of:

(1) positive and negative social interactions with peers and adults;
(2) physical interactions man-made and natural materials;
(3) the extent of structured and unstructured activity undertaken during a session.

This produced the pattern of change illustrated in Fig 4.11 indicating the extent of D's positive social and physical interactions increased over time.



+ve = positive interaction, -ve = negative interatction,
P= peer, A = Adult,
MM =man-made activity, N = natural activity
UnS = unstructured activity, S = structured and completed activity
T1=2/07, T2 = 4/07

Fig 4.11

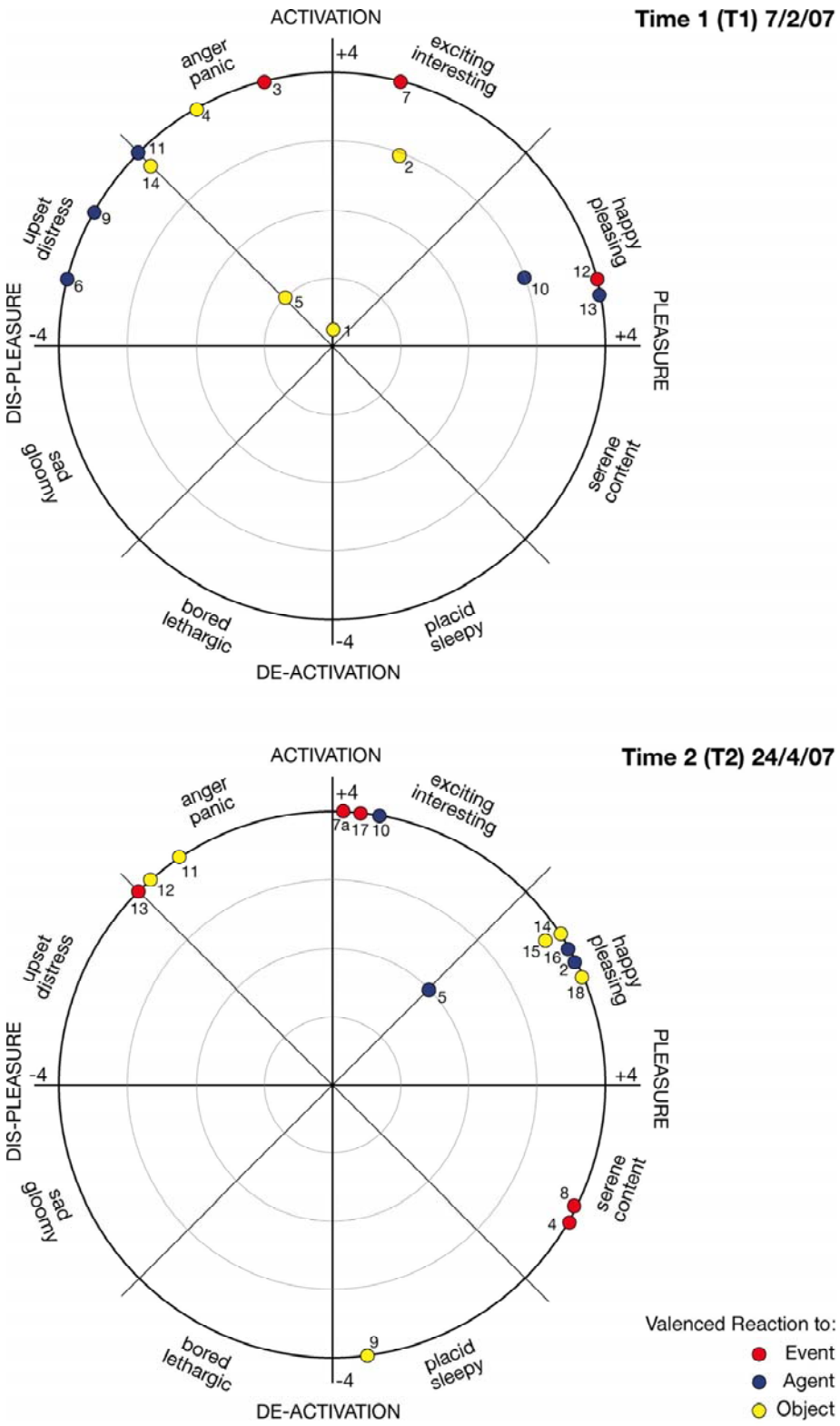
4.3.2.4 Stage 2 Using the three dimensional model, affective reactions, observed over two periods (Time 1=2/2007, Time 2=5/2007) were catalogued as reactions to Objects, Events or Agents (colour coded for demarcation, see Tables 4.7 and 4.8 below). Each experience was scored on a scale of +4 to -4 on the pleasure and arousal axes, and plotted over Time 1 (T1) and Time 2 (T2), on the circumplex map of emotions, see Fig 4.12 below. The experiences were also plotted spatially to pinpoint their physical location. See Fig 4.13 below. The results are summarised in a series of simple graphics designed to condense results, see Fig 4.14 below. This shows:

(1) a positive shift in D's spectrum of emotional experiences plotted on the circumplex and also calculated as a ratio;
(2) a positive shift in exploratory activity: over time, D. developed the confidence to move beyond the security of the camp hub, to independently explore the forest environs; his spatial field of activity therefore grew.

By way of example, all stages of the analysis are illustrated in Case Study 1; to simplify findings in Case 2 and 3, the preliminary analytical material is incorporated into Appendices 4.1 and 4.2, with the summary diagrams only included here.

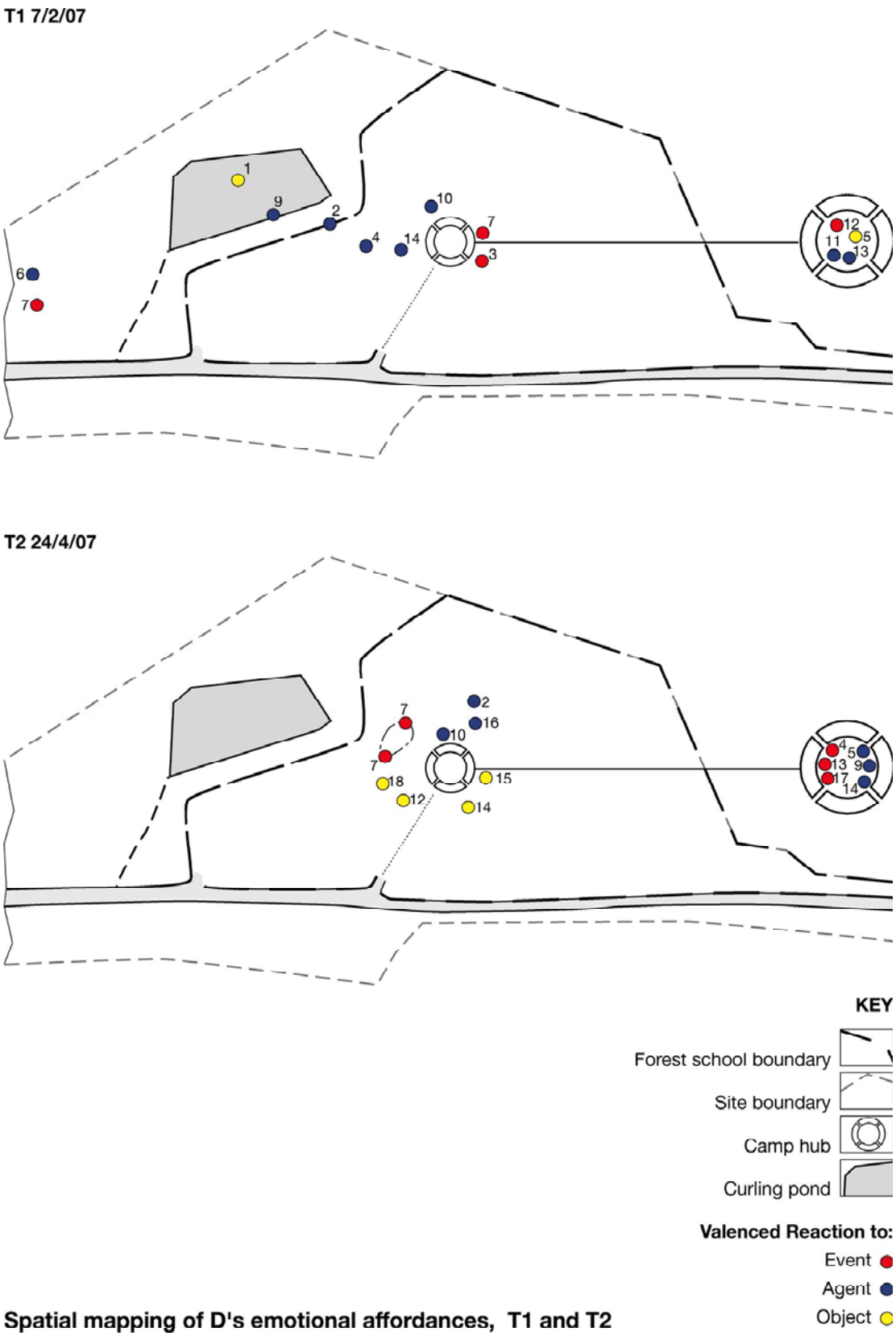
Table 4.7: D's valenced reactions to Events, Agents and Objects, Time 1, 7.02.07					
Key	**Primary Stimuli**	**Core Affect**	**Affective Quality of O, A, E**	**Cognitive component "best guess"**	**Expression**
🔴	**EVENT (E)**				
7	A game: a race across the clatter bridge (O)	Pleasure (0) Arousal (4)	Anxiety	Can I beat D?	Awkwardness and, uncertainty, stumbles
3	A game: climbing a tree	Pleasure (-1) Arousal (4)	Panic/Fear	I can't do this, I need help	Hesitance, slow advance, stop, appeal for help, grab a hand
12	A task: boiling the kettle	Pleasure (4) Arousal (1)	Curiosity	Can I keep this alight?	Peer inside, pop in fuel, stay and watch a while
🔵	**AGENT (A) OTHER**				
6	Adult (asked to tie boot laces).	Displeasure (-4) Arousal (1)	Irritation	You don't do them properly! I want T.	Flap arms, curse, taut body.
11	Provocative peer J	Displeasure (-4) Arousal (4)	Upset	J. is provoking me, I need to get away	Run away, hit a pole, swear, flap about
10	Adult (making willow dome)	Pleasure (3) Arousal (1)	Praise Trust	B. is doing a good job	Step forward, look around, admire, pause, repeat
9	Adult	Displeasure (-4) Arousal (2)	Distrust/ Paranoia	Whose moved my helmet?: "it's you!"	Disdain, accuse, shout, flap arms
🔵	**AGENT (A) SELF**				
13	Self as Comedian	Pleasure (4) Arousal (1)	Pride	B. could be Guy Fawkes!	Laugh, satisfaction, stay a while
🟡	**OBJECT (O)**				
1	Ice on Pond	Pleasure (0) Arousal (3)	Caution Curiosity	Is this safe?	Stop, look, watch others, wait, drop back- pack and helmet, advance cautiously, slowly slide, test it out, copy peers.
2	Iced puddle on track	Pleasure (1) Arousal (3)	Cautious Curiosity	A safer surface?	Copy peer, investigate, watch the bubbles, stamp, crack the ice, repeat
14	Woodland undergrowth and branches	Displeasure (-4) Arousal (4)	Annoyance/ Anger	I want to get out of here!	Stumble-trip, dump backpack, anxious face, flap arms, advance hesitantly
4	A stream to negotiate	Displeasure (-2) Arousal (4)	Panic/ Uncertainty	Which way to go?	Question, advance hesitantly, pause, look around, jump.
5	Splitting logs/axe	Displeasure (-2) Arousal (1)	Fear of axe	I'd rather someone else did this	Fear, pull back, cower

Table 4.8: D's valenced reactions to Events, Agents and Object, Time 2, 24.4.07					
Key	**Primary Stimuli**	**Core Affect**	**Affective Quality of O, A, E**	**Cognitive component: "best guess"**	**Expression**
🔴	**EVENT (E)**				
4	A task: getting the fire going	Pleasure (4) Arousal (-2)	Pride	"Didn't I do well!"	Delight, savour, be still, enjoy the flames, retain
7	A walk	Pleasure (4) Arousal (4)	Curiosity	What will we find?	Advance, explore, overcome obstacles (jump over, steer around)
8	A visit to the Wigwam	Pleasure (4) Arousal (-2)	Comfort/ Security	It's cozy here: let's have a rest	Chat, share, reveal, retain and savour
13	A task: making a whistle	Pleasure (-4) Arousal (-4)	Anger	Anger-out when it breaks	Distress, upset, throw a tantrum, run away
17	A challenge: a sawing contest	Pleasure (4) Arousal (4)	Glee/Joy	To win	Zeal, zest, focus, glee
🔵	**AGENT (A) SELF**				
5	Self as Experimenter (O= packet of crisps + fire)	Pleasure (2) Arousal (2)	Pride	How will this react on the fire?	Patience, watch and wait
17	Self as Experimenter (O = tree + rope)	Pleasure (4) Arousal (4)	Pride	How high can I climb this tree with this rope?	Invention, advance, climb, swing
🔵	**AGENT (A) Other**				
2	A adult to push me (O = swing)	Pleasure (4) Arousal (2)	Desire	Hold their attention	Chat, share, retain
10	An adult to dominate in prisoner of a war game (E) in the willow dome (O)	Pleasure (4) Arousal (4)	Satisfaction	To dominate, control, lock up, imprison	Invent, advance, create, elaborate
🟡	**OBJECT (O)**				
9	A bench in a shelter	Pleasure (4) Arousal (-4)	Rest Security	I want to sleep	Be still
10	A fly on a post	Displeasure (-2) Arousal (4)	Irritation, dislike	Desire to destroy, mutilate	Torment, mutilate with saw, chop, expand, zeal
14	Sap from Elder tree	Pleasure (4) Arousal 2)	Curiosity Comfort Like	This is nice to touch	Squeeze, press, manipulate
15	Sorrel and lime leaves	Pleasure (4) Arousal (2)	Curiosity Like	These taste nice	Forage, pick, share, pocket
18	An unfolding fern	Pleasure (4) Arousal (2)	Comfort Like	This feels soft	Touch, dwell, hold, share
12	A bee in my coat	Pleasure (-4) Arousal (4)	Panic/Fear	This could hurt!	Run-away, jump about, scream



D's Spectrum of Emotions at T1 and T2

Fig 4.12 (read in conjunction with Tables 4.7 and 4.8)



Spatial mapping of D's emotional affordances, T1 and T2

Fig 4.13

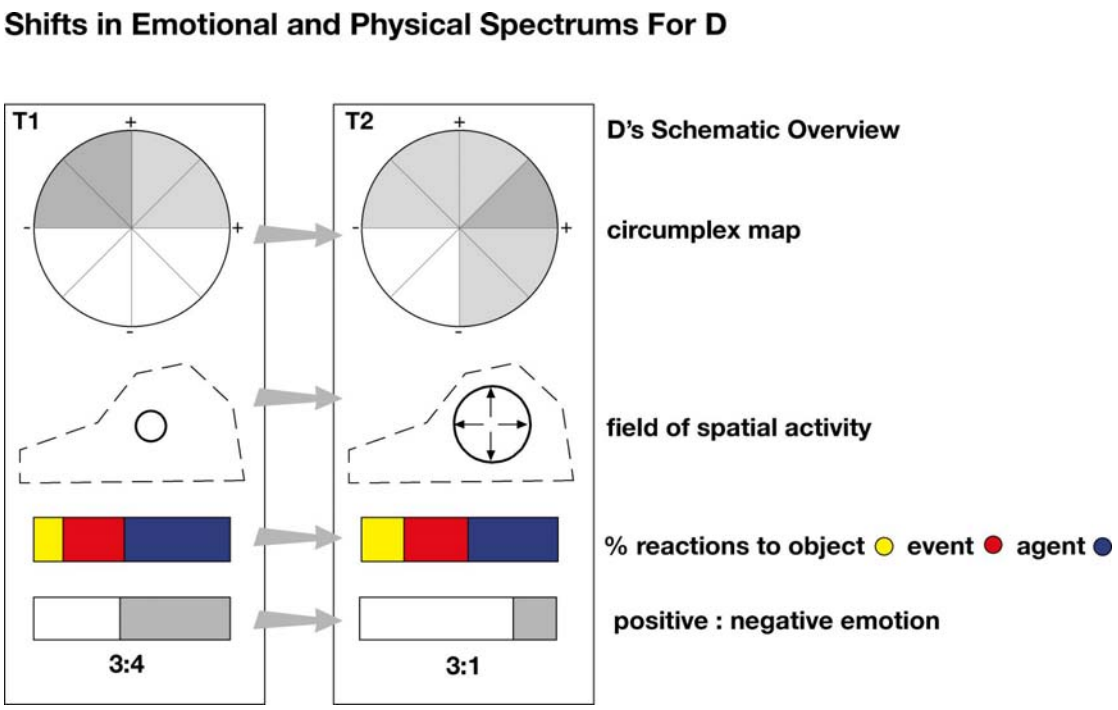

Shifts in Emotional and Physical Spectrums For D
T1
T2
3:4
3:1
D's Schematic Overview
circumplex map
field of spatial activity
% reactions to object
event
agent
positive : negative emotion

Fig 4.14

Case Study 2

Self-portrait

Table 4.9: K's spectrum of observed affective reactions *****key affective reactions	
Annoyance (sub-set of Anger)	6
***Joy**	8
***Disgust**	8
***Anticipation**	9
***Trust**	10
Fear	5
Surprise	3

(1) Overview K. was more open and agreeable in character than his peers, showing creativity and curiosity in the forest setting. This is supported by the observations recorded in Table 4.9 above. He laughed a lot in both settings, but could get huffy if things didn't go his way. His relationship with adults was good, but relations with his peers less successful. The forest was a giant stimuli for K's imagination as he creatively drew in tools, loose materials and willing agents into his games. The outside world had a special significance for K; he was determined to move on. He would look longingly at the outside world, and had a special seat in the forest located up above the road where he contemplated the moving traffic and the view beyond, an aspect caught in his photographs and video diary[42]. He would frequently film himself, an aspect caught in the above photograph.

(2) Changes in behaviour over time

The major change in K's behaviour between T1 and T2 was an increased ability to integrate with his peers (see Fig 4.15 over). His field of physical activity was already extensive at the start of the study. Over time, he moved inwards rather than outwards towards the social hub of the forest (the camp fire). This change was also reflected in the increased number of observed reactions to Agents. There was little change in the ratio of positive to negative experiences: K. positively responded to the forest setting from the start. K's z scores for anger, hedonic tone and energy were within the group range (z=<2.0) in both school and forest settings, but his post-score for stress in the forest was on the margins (z=2.0). Short term, the forest experience increased vigour in

[42] Because he's videoed the black tarmac the footage is visually indecipherable and was not included in the DVD.

K. compared with the close confines of the classroom, which substantially drained his energy.

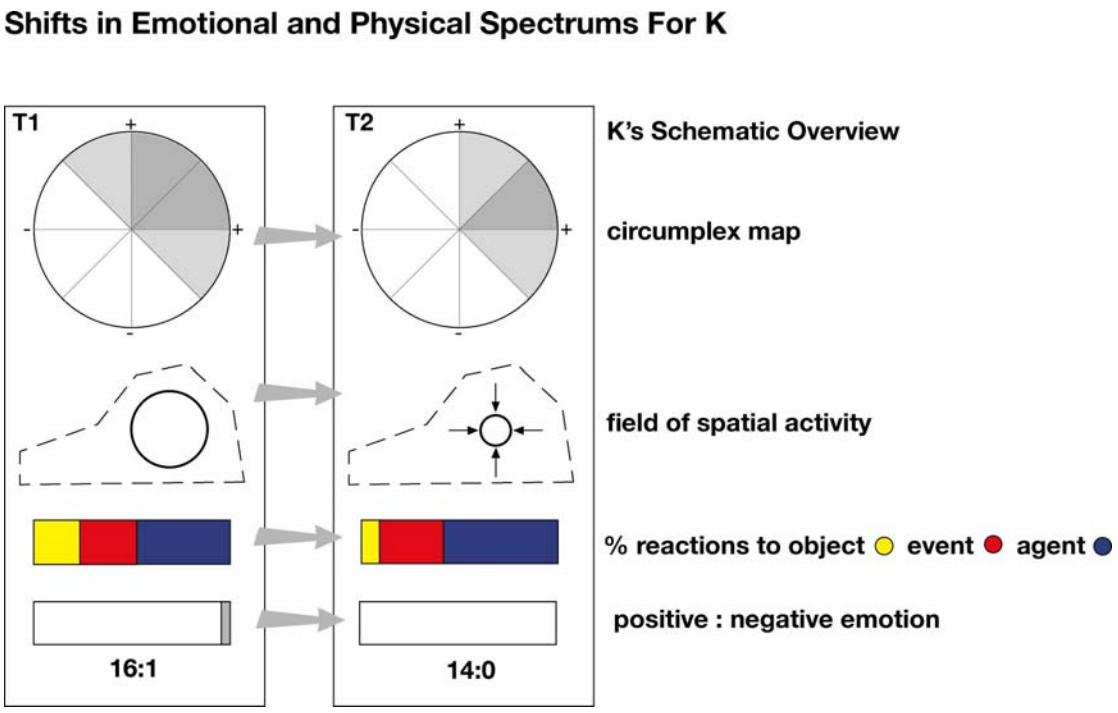


Fig 4.15

Case Study 3

Table 4 .10: P's spectrum of observed affective reactions *key affective response	
***Anger**	9
***Joy**	6
Disgust	5
Anticipation	5
***Trust**	6
Fear	2
Surprise	2
Sadness	4

(1) Overview P. was volatile and prone to violent outbursts interspersed with long, withdrawn silences. He was disengaged from peers and staff and often appeared unhappy and over-tired. P. had a passion for football and his behaviour would often improve prior to a game for fear of the privilege being removed.

(2) Changes in behaviour over time

Major behavioural changes observed in the forest setting:

(1) an increasing ability to creatively visualise (he would mimic the habits of animals);

(2) a growing respect and care for his peers; and

(3) a growing sense of ease around staff: on several occasions he felt comfortable in approaching and hugging staff[43].

Mapping P's affective reactions between T1 and T2 illustrate a shift towards more positive affective experiences (see Fig 4.16 over). The spatial plans show an increase in exploratory activity over time, moving from the camp fire to the wider forest environs. This pattern is reflected in the bar chart showing an increase over time in his ability to interact with the objects in the forest, a further indicator of his developing curiosity. P's z scores for anger, hedonic tone, stress and energy were within the group range (z=<2.0) in both school and forest settings. Short term, the forest experience (as compared to school) substantially reduced stress and increased vigour in P.

Summary A case study approach flags the need to consider individual indicators of change owing to unique personality and behaviour in this setting: in Case Studies 1 and

[43] The need for physical contact in these boys is recognised and nurtured by the school.

3, evidence of increased exploratory activity is a positive outcome; in Case Study 2 evidence of increased social connectedness (less exploration) represents a more positive change. Increased vigour in each of the boys was a significant outcome of the short-term forest experience.

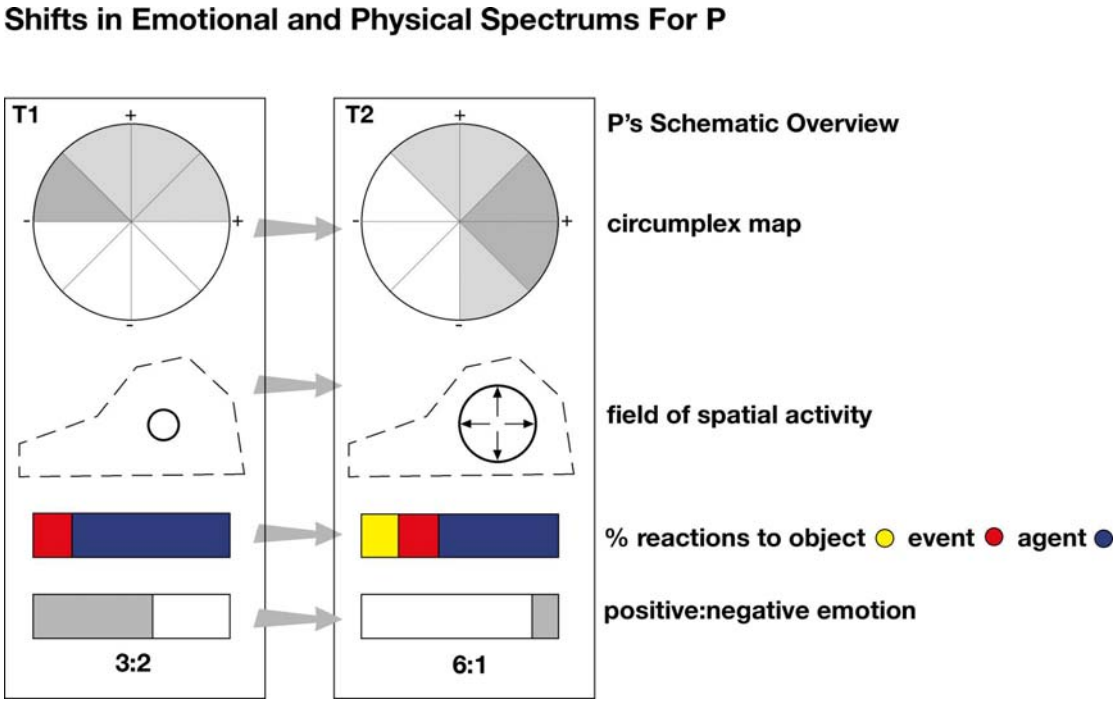


Fig 4.16

4.3.3 Visual analysis (read in conjunction with DVD 2)

The film footage generated by the boys was edited to form an 10-minute DVD designed to support main findings. On occasions the researcher was specifically asked to film a boy and complied. The clips have been chosen to illustrate some of the main themes of the study: exploration ("*a wee walk in the woods*"), domesticity and conviviality ("*the delivery of bacon sandwiches*"), retreat and calm ("*the hammock*"), fascination ("*my wee den*") and zest *("Don't stop me now. I'm having a good time*!"). Episodes were also selected to show evidence of the three-dimensional structure of emotions, that is, of valenced reactions to Objects, Events and Agents (see Table 4.11 below). It is clear from the film that reactions to these stimuli are simultaneously happening at once. Owing to behavioural problems, the video exercise was not always successful, but when it did work the results were remarkable; the filming and description of the hammock a case in point. The camerawork is proficient, the zoom is used creatively and the accompanying verbal description is controlled and illuminative. The ambience of the film is suggestive of calm, comfort and retreat; the pauses on the knots suggestive of security. Other footage, by way of contrast, has been included to convey something of the chaotic and antagonistic behaviour characteristic of the boys on occasions.[44]

Table 4.11: Summary of DVD Episodes (in running order)

Valenced reaction to …	**Title**	**Core affect**
Event	The bacon delivery	Contentment
Event	"*A wee walk in the woods*"	Interest
Event	"*Attack! Attack*!"	Compliance
Event	"*Stars in your Eyes*"	Ambivalence
Agent: self	The hammock	Pride
Agent: other	"*Don't stop me now!"*	Admiration
Object	"*My wee den*"	Security
Object	Forest trees and frost	Curiosity

The video research was successful in giving some inarticulate members of the group a participatory voice. As shown in Chapter 3, individuals take on a new persona behind the camera. This was particularly noticeable in P., a withdrawn and volatile individual, who became verbally expressive and communicative with peers and adults behind the camera (clip entitled "*Don't stop me now*!"). Most of P's film was visually indecipherable, characterised by chaotic, out-of-focus, fleeting images that captured his world. But the verbal accompaniment was telling, revealing a real need for staff and

[44] Some of this material is uncomfortable to view and is questionable ethically but to conceal it would not accurately convey what was going on.

peer interaction. Parallel themes with the ethnographic study are mapped in the matrix below; where a theme resonates with a particular individual this is highlighted. Jg's film, for example, was a particularly good example of fascination in the forest and of the comfort of dens. The length of each individual film was an interesting result in itself given the concentration difficulties and lack of behavioural control within the group.

Table 4.12: Matrix of research themes and video evidence							
Theme		**D.**	**De**	**Jd**	**K.**	**Jg**	**P.**
Exploration	**Self**	√	√	√	√		√
	Forest (and activities)	√	√	√	√	√	
	Outside World		√		√		
Socialization	**With Staff**	√	√	√	√	√	√
	With Peer	√	√			√	√
	Homeliness	√	√	√	√	√	√
	Humour		√	√			
Anger	**Provocation of Staff**		√				
	Provocation of Peer						√
Creativity	**With camera**	√	√	√			
New Persona				√			√
Length of film (min)		**12**	**18**	**6**	**15**	**10**	**24**

4.4 Discussion

Firstly, was the forest setting restorative and were outcomes more positive than in the school setting? Mood significantly improved in the forest on all four variables; it was especially advantageous to stress and energy. By contrast, the school setting consistently depressed outcomes as anticipated. When compared to results in mainstream education (chapter 3) outcomes were more consistent with restorative theory. However, the residential school had less of a detrimental impact on anger than the mainstream example. This is probably explained by smaller class sizes in the specialist setting, higher staff-to-pupil ratio's and other interventions designed to control behaviour. Concerns about the practicalities of carrying out quantitative research in the subjects were unfounded; the participants appeared to be comfortable talking about their emotions and took the research seriously.

The second question this chapter asked was in relation to human needs. The two biggest challenges facing these boys are behaviour control and re-socialisation in order to return to mainstream education and society. The cost of failure is potentially catastrophic, the next step being removal to a secure unit. Firstly, on behaviour control: the quantitative data shows the forest setting significantly reduced anger and stress, emotions consistently associated with anti-social behaviour (see Chapter 3 for discussion). Reducing anger opens up opportunities for other behaviour options, an outcome supported by the qualitative data. The ambience of calm in the forest setting was a huge contrast to the often tumultuous atmosphere of the classroom; staff and pupils visibly became less stressed in the forest, starting with the long walk down to the forest, a ritualistic activity allowing tensions and conflicts to be left behind and new relationships to be formed. In the forest the boys learnt to exert control over their environment, utilising raw forest materials for heat and food, negotiating difficult terrain and undertaking normal boyish activities (manipulating and mastering insects, for example). The adult-child relationship shifted on site, as the boys became more co-operative; they were also offered opportunities to direct staff within their elaborate games (as small children do). In this way, the forest setting offers the boys valuable opportunities to catch up with their childhood since many, through circumstance, have grown up too quickly.

This study was also interested in how successful the forest experience is in promoting rehabilitation. Normal family life is missing in these boys' lives and in some instances basic needs for survival (food, warmth etc.) have not been met. As one member of staff described it, "*these boys are operating at the lowest level of survival"*. Cooking and eating around the camp fire is a ritualistic element of the forest school experience nurturing socialisation. Here the boys chat, drink hot chocolate, toast marshmallows, make bread, popcorn etc. This theme of "homeliness" is reflected in the construction of dens, shelters and hammocks, offering places to retreat and be alone (essential in this environment), places to share time with a peer, or as stimuli for imaginative home-making games. These places offer warmth and comfort akin to the qualities associated with private bedrooms in Chapter 6. They are an essential component of mood regulation in these boys, fostering calm, quieting and trust. The boys would often share stories from the past in these dwellings, a response indicative of growing trust and integral to rebuilding adult-child relations.

The sheer scale of the forest fosters an important (if false) sense of freedom; the boys are essentially captive in their environment (they are here against their will) and the forest is the place they frequently choose to escape to. The quantitative data shows that being away in the forest allows anger-out and positive affect to increase. Is there any evidence to suggest that this also increases behaviour options as Fredrickson's (2004) hypothesis suggests? This is particularly important to this context where behaviour patterns have become entrenched. A direct link between behaviour change and affect cannot be proven, but there is substantial evidence from the qualitative research, suggesting the forest promotes more *flexibility* in behaviour options. In particular, it promotes increased creativity, exploration and social interaction, three dimensions in Fredrickson's framework. All three dimensions can be seen in Case Study 3, where patterns of extreme withdrawal and volatility are temporarily reversed. The ability to think more flexibly and expand mindset is reflected in the number of recollections the forest setting nurtures. In some boys this process was creative, stimulated by the imagination and scale of the context, resulting in elaborate conceptions: J., for example, used a hammock as a device to flip and toss his way back through fictional dimensions of time and space, recollecting positive family experiences on the beach; K. flipped backwards in time on the swing, recalling happier times with siblings. It is difficult to measure this quantifiably, but the fact that this process is occurring naturally, without adult intervention, is a positive outcome.

Can these outcomes be linked to particular objects and physical contexts within the forest setting? Interest was associated with movement and exploration through the wider forest; trust and recollection with dens, shelters and walks in the quieter parts of the forest; comfort and contentment with the fire and cooking environs. There was also some evidence to suggest that personality impacts on the type of emotional experience and where it takes place; affordances are, after all, unique to an individual. Extrovert personalities tended to stay close to the fire, be particularly vigilant in getting the fire established, exuberant about cooking food and enjoying the social interaction that location afforded. Introverted personalities were more explorative, retreating into remote locations, or creative games, enjoying the freedom of the forest and opportunities for peace and quiet. The Case Studies illustrate positive changes in behaviour occurred when individuals moved out of their respective comfort zones.

To summarise, the forest experience promotes discrete and cumulative restorative outcomes, improving mood, capturing curiosity, creativity, exploration and challenge. It also allowed therapeutic processes to occur naturally, without professional intervention.

4.5 Limitations

4.5.1 Validity

It would be difficult to independently verify the ethnographic findings from this study; this is subjective data and personal "head notes" inevitably played a part in coding the written field notes. In future, the problem could be solved (in less sensitive contexts) by recording observations with a video camera, allowing subsequent analysis to be independently verified. In an attempt to minimise bias and threats to validity, methodological triangulation was carried out (Table 4.13); findings from all three methods re-iterate findings on mood uplift and behavioural control; in relation to findings on socialisation and personal development, there is partial verification from the ethnographic study and video footage. Integrating a quantitative measure in future would help re-iterate results on these dimensions.

Table 4.13: Matrix cross-referencing findings

Research theme	**Method**		
	Quantitative	Ethnographic	Video
Mood uplift	√	√	√
Behaviour control	√	√	√
Socialization	✘	√	√
Personal development	✘	√	√

A common criticism of anthropological research is that it only contributes "*one case to the cross-cultural store of knowledge*" (Johnson and Johnson 1990). It amounts to *one single observation*, however rich and complex, and despite the quantity of field notes or length of time in the field. How generalisable, then, are the findings? Certainly this is a single unique setting with unique individuals, hence the Case Study approach. Patterns of behaviour change, however, were consistent within-group and mood outcomes replicated findings from Chapter 3. The significance of research in small participant

groups may ultimately depend on the size of the effect (as suggested by Mitchell 2008); this study, although small in number, found large effect sizes.

4.5.2 Methodological limitations

The three-dimensional framework of Events, Agents and Objects enabled the physical and social context to be considered but reactions to all three stimuli took place simultaneously. Potentially, "feeling" could come from many different directions, internal and external. Pinpointing the external stimuli was relatively easy in this group of subjects, but the internal construal of a situation and sub-conscious element of the emotional experience can only ever be a 'best guess'.

A huge effort is made on a daily basis to bring about changes in behaviour in this school setting. It's therefore not possible to attribute improvements in behaviour to one setting alone. The study would be strengthened in future by employing a simple indicator of behavioural change after the forest experience (for instance, did an individual sleep more effectively after the experience/did they show any improved ability to carry out a routine task like tidying their room?). The feasibility of this was explored with the school but unfortunately did not materialise.

4.5.3 The role of the researcher

Did getting to know the researcher influence the data? Relationships with each boy certainly varied: some boys accepted the researcher without hesitation; in others the process took time (Case Study selection reflected this). Johnson and Johnson (1990) argue that knowing the researcher helps supports validity, *"We must know our subject well, and be well known to them, if we are to obtain the most valid information about them"*. A passive participant-observer role was deliberately adopted to reduce the threat of influencing the data and to foster greater objectivity, but when asked to participate I did so, trying to remain unbiased and non-judgemental when mayhem broke out[45].

[45] On one occasion I felt a moral obligation to tell a member of staff about a potentially dangerous situation, on other occasions I kept quiet.

Was this the right approach? Would I have learnt more by adopting a more investigative, enquiring approach? I think the approach, given the sensitivity of the context was right; enquiring into the detail of these boys' lives was not appropriate. My role was quite different to that of staff in the setting, who held positions of authority. The boys delighted in directing another adult in their games (as young children do), another mechanism by which they developed control of their environment.

The socialisation of the researcher into the community, as in the above example, has consequences on the research. Jackson (1990) has suggested that a measure of your success in the process is how comfortable you feel in that setting. How well you 'fit' the environment under observation dictates the quality and quantity of the information picked up. As a researcher, you try hard to fit the context, but this process does take time. Certainly the quality of field notes improved over the period of the study, suggesting the degree of 'researcher-fit' also improved commensurately.

4.6 Conclusions

Outcomes on mood are consistent with restorative theory; the forest setting improved mood in the short-term, and this study replicates findings elsewhere in the PhD linking nature with positive mood regulation. Cumulative restorative outcomes include a growing sense of ease and trust, social cohesion and increased exploratory and creative activity (linked in the literature with personal development). This is a special setting, but its success is partly attributable to offering a "normal" set of experiences denied to these boys in the past; opportunities to share a meal, for example, or undertake a typically boyish activity such as squashing and manipulating frog spawn. As an intervention for anger management and re-socialisation, the forest experience has much to offer. Ironically, some of the boys are excluded when anger levels soar out of control; one individual, making a plea for inclusion, described the experience as "*second best to playing football*", a significant comment, given that football has revered status in this culture.

Getting to the heart of any “felt” experience of the physical environment is problematic, as this research has shown. However, the resulting framework, and suggested modifications, offer potential in the future for exploring the affective dimensions of place.

Chapter 5: Project places as niche environments in young people

Previous chapters have shown the ability of natural environments to promote restoration in the short term using standard psychological tests. This chapter continues to explore restorative environments in young people (age 11-13) using a person's project system as the main unit of analysis. Well-being has previously been defined as how well a personal project system is functioning (see Chapter 1); since the project place is an integral component of this system, the logical spin-off forming the conceptual basis of this chapter is that places supporting successful projects will be associated subjectively with positive affect. Supportive project places are defined within the research as "niche" environments, facilitating person-environment fit, a concept theoretically linked with restoration (Korpela et al 2008). This Chapter explores the relationship between supportive project places, well-being and adolescent developmental needs for autonomy, social integration, identity and risk. Themes relating to young people's development are set out in the introduction followed by results and discussion, which are structured around the three variables in the study: place, project and well-being indicators.

5.1 Introduction

The participants in this study (aged 11-13) face a particular set of age-related developmental tasks and challenges, transferring from primary to secondary school and from childhood to adolescence. Measuring well-being in young people requires specific age-appropriate tools; the New Economics Foundation **(**NEF) has shown the importance of considering personal development when exploring adolescent well-being, defined as "*being curious, engaging in challenging and absorbing activities*" (NEF 2004)[46]. This Chapter uses the personal project system as an indicator of well-being in young people and in order to explore relationships with place.

Only two studies to date have explored the physical context of projects: Little et al (1986) and Wallenius (1999). But the results are conflicting. The former (1986) study found 92% of college students could place their projects and that a higher diversity of place was associated with lower well-being; the latter study found only 36% of working

[46]NEF integrated a scale of curiosity in a study on well-being in young people (2004) to assess the level of individual engagement in activities and capacity for exploration. NEF suggest this indicator is related to long term health outcomes and the ability to cope flexibly and creatively with life's challenges.

adults (mean age 30) could place projects and that diversity of place was associated with higher life satisfaction but not depression. The age span accounts for some of these differences: as age increases it would seem people's projects become more abstract and more difficult to place (Wallenius 1999).

Wallenius (1999) defines well-being in terms of subjective fit and "*the perceived supportiveness of the environment in connection with personal goals"* using personal projects as a unit of measurement. Results showed that perceived supportiveness of the environment predicted one aspect of well-being (life satisfaction) but not depression. In the environmental context, higher life satisfaction was correlated with less frequently mentioning home and workplace but no correlations between depression and place categories were found. Of the environmental components perceived to support personal projects, the social environment was the most frequently mentioned, a concept particularly salient to young people, as explored in Chapter 7.

Person-fit, well-being and restorative effects of environment can be viewed as interrelated phenomena. Drawing on person-environment fit theory (Canter 1991), a person's image of the world forms the basis for their actions; if those actions are associated with success and enjoyment, a logical follow-on is that the place supporting the behaviour will assume a positive image. Restoration is similarly associated with environments that have supported success and competence in the form of evolutionary survival (the biophilia hypothesis, Kellert 1993). Korpela has suggested niche building is an important component of restoration and that people will seek out environments that are correlated with their personal needs, values, dispositions etc. (Korpela et al 2008). By extension, I suggest that project places are 'niche' environments facilitating person-environment fit and well-being.

Young people's goal systems: Nurmi (2004) has suggested that environmental selection and young people's personal goals are channelled by specific age-related developmental tasks and social expectations. Drawing on Deci and Ryan's (2000) needs theory, Salmalo-Aro et al (2007) defines adolescent developmental needs as the need for autonomy, relatedness (interpersonal connectedness) and competence. Risk and adventure are also important developmental needs linked to personal growth and identity (Ward Thompson et al 2006). Well-being across the life span is generally associated with a good fit between goals and age-related developmental needs (Wiese

2007), and in young people it is associated with projects focusing on education and relationships with family and friends (Salmelo-Aro et al 2007). Girls tend to produce more interpersonal family and education goals; boys more projects relating to acquisitions and material values (Salmelo-Aro et al 2007). Well-being in young people is also linked to self-identity (defined by Little (1987b) as "self-typicality"[47]). Self-protypical projects are defined as "*projects involving interpersonally intimate or nurturant themes*". In young people, these tend to be societal projects, spiritual, sex and boyfriend/girlfriend projects. Education projects have been shown to be the least typical (Little 1987b). Identity formation in young people is linked to exploration (Schmitt-Rodermund and Vondracek 1999) and provides a link with the themes of mystery and fascination in restorative theory.

Adolescent-environment fit is conceptualised within this study as *supportiveness of the environment in connection with age-related developmental needs;* restorative environments are conceptualised as a places meeting adolescent needs for autonomy, social connectedness and risk. Environments known to support these needs in adolescents are urban "hang out" places (local streets, parks, vacant areas, indoor shopping places) (Travlou 2005) and wild adventure space (Ward Thompson et al 2006). This study therefore anticipated that key project places in young people would reflect these environments.

5.1.1 Aims Based on the literature, this Chapter posited the following research questions:

(1) Is place a distinguishing factor of young people's project systems and are there differences across gender and ages?
(2) Are there particular "niche" environments supporting age specific projects in young people?
(3) What are the well-being associations with place and projects?

In keeping with a sub-theme of the thesis, the relationship between affective and cognitive well-being indicators was also explored.

[47] This study suggests that the definition of self-identity in young people is widened to incorporate "non-typical self" since the young people in this study are exploring new identities through projects that surprise others.

5.2 Method

Personal project analysis (Little 1983) was employed in this Chapter to help understand the psychological dynamics underlying young people's relationships with place. This reflects a move away from descriptive data towards theoretical conceptions in the studies of children and adolescent place preference (Ward Thompson, 1998).

5.2.1 Overview

Data for the study was collected during a 15-minute interview with young people aged 11-13 (n=45) comprising 26 boys and 19 girls (mean year group, S1[48]). This age group was chosen to link with other research in the PhD. The sample was drawn from four youth clubs in Edinburgh: Marchmont (17%), Gorgie (13%), Buckstone (25%) and Broomhouse (45%), including economically and socially deprived communities. The ethnic mix was mostly white Scottish. The data was collected in September and October 2007. Interviews were structured around the Personal Project Analysis Inventory (Little 1983) (interview template appears in Appendix 5.1) and were recorded, transcribed and coded as outlined below.

5.2.2 Measures

Places Wallenius's (1999) place categories were used as a basis for coding but revised to reflect settings particularly salient to young people. This generated seven categories of place, sub-divided into further sections comprising 21 separate places. For example, the local outdoors was sub-divided into local park, wood, street or field. In order to simplify analysis, a three-category environmental classification was employed, comprising internal environment, external-natural and external-built. The hierarchy is shown in Fig 5.1. Places in the place classification system sometimes fell into more than one category. For example, sport settings included some internal settings, but owing to the predominance of outdoor pitches these were generally categorised as external-built environments.

[48] First year secondary school

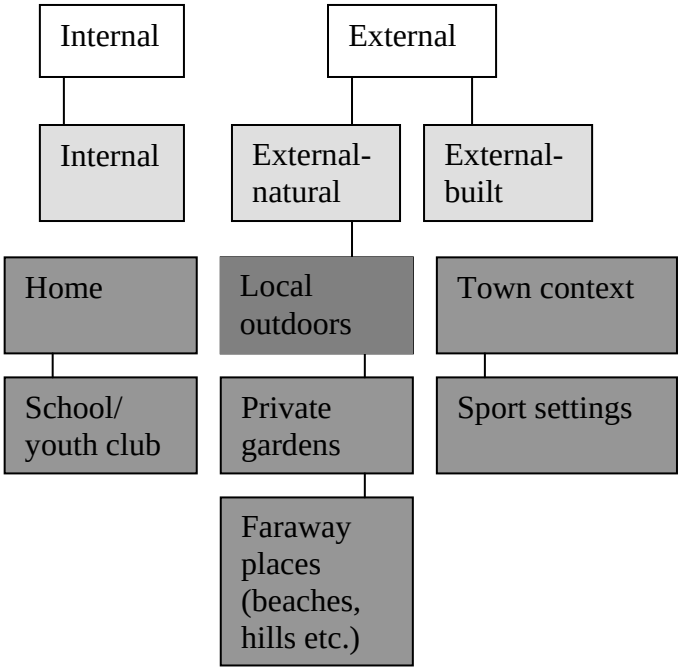


Fig 5.1: Hierarchy of place categories

Projects Based on personal project analysis (Little 1983), young people were asked to think of eight important projects, and rate them for six project indicators (fun, stress, efficacy, support, self-identity and importance) on a scale of 1-4, ranging from 'definitely fun' to 'definitely not fun'[49]. The rationale for selecting these dimensions is set out in Chapter 1. Self-identity was chosen in place of challenge, since it is particularly salient to young people's well-being (Little 1987b). The environmental context was defined by asking participants to name the place where a project would take place. The generation of eight projects was determined from previous studies (Wallenius 1999, Salmela-Aro 1992). 77% of the sample could generate eight projects, the remainder six or seven. Prompts and examples (see Appendix 5.1) were only provided if respondents were having difficulties thinking of projects. The projects were classified into ten categories based upon content. The categories were similar to those used in previous studies on adolescents with the addition of new experiences (Little 1987b, Salmela-Aro et al 2007, Bullen, PhD in progress):

- Interpersonal-family *("help my granddad, he's quite old", "get on better with by brother, be less annoyed with him*")
- Interpersonal-friend ("*see more of my old friends*", "*get on better with my mates' girlfriend"*)
- Intrapersonal *("getting more confident about meeting people", "express myself, be a bit less shy*")
- Societal ("*have a charity sale, maybe a street sale, I've done that before"; "take a group camping"; "help people less better off*")
- Sport/Health *("brush up my goal keeping skills", "stop eating too much chocolate"*)
- Education ("*get my homework done on time", "get better at maths*")
- Career ("*go to university, maybe physiotherapy, "work in the theatre*")
- Hobby *("get better at cooking*")
- New Experiences *("scuba diving", "just explore and stuff", "go to Barcelona")*
- Autonomy *(" I would like to be able to walk or use public transport and use my bike more than ask for lifts")*

[49] Typically, projects are rated 1-10. The 1-4 scale is used elsewhere in the research and for consistency was maintained here.

5.2.3 Scoring and reliability

Following methods defined in Wallenius (1999) and Nurmi et al (1995), relative frequency scores were calculated separately per person for each place and project. For example, the place frequency was calculated by dividing the number of times a particular place category was mentioned by a subject by the total number of projects generated (8). Much of the analysis here, and in Chapters 6 and 7, uses these mean frequency rates. Overall frequencies for the sample as a whole are also reported. Sometimes, these two results give a conflicting picture; since the relative frequency score is generated from within the context of an individual's overall project system, we consider these results offer a more appropriate basis for comparison.

5.3. Results

Results are set out in accordance with the main research questions:

(1) Discriminating places and differences in gender and age
(2) Discriminating projects and differences in gender and age
(3) Relationships between projects and places
(4) Well-being associations with places and projects (supported also by regression analyses).

Where comparisons can be directly made with Wallenius (1999), these are included. Since the analysis is exploratory, using multiple significance tests, Bonferroni's correction[50] is applied when reporting significant results. However, since this is known to be a conservative measure of significance, and because this research was keen to identify possible trends for further investigation, it seemed appropriate to also quote individual significance values without the applied correction.

5.3.1 Discriminating Places

Respondents mentioned on average five places (range, two to eight). This is slightly less than the mean in adults (seven) (Wallenius 1999) and possibly reflects the more limited mobility of young people. *96.7% of respondents could distinguish specific places for their projects and significant differences were found between place categories.*

[50] 0.05 divided by number of outcomes. This chapter, and Chapter's 6 and 7, distinguish between statistically significant results (denoted**) with Bonferoni correction applied, and results of marginal significance (denoted*) where Bonferroni is not applied.

The most frequently-mentioned places were faraway places (mountains, the beach, overseas), the local outdoors (park, street, field, wood), home (own, relatives and friends) and school (see Fig 5.2 below). Differences in mean relative frequencies were significant between eight place categories (Kruskal Wallis H(5)=37.49, p=0.000); differences were not significant amongst the top three place categories.

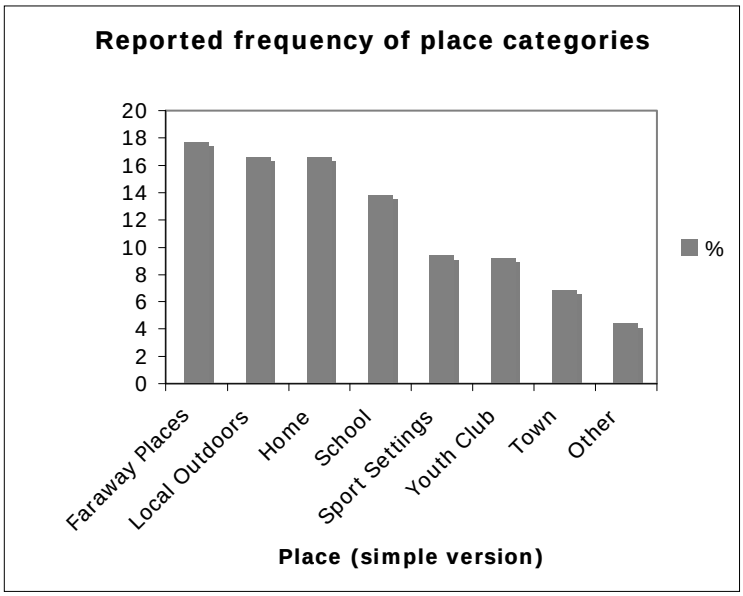


Fig 5.2

Table 5.1: Reported place frequencies

Place	% freq.	Rel. mean freq (SD) n=45
Faraway places	17.7	0.29 (0.14)
Local outdoors	16.6	0.25 (0.09)
Home	16.6	0.29 (0.19)
School	13.8	0.26 (0.13)
Sport settings	9.4	0.22 (0.10)
Youth club	9.2	0.27 (0.12)
Town context	6.9	0.19 (0.06)

Three place categories: frequencies based on a simple categorisation of place (internal, external-built, external-natural) are shown in Fig 5.3 over. Internal environments were most frequently mentioned, followed closely by the natural outdoors. The low frequency of the built outdoors is surprising, based on the place preference literature for adolescents.

Differences in relative frequencies were significant between three settings (internal, external-natural and external-built) (Kruskal Wallis H(2)=61.54, p=0.001). The difference between internal and external-natural was significant (Mann-Whitney U=1200, p=0.001), as was the difference between external-natural and external-built (Mann-Whitney U=1125, p=0.001).

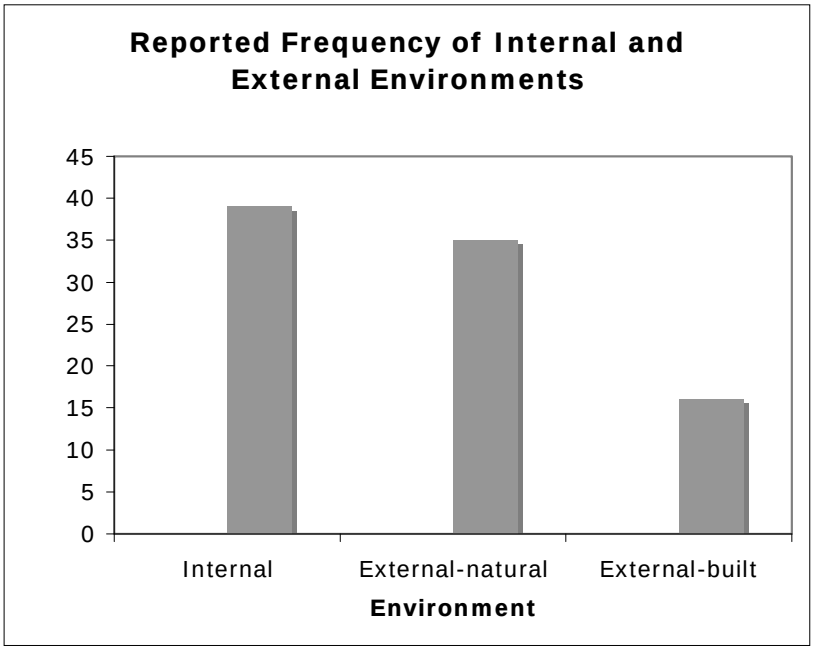


Fig 5.3

Table 5.2: Reported frequencies of internal and external environments		
Place	% freq.	Rel. mean freq (SD)
Internal	40	0.51 (0.18)*
Ex-Natural	37.5	0.47 (0.13)*
Ex-Built	14.4	0.30 (0.11)*

*settings significantly different ($p<0.01$)

5.3.1.1 Gender differences between project places

Boys more frequently mentioned the local outdoors as a context for projects and this difference with girls was statistically significant (Mann-Whitney U=276.6, p= 0.002 ($p<0.05$[51]).

Boys also mentioned home more frequently but this difference was marginal (U=311.5, p = 0.05[52]). Girls were more likely to mention the town context, but this difference was not statistically significant.

[51] Bonferroni correction ($p<0.007$).
[52] Bonferroni not applied.

Table 5.3: Gender differences across project places				
Simple Place	*% subjects Boys n = 26*	*% subjects Girls n= 19*	Mean Freq (SD) ***Girls***	Mean Freq (SD) ***Boys***
Faraway Places	88.5	73.7	0.28 (0.12)	0.29 (0.15)
School/Youth club	84.6	94.7	0.33 (0.13)	0.38 (0.20)
Local Outdoors	80.7	84.2	**0.21 (0.09)****	**0.27 (0.09)****
Home	73.1	89.5	0.25 (0.15)	0.32 (0.21)
Sport setting	57.7	47.4	0.25 (0.12)	0.20 (0.09)
Town context *Note large difference in frequencies*	19.2	68.4	0.20 (0.05)	0.17 (0.06)
Other	34.6	31.5	0.16 (0.09)	0.22 (0.11)

** p<0.05 Bonferroni correction applied

5.3.1.2 Age differences between project places

An interesting difference with the adult study (mean age=30) (Wallenius 1999) was the emergence in this study of faraway places as a frequently-mentioned place category[53], suggesting that the need for exploration in young people is much greater than in adults. Another key difference is in the citing of the natural local outdoors as a project place in young people. Young people mention the home, town context and school (as compared to workplace) less frequently than comparable settings in adults. Similarities between age groups were found in the use of sport settings.

Table 5.4: Percentage subjects mentioning different place categories		
Place	**% adults (mean=30 yrs) (Wallenius 1999) n=167**	**% YP (11-13) (2008) n=45**
Faraway places	-	86.6
Local outdoors	34.1	84
Home	100	80
School	87.4 *(workplace[54])*	71
Sport settings	52.1	53.3
Youth club	10.8 *(clubs/organisations)*	44.4
Town context	55.7 *(retail)*	40

[53] Wallenius found that 15% of subjects mentioned holiday residences, the closest direct comparison.
[54] Since the workplace is the dominant everyday environment in adults, and school the dominant everyday environment in young people, it seems justifiable to compare these two results.

5.3.2 Projects

Differences in relative mean frequencies were significant across project categories (Kruskal Wallis H(7)=51.28, p=0.001). Young people most frequently mentioned sport/health projects, followed by intrapersonal and interpersonal (family) projects and new experiences. Autonomy (doing something on your own for the first time) was mentioned infrequently, but a large percentage of projects in other categories were also about developing autonomy (new experiences).

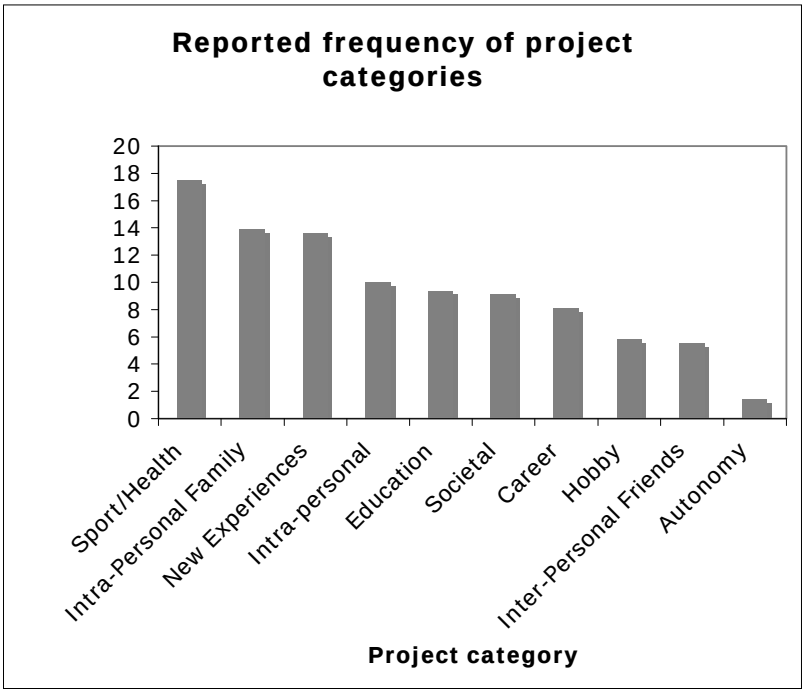


Fig 5.4

Table 5.5: Reported frequencies of project categories		
Project	**% freq. overall**	**Rel. mean freq. (SD) n=45**
Sport/health	17.5	0.32 (0.17)
Interpersonal (family)	13.9	0.23 (0.09)
New experiences	13.6	0.24 (0.09)
Intrapersonal	10.3	0.25 (0.11)
Education	9.4	0.16 (0.05)
Societal	9.2	0.19 (0.08)
Career	8.1	0.18 (0.08)
Hobby	5.8	0.17 (0.07)
Interpersonal (friends)	5.8	0.20 (0.07)
Autonomy	1.4	0.14 (0.08)

5.3.2.1 Gender differences between projects

Differences were not significant with the Bonferroni correction applied ($p<0.05$[55]) but the following marginal results are reported. Boys mentioned more sport/health projects (Mann-Whitney U=300, p=0.049). Girls mentioned more career (U=50, p=0.009), hobby (u=27.5, p=0.041) and societal projects (U=83, p=0.036). Education projects form 73% of boys total project system compared to girls (47%) but the difference between mean frequency scores was not significant.

Table 5.6: Gender differences between project categories

Project	*% subjects Boys n = 26*	*% subjects Girls n =19*	Mean Freq (SD) *Boys*	Mean Freq (SD) *Girls*
Interpersonal-family	69.2	80.0	0.24 (0 09)	0.21 (0 09)
Sport/Health	73.1	68.4	0.35 (0.02)*	0.27 (0.15)*
New Experiences	73.1	63.1	0.25 (0.09)	0.21 (0.07)
Education	73.1	47. 4	0.17 (0 05)	0.13 (0.01)
Career	46.2	57.9	0.14 (0.01)*	0.23 (0.10)*
Societal	61.5	52.6	0.16 (0.06)*	0.23 (0.10)*
Intrapersonal-friends	42.3	57.9	0.20 (0.09)	0.28 (0.10)
Hobby	30.7	52.6	0.13 (0 01)*	0.20 (0.08)*
Autonomy	11.5	10.5	0.13 (0.00)	0.15 (0.02)

*marginal significance, Bonferroni not applied

5.3.2.2 Age differences between projects

Table 5.7: Age differences between project categories

Project	**% adult (mean = 30 yrs) (Wallenius 1999)**	**% YP (11-13) (2008)**
Sport/health	37.7 *(Health)*	71.1
Interpersonal-family	71.2 *(Pair relationships and children)*	75.5
New experiences	29.9	71.1
Intra-personal	43.7	48.8
Education	41.3 *(Studies)*	62
Societal	5.4	57.7
Career	76.1 *(Work/profession)*	51
Hobby	59.3	40
Interpersonal-friends	47.3 *(Social relations)*	33.3
Autonomy	-	11.1
Acquisitions	59.3	-

[55] Bonferroni correction ($p<0.006$).

Differences between this study and research in older adolescents (Salmelo-Aro et al 2007) show less interpersonal-friends and acquisition projects (of which there were none here), suggesting that family remains a key social domain for the 11-13 age group, and that consumerism is unimportant. The most striking difference with the adult (1999) study (see Table 5.7) is the frequency of new experiences and societal projects in young people's project systems as compared to adults, reflecting age-specific needs for exploration and community (and global) cohesion. Similarities across the age span were found in relation to intrapersonal and interpersonal projects (friends and family).

5.3.3 The relationship between places and projects

In order to explore the concept of niche environments (supportive of particular age specific goals) bi-variate correlations[56] were run between places and projects; since this would provide some 63+ permutations[57], analysis was based, firstly, on hypotheses and secondly, on exploration of outdoor places (built and natural), followed by analysis across a simple three-place classification (internal, external-built, external-natural).

Firstly, as hypothesised, mean frequency scores for *home* were positively correlated to *interpersonal-family* projects (so as the frequency of one increases so does the other) (r=0.59, n=28, p=0.001); and *school* was positively associated with *education* projects (r=0.64, n=17, p=0.006). Secondly, where results could not be anticipated, relationships between projects and the built and natural outdoors were explored. Positive associations were found between *town* and *career* projects (r=0.91, n=8, p=0.002)[58]; *new experiences* positively associated with *faraway places* (r=0.56, n=37, p=0.001); and *societal* projects with the *local outdoors* (r=0.41, n=24, p=0.044) (so as the frequency of one increases so does the other).

Simplifying the setting classification made the analysis less sensitive to relationships between place and projects. The simple setting classification showed *interpersonal-family* projects were positively associated with *internal* environments (r=0.44, n=27, p=0.022, (anticipated) and *new experiences* with the *natural outdoors* (r=0.32, n=41, p=0.041) reinforcing the above findings. To summarise:

[56] Spearman's non-parametric correlations were used throughout.
[57] Bonferroni correction not applied since selective outcomes only were explored.
[58] The town category included theatre/music venues, cited as the context for future career projects in entertainment. Not an external location.

Natural outdoors: a niche environment for new experiences and societal projects.
Internal: the home setting emerged as a niche environment for education, interpersonal and intrapersonal projects.
Built outdoors (sport settings, town): did not emerge as a niche environment for any particular project other than future careers (drama, cookery etc.). Overall, far fewer projects are placed here; just 9% of young people reported using sport settings and only 7% of young people cited the town context as project places. Although sports projects were amongst the most popular they mostly took place in the natural outdoors (fields, local parks) rather than formalised sport settings.

5.3.4 Well-being dimensions

The distribution of four well-being dimensions (*fun*, *efficacy*, *support*, *stress* and *self-identity*) was negatively skewed, i.e. the means lent towards higher values, indicating that well-being (as measured by the project system) within the sample was better than average. This typical pattern is illustrated in Fig 5.5 showing scores for *fun*. Fig 5.6 for *stress* shows a different pattern, with 33% of young people feeling slightly stressed about their projects.

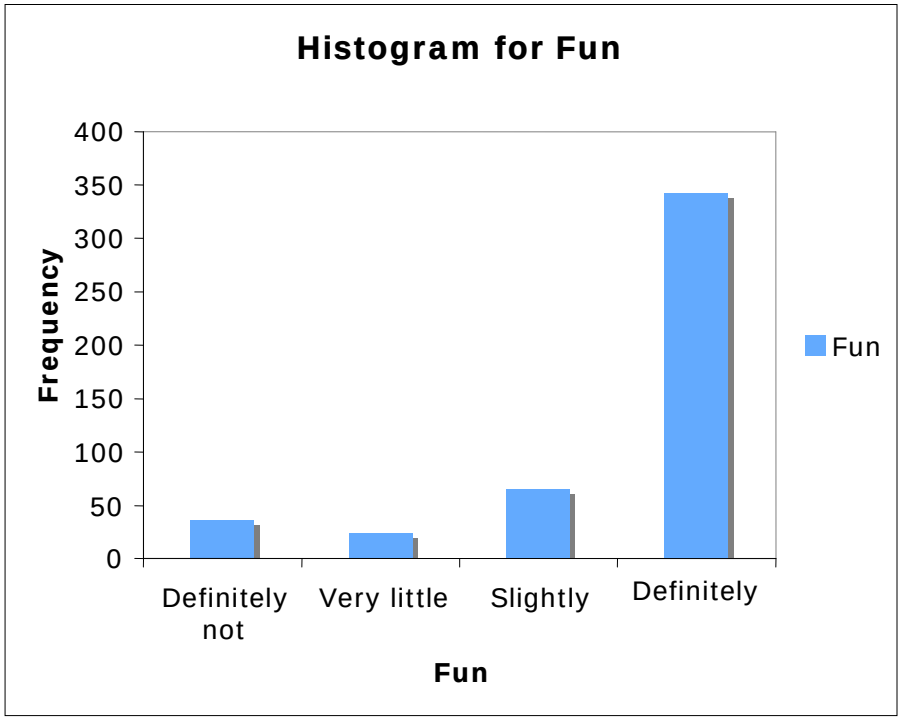


Fig 5.5

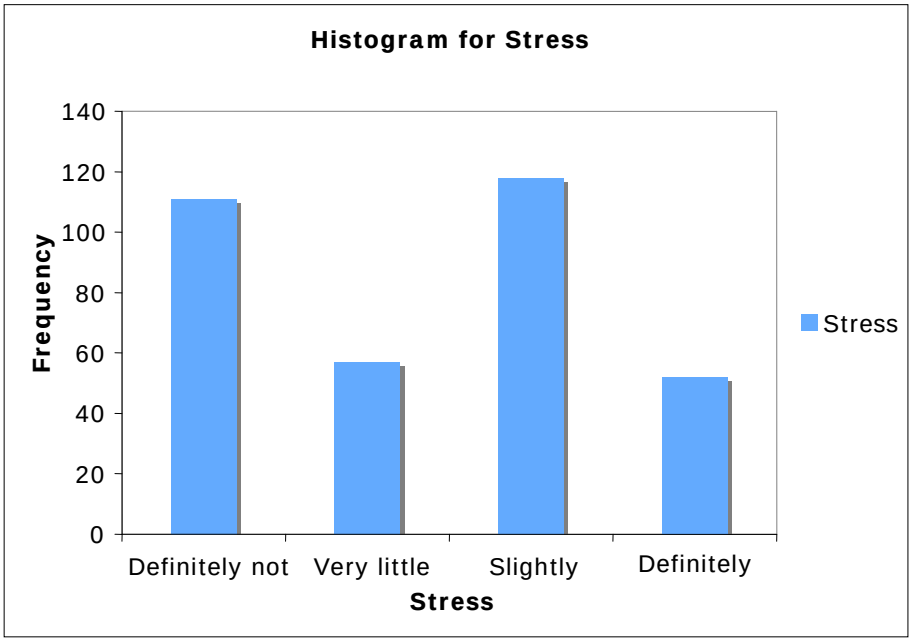


Fig 5.6

5.3.5 Relationships between places and well-being dimensions

On three simple settings (internal, external-built, external natural) significant differences were found (Kruskal Wallis) across three variables: *fun*, (H(2)=11.50, p=0.003 (p<0.05[59])), *importance* (H(2)=14.57, p=0.001 (p<0.05[58])), marginal on *support* (H(2 =5.62, p=0.06). Statistically significant differences are shown in Fig 5.7 below. When explored across seven place categories, similar significances were found on the same three variables (Kruskal Wallis): *fun* (H(5)=16.78, p=0.005 (p<0.05[58])), *importance* (H(5)=27.28, p=0.001 (p<0.05[58])), marginal on *support* (H(5)=10.97, p=0.052).

[59] Bonferroni correction (p<0.008).

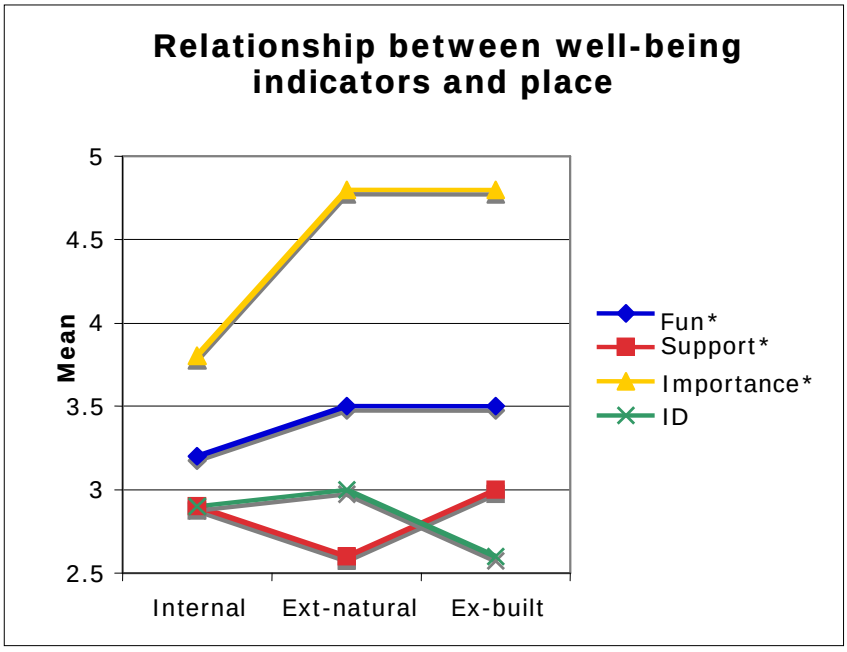


Fig 5.7 Note: high importance = low score. Differences in setting for fun, support and importance are statistically significant ($p<0.05$).

Table 5.8: Well-being indicators by place category				
Place	**Well-being indicator Mean (SD)**			
	Fun	**Support**	**Importance**	**ID**
Internal	3.15 (1.09)	2.89 (1.24)	3.83 (2.25)	2.94 (1.20)
External-natural	3.49 (0.93)	2.60 (1.3)	4.82 (2.15)	2.99 (1.15)
External-built	3.50 (0.85)	3.02 (1.22)	4.76 (2.25)	2.60 (1.28)

Fig 5.7 shows the natural outdoors was associated with projects that are more fun than in other places but that these projects are less important and less supported. The difference on self-identity was marginal between the built and natural outdoors (Mann-Whitney U=2497, p=0.042[60]). The natural outdoors was associated more with non-typical projects and is a possible indicator of well-being in young people. The most important projects are found in the home (low score = higher importance) but these are also the least fun. **There is clearly a relationship between importance, affect and place** but this relationship is complex; the next section explores these associations taking into account relative mean frequencies.

[60] Bonferroni not applied.

5.3.5.1 Correlations between place and single well-being indicators

Correlations were *ns* (correction p<0.001 (36 outcomes possible)). However, since some interesting affective differences between settings were found, marginal results are reported, some of which are approaching significance.

(1) *Faraway Places:* the more frequently subjects mentioned faraway places within their project system the higher the *stress* dimension (r=0.32, n=60, p=0.013). Typically, projects in these places contain high risk (abseiling, bungee jumping), perceived as stressful but not as atypical of a young person. Stress might be construed as a positive dimension in this context, offering challenge.
(2) *Home:* the more frequently subjects mentioned home the higher the *stress* dimension (r=0.35, n=36, p=0.036).
(3) *Local outdoors and town contexts:* the *importance* dimension was lower where participants more frequently mentioned the local outdoors (r=0.33, n=61, p=0.014) and town context (r=0.53, n=24, p=0.008).

These results mirror those above, showing a relationship of positive affect with the natural outdoors (less stress).

5.3.5.2 Relationships between place and multiple well-being indicators

Relationships between affective and cognitive well-being indicators and, in particular, self-identity, were explored by place. Correlations were mostly non-significant when Bonferroni correction was applied (p<0.001) but marginal results approaching significance are reported.

- **Natural outdoors:** fun and efficacy were positively associated with frequently mentioning the local outdoors (r=0.44, n=62, p=0.001 (p<0.05) and faraway places, (r=0.36,n=62, p=0.004), so as fun increases so does efficacy in these places. Support and efficacy were also positively correlated with faraway places (r=0.26, n=61, p=0.042); stress and efficacy were negatively correlated in the local outdoors (r=-0.31, n=62, p=0.014), so as stress increases efficacy decreases. *These patterns were as anticipated, replicating other findings in the PhD.*

- **Built outdoors:** contrary to the above patterns, efficacy and fun were negatively correlated in this context, so as efficacy increased, fun decreased.
- **Internal environments**: the negative correlation between fun and stress was particularly significant in the home (r=-0.37, n=59, p=0.004). There were no significant relationships between positive indicators.

The relationships between indicators were different across settings; relationship operated as predicted in the natural outdoors but the patterns were reversed in the built outdoors and internal settings.

Self-identity: findings were not as expected (i.e. an association between low stress and typical self). For example, in the school/youth club settings low stress was associated with "non-typical self" (r=-0.27, n=0.015, p=0.015) suggesting self-identity is working differently in young people than previously anticipated.

5.3.6 Relationships between projects and well-being indicators

Significant differences were found across project categories on four variables using Kruskal Wallis: *fun* (H(7)=56.89, p=0.001 ($p<0.05$[61])), *stress* (H(7)=28.18 p=0.001 ($p<0.05$[59])), *importance* (H(7)=43,15, p=0.001 ($p<0.05$[59])), marginal on *support* (H(7)=14.89, p=0.037). These differences are shown in Fig 5.8 over. The greatest divergence is on the i*mportance* scale with interpersonal projects (family) appearing as the most important. Projects low in stress were most fun but generally least important: new experiences and sport/health. For clarity, results are shown for the top six project categories only.

[61] Bonferroni correction ($p<0.008$).

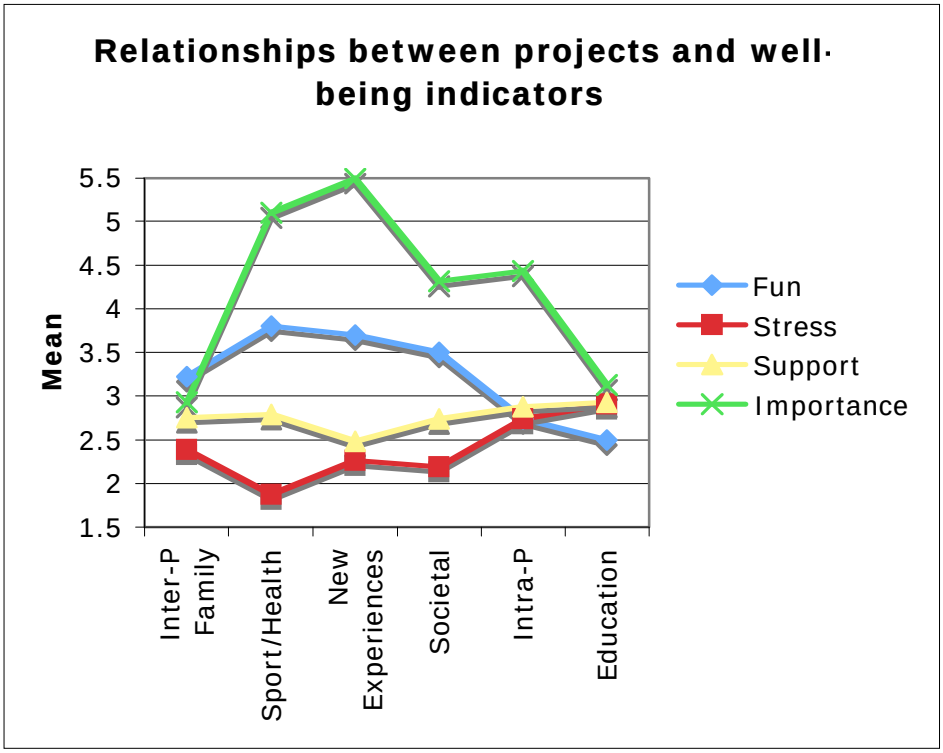


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Fig 5.8 Note: a low score for importance = high importance.
Differences in well-being dimensions across project categories were statistically significant

Table 5.9: Well-being indicators by key project categories				
Project	Fun	Stress	Support	Importance
Interpersonal-family	3.22	2.39	2.75	2.93
Sport/health	3.84	2.19	2.74	4.30
New Experiences	3.69	2.25	2.48	5.49
Societal	3.53	2.19	2.74	4.30
Intrapersonal	2.75	2.75	2.88	4.43
Education	2.52	2.94	2.91	3.12

Relationships between project and well-being indicators were further explored using relative mean frequencies. Results were *ns* on the Bonferroni correction ($p<0.001$, 48 possible outcomes) but results approaching significance are reported below.

Interpersonal-family: the more frequently subjects mentioned this category, the greater the stress dimension ($r=0.35$, $n=48$, $p=0.014$). Typical of this type of project was "*to get on better with my brother/sister*" or "*helping my gran*".

New Experiences: more frequently mentioning new experiences was associated with reduced fun (r=-0.42, n=47, p=0.004) and a higher "non-typical self" (r=-0.36, n=47, p=0.014), projects associated with faraway places.

Societal: The greater the fun dimension the more frequently subjects mentioned societal projects (r=0.40, n=32, p=0.027), a project category positively correlated to the local outdoors.

Interpersonal projects scored highest on the importance scale, reflecting Little's (1987b) notion that highly meaningful projects involving "intimacy or connectedness" with others is important to young people. At this age, however, interpersonal-family projects are linked with high stress, possibly explained by the heavy frequency of "*getting on better with sibling"* projects, most probably extrinsically motivated by a nagging parent.

5.3.7 Relationships between well-being dimensions

Results were mostly as predicted[62], based upon the project literature:

5.9.1 Significant negative correlations were found for *fun* and s*tress* (r=**-0**.39, n=342, p=0.001) and *efficacy* and *stress* (r=-0.27, n=341, p=0.001). This was as expected: as stress increased, perception of fun and efficacy decreased.

5.9.2 Significant positive correlations were found between "non typical self" and *stress* (r=0.14, n=336, p=0.009) (so as stress increased the association with non-typical self increased (unpredicted)); and also between *support* and *efficacy* (r=0.21, n=338, p=0.001) so as support increases, so does efficacy.

[62] Bonferroni correction is therefore not applied in this section.

5.3.8 Well-being dimensions as predictors of an environment

5.3.8.1 Logistic regression

The relationship between well-being and place was further explored using regression analyses. The first stage of the analysis showed significant differences across several project dimensions, in particular, *importance*, *fun and support*. Forward stepwise logistic regression analyses were then performed to explore whether the well-being dimensions could predict a particular type of environment. Two analyses were run using place as the dependent variable: a simple internal v. external comparison and a comparison of the built outdoors v. natural outdoors. An alternative research question would be to predict well-being from place and project dimensions. However, as well-being is a complex, multi-faceted concept, a simpler focus was to attempt to discriminate place (the central topic of the thesis) from the knowledge of project dimensions.

(1) Internal v External (Model 1)

Inspection of the regression co-efficients in Table 5.10 shows that *fun* and *importance* are significant predictors between internal and external environments. *Support* is not included in the final model but on a one-tailed hypothesis (posited on earlier findings) this variable became significant ($p<0.05$). Examination of the R2 values (goodness of fit indicator) show that between 7 and 10% of the variance is accounted for by the variables *fun* and *importance*.

Table 5.10: Results of logistic regression analysis, variables in the equation (Step 2 SPSS 14 output) Model 1

	B SE		WALD	df	Sig	Exp(B)
Step 2						
Fun	0.300	0.128	5,477	1	0.000	1.350
Importance	0.219	0.056	15.249	1	0.000	1.245

Table 5.11: Results of logistic regression analysis, classification table (Step 2 SPSS 14 output) Model 1

	Predicted		
	Internal	**External**	**% Correct**
Internal	**83**	**53**	**61.0**
External	**57**	**84**	**59.6**
Overall %			**60.3**

(2) External built v External natural (Model 2)

The regression co-efficients in Table 5.12 show *support* and *self-identity* to be significant predictors between the built and natural outdoors, with *stress* becoming significant on a one-tailed hypothesis (posited by earlier findings). The classification table (Table 5.13) shows the model is 95.5% accurate at predicting the natural outdoors, but only 13.3% accurate at predicting the built outdoors, and overall that it is 71.8% accurate. *Importance, a significant predictor between internal and external environments, is not significant here.*

Table 5.12: Results of logistic regression analysis, variables in the equation (Step 4 SPSS 14 output) Model 2

	B	SE	WALD	df	Sig	Exp(B)
Step 4						
Stress	0.308	0.181	2.877	1	0.090	1.36
Self-ID	0.292	0.151	3.726	1	0.054	1.339
Support	-0.370	0.660	5.672	1	0.017	0.691

Table 5.13: Results of logistic regression analysis, classification table (Step 4 SPSS 14 Output) Model 2

	Predicted		
	Internal	**External**	**% Correct**
Ex-built	6	39	13.3
Ex-natural	5	106	95.5
Overall %			71.8

A limitation in the regression analysis is the large percentage share of variance in the dependent variable (environment) that cannot be explained by the models, suggesting that other determinants might be found. The classification table, whilst significant, is not particularly helpful because of the low sample size of the external built environment. However, further evidence is supported by Latent Class analysis reported below.

5.3.8.2 Latent Class analysis

Following methods outlined by Aspinall (2007), latent class analysis (using Latent Gold software) was carried out to explore whether the predictor variables identified by logistic regression analysis were also significant discriminators between clusters or sub-

groups in the data[63]. Would the well-being dimensions fall into particular environment sub-groups? For clarity, only four variables were entered into the cluster analysis: setting (internal v. external and built outdoors v. natural outdoors) with *support, fun* and *importance (*based upon significance elsewhere). In some models gender was entered.

(1) Outputs for Internal v External (Model 3)

In the first part of the output, the software found four models, in this case indicating that a two-cluster model is the best fit (BIC(LL)=2,925.61)[64]. Table 5.14 shows the significance values for the indicator variables across the two clusters. *Importance* and *environment* were significant discriminators between the two clusters ($p<0.05$), *fun* and *support* were significant only on a one-tailed hypothesis (posited by earlier analysis).

Table 5.15 over shows the probability of an indicator variable, given cluster membership. Cluster 1 membership equals 65% and 35% in Cluster 2. The values under the cluster columns are: probabilities of being in an internal or external environment; of scoring high or low on a well-being dimension or; on the importance measure. 73% of membership in Cluster 1 fell into the Internal environment, with 36% of membership viewing projects as highly important, high on support (53%) and high on fun (53%). By comparison, 95% of the membership in Cluster 2 fell into the External environment, with 38% viewing projects as unimportant, low on support (34%) but much more fun (76%). *Affect is clearly discriminating between the internal and external environment. Results here replicate other analyses identifying an association between the natural environment and enjoyment. Fun is not linked to either Support or Importance. The residuals showed this relationship further.*

Table 5.16 presents similar data, but here the probabilities are inverted i.e. it shows the probabilities of being in a particular cluster, given a particular indicator variable.
If your projects are more likely to take place in an internal environment, the probability of being in Cluster 1 is 97%, with an 82% chance of not having any fun. Whereas, if your projects are more likely to fall in an external context, your probability of being in Cluster 2 is 66% and you have a 42% chance of definitely having fun.

[63] Latent Class analysis identifies clusters or sub-groups of people who are characterised as different from another sub-group in a particular way.
[64] Various co-efficients of the model can indicate the significance of one model over another, but generally the lowest BIC(LL) value is a good indicator.

Finally, latent class analysis provides a profile of the probability of cluster membership, given any combination of indicator variables (standard classification). Since this runs to several pages it is not included here[65].

When gender was added to the model, it was a significant indicator ($p<0.05$) with males grouped with the internal environment and females with the external. Since environment was non-significant in this model the results are not reported.

[65]Example 1: you have a 95% chance of falling in Cluster 1 if your projects fall in the internal environment, are highly important, no fun, and not supported.

Table 5.14: Measures of the significance of difference between clusters for each indicator variable, Model 3					
Models for indicators	Cluster 1	Cluster 2	Wald	**p-value**	R2
Environment- internal	1.02	-1.02	4.52	**0.03***	0.43
-external	-1.02	1.02			
Importance	-0.18	0.19	6.18	**0.01***	0.12
Fun	-0.24	0.24	2.87	0.09	0.04
Support	0.16	-0.16	2.89	0.08	0.04

Table 5.15: Probability of indicator variable given cluster membership			
		Cluster 1	**Cluster 2**
Cluster Size		0.65	0.35
Indicators			
Environment	**internal**	0.73	0.04
	external	0.27	0.96
Importance	**high**	0.36	0.12
	low	0.14	0.38
Fun	**definitely not**	0.13	0.03
	definitely	0.59	0.77
Support	**definitely not**	0.19	0.34
	definitely	0.59	0.36

Note: only the upper and lower scale bands for each well-being indicator are shown: differences between intermediate bands were low.

Table 5.16: Probability of cluster membership given indicator variable			
		Cluster 1	**Cluster 2**
Overall Probability		0.65	0.35
Indicators			
Environment	**internal**	0.96	0.03
	external	0.34	0.66
Importance	**high**	0.90	0.10
	low	0.36	0.64
Fun	**definitely not**	0.83	0.17
	definitely	0.57	0.42
Support	**definitely not**	0.47	0.52
	definitely	0.72	0.28

Note: only the upper and lower scale bands for each well-being indicator is tabulated: differences between intermediate bands were low.

(2) Outputs for External-built v External-natural (Model 4)

Based on the analysis from the logistic regression model, well-being indicator variables used in this analysis were *support, self-identity and stress*, together with environment. The first model showed ID to be non-significant so the analysis was re-run with the two- cluster model reported below (BIC(LL) 1,137.91).

Table 5.17 over shows ***s**upport* as a significant indicator variable of the model, together with environment; *stress* was marginal. Table 5.18 shows the probability of indicator variable given the cluster membership: 84% of membership fell in the natural environment in Cluster 2, but 66% also fell in Cluster 1, so *environment (whilst statistically significant) was not as good a discriminator here between clusters as in the Internal v. External model*.

In Table 5.19 we see the invert of this, showing the probability of cluster membership given an indicator value. If your projects fell in the *built outdoors,* the probability of being in Cluster 1 was 77%, and despite a 97% chance of being supported, there's also a 68% chance of feeling definite stress. By comparison, if your projects fell in the *natural outdoors* you would have a 43% chance of being in Cluster 1, with a 54% chance of not being stressed, but a 92% chance of not being supported. *Here, negative affect is discriminating between environments but appears to be unrelated to receiving support*.

Summary In the Logistic Regression model *fun* and *importance* emerged as significant predictors of an internal v. external environment (Model 1) and *support* and *self-identity* (self-typicality*)* as predictors of the built v natural outdoors (Model 2). Efficacy did not emerge as a significant predictor variable in either Model.

This picture is replicated by the latent class analysis showing *fun*, *support* and *importance* as significant discriminators between Internal and External environments (Model 3); *support* and *stress*[66] as significant discriminators between built v natural outdoors (Model 4). Affect is shown to be a good discriminator of environment in both models with enjoyment and reduced stress clustering with the external natural

[66] Stress is significant on a one-tailed hypothesis only.

environment. *This replicates other analyses in the PhD showing an association between natural environments and enjoyment and reduced stress.*

Table 5.17: Measures of the significance of difference between clusters for each indicator variable, Model 4					
Models for indicators	Cluster 1	Cluster 2	Wald	**p-value**	R2
Environment- external built	0.25	-0.25	4.04	**0.04***	0.04
-external natural	-0.25	-0.25			
Support	1.04	-1.04	3.68	**0.05***	0.64
Stress	0.22	-0.22	3.44	0.06	0.05

Table 5.18: Probability of indicator variable given cluster membership			
		Cluster 1	Cluster 2
Cluster Size		0.62	0.38
Indicators			
Environment –external built		0.78	0.22
external natural		0.57	0.43
Support	**definitely not**	0.08	0.92
	definitely	0.97	0.02
Stress	**definitely not**	0.45	0.54
	definitely	0.68	0.32

Note: only the upper and lower scale bands for each well-being indicator are tabulated: differences between intermediate bands were low.

Table 5.19: Probability of cluster membership given indicator variable			
		Cluster 1	Cluster 2
Overall Probability		62	38
Indicators			
Environment	**external built**	0.78	0.22
	external natural	0.56	0.43
Support	**high**	0.08	0.92
	low	0.97	0.02
Stress	**definitely not**	0.46	0.55
	definitely	0.68	0.32

5.3.9 Results Summary

(1) Place is a distinguishing feature of young people's project systems. Niche environments in young people are: residential settings supporting interpersonal-family projects; the local outdoors supporting societal projects; and faraway places supporting new experiences. These three project categories are consistently linked with well-being in the literature.

(2) Gender differences: boys significantly mentioned the local outdoors and home more frequently than girls. Boys and girls significantly differ in their choice of projects, boys favouring sport/health projects and girls favouring career, hobby and societal projects.

(3) Age differences: the natural outdoors support a much wider range of goals in young people than research in adults has shown to-date; faraway places in particular. Societal projects and new experiences formed a greater part of young people's project systems as compared to a study in adults.

(4) Affective associations between place and projects: home is associated via the project system with lower affect and higher stress but more important projects; the natural outdoors is associated with positive affect, self-identity (both correlates of well-being) and with less important projects.

Faraway nature is associated with higher stress projects, a dimension positively correlated with increased self-identity (here defined as "non-typical self"[67]). The research suggests that this is indicative of challenge and risk, a key developmental need in this age group.

(5) Affective discriminators of place: fun and stress could discriminate between places, as could support and importance.

(6) Associations between affective and cognitive well-being indicators: the evidence is mixed. The relationship between *fun* and *efficacy* is supported by correlations and factor analysis but not by regression analysis.

[67] For a discussion on defining self-identity, see Section 4.4.

5.4 Discussion

5.4.1 Place: this chapter started with the question: is place a distinguishing feature of young people's project systems? Place does distinguish across the project system: a very high proportion of personal projects are linked to specifiable settings, suggesting that younger people's project systems are more precise and less abstract than adults. This confirms speculation by Wallenius (1999) that the level of project abstraction intensifies with age. The most frequently-mentioned projects places were faraway places, the local outdoors, home and school. The literature points to home, workplace and sport settings as the most common project places; the emergence of the natural outdoors as an important context for projects is a new finding. We would expect everyday places to form the heart of the project system (Wallenius 1999), not the faraway; high frequencies in this study indicate an age-specific developmental need in young people for exploration, not evident in research in adults. Exploration is known to be a precursor of identity achievement in young people (Schmitt-Rodermund and Vondracek 1999) and well-being (NEF 2004).

A second aim of this research was to explore the concept of "niche" environments and define the kinds of projects they support. Two settings emerged as important: firstly, the natural outdoors was widely reported as a context for all project categories, but mostly supportive of new experiences and societal projects, project categories positively associated with well-being (discussed further below). Young people use the natural outdoors within their project system far more than research on adults has shown (Wallenius 1999). In addition, the internal environment supports education and intrapersonal and interpersonal projects; the external-built is less supportive of project categories and mostly supports sport and future career projects. The low frequency of town settings as project places is a surprising finding, given that teenagers are prone to hang out in shopping malls and high streets and may be reflective of age differences. Independence is just developing in this age group (11-13), reflected by the low number of autonomy projects, and whilst subjects clearly aspire to further away places, mobility restrictions suggests that the local neighbourhood remains a dominant environment.

A third aim of this chapter was to explore associations between project places and well-being. Results across a number of statistical tests show affective and cognitive indicators can discriminate between settings notably for fun, support and importance.

Similar relationships were found across a series of statistical tests: internal environments (home) associated via the project system with reduced enjoyment, increased stress and high importance; the natural outdoors associated with high enjoyment, increased self-identity ("non-typical self") and low importance. These findings reflect Wallenius (1999), where internal environments were associated with lower life satisfaction (home and workplace); here, home is correlated with lower affect. However, there may be adult-child differences. Low importance appears to correlate with higher enjoyment, an unexpected result since importance (from the project domain, meaning) typically correlates with well-being in adults.

These results are further reinforced by regression analyses showing that fun and importance were significant predictors of internal v. external environments (Model 1), and support and self-identity (self-typicality*)* predictors of the built v natural outdoors (Model 2). Efficacy did not emerge as a significant predictor variable in either model, a surprising result given that it repeatedly correlated with enjoyment within this study and across the PhD. Further evidence is provided by latent class analysis showing: fun, support and importance to be significant discriminators between internal and external environments (Model 3); support and stress[68] as significant discriminators between built v. natural outdoors (Model 4). Affect appears to be a good discriminator of environment in both models with enjoyment and reduced stress clustering with the natural outdoors. This replicates other analyses in the PhD, showing associations between natural environments and enjoyment and reduced stress.

The PhD posits that positive affect will be associated with improved mindset in natural environments. This is supported both by correlations in the study showing inter-relationships between affective and cognitive indicators and natural environments[69]. *This pattern, whilst supporting other findings in the PhD, is not supported by regression analysis in this study*. In Model 1 (Latent Class) increased support and importance is not associated with increased enjoyment, in Model 2 reduced stress is not associated with increased support. Clearly the association of affect with "mindset" is more complicated in young people than the theory and research in adults to-date suggests. Fredrickson

[68] Stress is significant on a one-tailed hypothesis only.

[69] Enjoyment was positively correlated with improved efficacy (faraway places); low stress with improved efficacy (local outdoors). These patterns were not replicated in the external built or internal environments.

(2004) speculates exploration is one outcome of positive affect: the association between faraway places and enjoyment provides some support for this concept.

5.4.2 Projects: the projects themselves were not the main focus of the research, but can provide valuable clues as to environmental selection. Adolescents focus on interpersonal, recreational activities (sport and new experiences) and education-related goals, reflecting Little (1987b). Gender differences are partially replicated (Salmalo-Aro et al 2007), with girls showing more interest in societal and interpersonal family projects, boys in education and sport. Future career and acquisition projects did not emerge as major project categories, a significant difference with the older male teens (Salmalo-Aro et al 2007) and adults (Wallenius 1999). Another difference with the older adolescent age group (15+) is that interpersonal goals focus on family and not friends. The context of family and home is still very significant.

Young people are far more likely to mention new experiences and societal projects when compared with adults[70]. The frequency of societal projects also correlates with greater enjoyment in the study. Young people (11-13) appear to be more adventurous and altruistic in their goals as compared with adults, un-materialistic in their aspirations and not yet thinking about future careers.

5.4.3 Well-being: Are young people therefore flourishing? The high frequency of interpersonal and societal projects in the sample (and the link between these project types and well-being in the literature) would indicate they are indeed flourishing. The fact these projects are supported by natural environments has important implications for policy. Supporting such projects in young people has the potential to build social capital and confer benefits to society whilst also meeting young peoples' developmental needs. Further evidence of young peoples' well-being is provided by the individual project indicators. Young people appear to be enjoying their projects, feel well supported and able to do them well, and are developing new identities through them (friends and adults would be definitely surprised to see them do such things); only stress presents a more mixed picture. Overall, the results suggest young people are thriving, a reassuring finding in the light of UNICEF research (2007) placing the UK at the bottom of the developed world in terms of well-being in children and young people. Whilst

[70] 83% of young people mentioned new experiences as compared to 30% of adults. 58% of young people mentioned societal projects as compared to just 5% in adults (Wallenius 1999).

35% of young people report feeling slightly stressed about their projects, results for faraway places/new experiences show stress can also be accompanied by increasing new self-identity and might not necessarily be a negative correlate of well-being in this particular age group. This finding partially supports the challenge hypothesis of the thesis, and the notion that risk is an important developmental component in young people.

When correlated independent of setting, the project indicators worked as predicted by the literature: fun and support positively associated with efficacy, stress was negatively associated with efficacy. Little's (1987b) findings on self-identity are only partially replicated: self-identity (as defined by "typical self") did not correlate with efficacy, support or fun, as we would expect but it did correlate with low stress. Mostly these young people's projects surprise their friends and family and in this context I query Little's association of self-proto-typicality with well-being. Teenagers desire autonomy and are constantly challenging expectations of adults and seeking new identities. "Untypical" projects might therefore be interpreted as positive where taking on something surprising and exploratory is to be encouraged. If we re-code this category "newly developing identity", correlation results for settings read differently: a "new" self-identity becomes associated with the natural outdoors and "typical" or "old" self-identity with sport settings. Higher stress now correlates with non-typical self ($r=0.154$, $n=336$, $p<0.01$), indicative of associations between risk and developmental needs in young people and adding weight to the challenge hypothesis of the thesis. Societal projects also rated highly on "non-typicality", suggesting that they are helping forge new identities in young people; education projects scored lowest on self-typicality partially replicating Little's findings (1987b). The self-identity dimension is shown here to be complex: nurturing "typicality" and "non-typicality" can both be construed as beneficial.

5.5 Limitations of the study

Is a natural environment restorative simply because it is associated via the project system with having fun? This relationship cannot be proven by this study, but affect is shown to discriminate between environments, and positive affect is consistently linked across a number of statistical tests with the natural outdoors. The natural environment supports exploration via new experiences and societal projects, categories consistently associated with well-being.

The relationship between niche project environments and well-being might be strengthened in future research by incorporating additional well-being indicators within the data collection (e.g. self-esteem, curiosity). Clearer evidence of the restorative attributes of particular settings could be obtained by having subjects rate key project places for restorative qualities: sense of ease, for example, or sense of freedom.

This is a rich data set, potentially supporting additional analysis on teenage development and well-being. In particular, the concept of home warrants further study. Home is not a generic term and it's plausible that there could be two distinct groups in the data; those with higher and lower affective home environments. In addition, an overall well-being score for each individual could be calculated from the data and correlated with setting frequencies. Individual indicators warrant more attention: the support category, for example, of marginal significance. This group of teenagers are at a transitional stage of development but still require support. Are efficacy and support correlated and is there a link with the person a project is done with? Does this pattern change over time i.e. does growing autonomy negate the need for so much support? This could be explored more closely in terms of project type and place. The regression analyses could attempt to predict well-being from place, rather than the other way around, as carried out here.

Personality disposition and associations with particular settings is another potential extension to the study. Korpela et al (2008) has flagged up the lack of research about personality factors in relation to experiences in everyday restoration. Salmela-Aro et al (2007) have explored adolescent projects via a classification of "past, present, future orientation" using latent class analysis. Personality was classified according to project type rather than traditional trait measures and offers a method that could be replicated

here. Disposition could then be correlated with place frequencies, to gauge whether personality discriminates between project places. The project system is sensitive to age differences, and mapping changes across a period of years is another possible potential extension to this research. Project well-being indicators appear to operate differently in young people and warrant further research. The challenge dimension was substituted for self-identity in the research; the results indicate challenge is potentially interesting and future research should retain this dimension.

5.6 Conclusion

What evidence does this study provide that the natural outdoors is supporting well-being in young people? The study suggests the natural outdoors is associated via the project system with enjoyment, reduced stress, self-identity and support; indicators that all correlate in the project literature with well-being. Meaning and importance of projects (another correlate of well-being) is not associated with this setting.

The concept of restoration is extended within this chapter to include the notion of person fit and niche environments. Niche environments for young people include faraway places, supporting new experiences, challenge and self-identity, and the local outdoors, supporting societal projects associated in the project literature with well-being. Adolescent person-fit, as hypothesised in the introduction, is linked with autonomy, social integration, risk and self-identity.

NEF (2004) have flagged the need for developing appropriate tools for measuring well-being and personal development in young people. This study has shown the suitability of personal project analysis as a methodology for carrying out well-being research in young people and in identifying the physical and social contexts associated with well-being. The method enabled a huge amount of information to be gathered in a short space of time; young people happily engaged in the process and were often surprised and delighted by the number of projects they generated. This study has also shed light on how recreational and social policy for young people might be directed in future, and has indicated the potential for building social capital by nurturing young people's projects. Whilst the study indicates that young people are flourishing in their goal conceptualisations, it should also be stressed that, without support, this potential will not be realised.

Chapter 6: Place affordances for mood regulation in young people

Chapter 5 illustrated how environmental selection in young people is directed by age-specific developmental needs and goals, including the need for self-identity and social integration. This chapter continues the line of investigation by exploring how environment selection is directed by age-specific emotional needs. In particular it explores specific place affordances for restoration and well-being in young people aged 11-13.

This Chapter introduces the concept of emotion regulation, how it links with restoration theory and documents empirical evidence identifying regulation of mood with natural environments. Results are reported in three sections: a quantitative analysis of, firstly, mood regulatory settings; secondly, of discriminating variables between environments; and thirdly, qualitative and quantitative analysis of several individual mood variables analysed elsewhere in the PhD. Discussion focuses on place affordances for restoration and well-being and draws comparisons with results from Chapter 5.

6.1 Introduction

Emotion regulation can be defined as actively coping with moods and emotional situations and has been linked theoretically with restoration (Korpela 2003). A person may employ psychological, physical, social or environmental strategies in order to regulate emotions. "*Environmental self-regulation*" refers to the process by which emotions are modulated by some external regulator of a particular place such as sensory stimulation, visceral processes or social factors (Korpela 2002). This chapter explores how the physical context moderates in this process. No sharp distinction is drawn between mood and emotion in this study; in the literature, this distinction is guarded more at a theoretical level than empirical (Fredrickson 2004)[71].

Korpela has integrated theory on favourite places and restorative environments, based upon the shared concept, that people use particular places to regulate emotions after negative antecedents (e.g. stress, bad mood, quarrel with someone) from which the restorative environment or favourite place brings relief (Korpela and Ylén 2007). In

[71] Fredrickson argues that identical techniques are used in empirical research for inducing moods and emotions. See chapter 4 for discussion on the differences between mood and emotion.

both research fields, short-term health-related conditions (stress, negative affectivity) are alleviated by visiting favourite places (Korpela and Ylén 2007). Much of the empirical work to-date has focused on how favourite places help improve negative mood; positive emotions have received little empirical attention. Korpela has speculated that "uplift" moderates in the restorative process and has suggested favourite places are linked with the continuation of positive mood (Korpela and Ylén 2007, Korpela et al 2008). Cultivating and prolonging positive mood is theoretically and empirically linked with human flourishing and improved health (Fredrickson 2004). Positive emotions broaden modes of thinking or acting ("thought-action repertoires"), in turn, helping to build personal resources. Creativity, exploration, social interaction and resilience are all potential outcomes (see Chapter 1 for a fuller discussion). The potential role of the natural outdoors in the production or continuation of good mood forms a key focus for this chapter.

Natural v. urban settings? The research to-date is not conclusive and suggests choice of setting for mood regulation varies across the age span. Adults have been shown to select natural settings over urban and residential settings when regulating negative mood (Korpela 2003). In young people, Thurber and Malinowksi (1999) have shown how negative mood dictates place selection in boys (age 8 to 16), finding evidence that negative emotions increased environmental exploration. This research, however, was limited to an evaluation in a faraway place (a US holiday camp). Research on everyday places (Korpela et al 2002) has shown some children will consciously use an everyday favourite place for emotion-regulation in response to challenging events (emotional or cognitive) (46% of 12-13 year olds), but this was not significantly associated with natural settings. Korpela's (1992) study on older adolescents (age 17-18) showed the most frequently-mentioned favourite places for relieving negative emotion were private homes (39%), natural settings (15%) and retail settings (15%). Adolescents' favourite places were associated with freedom, control and escape from social pressures. Owens (1998) found that amongst 14-18 year olds, natural settings and home were one of the best places for feeling better and getting things in perspective. Sommer's (1990) study of Estonian teenagers found that 11-13 year olds preferred natural places significantly more then their 15-17 year old peers. Favourite place was strongly associated with themes of comfort, peace and quiet.[72]

[72] Note, this research was carried out in a post communist society where access to commercial settings for young people was notably absent.

Other research on teenagers' place preferences has indicated a lower preference for nature and a higher preference for urban environments offering action and peer interaction (see Kaplan and Kaplan 2000 for a full review). Silbereisen et al (1986) found that 12-15 year olds in Berlin favoured sport settings and own home, with nature ranked fourth (forming only 9% of all places mentioned) in 12 year olds and ranked fifth (6%) in 15 year olds (cited by Korpela 2002). Schiavo (1988) (cited by Sommer 1990) found no difference in preference for natural settings over other types of places in adolescents, reflecting Korpela et als (2002) findings in children. Bixler and Floyd (1997) (cited in Kaplan & Kaplan 2000) found a lower preference for nature in teenagers as compared to environments offering action and peer contact.

Gender differences: Korpela et al (2002) found girls selected natural settings more than boys as their favourite place, but that this difference was not statistically significant. Sommer (1990) found boys (11-12 year olds) were significantly more likely to mention natural places than girls and more frequently mentioned themes of comfort, quiet and relaxation.

To summarise, the research in children and young people shows residential, natural settings, sport and retail settings recur frequently in young people's and children's place preferences. Frequency ratings for settings vary across the age span and gender, suggesting that environmental selection is age-specific based on developmental needs at the time. Home is the most consistently mentioned category; natural settings are not consistently highly rated. Places offering comfort, privacy and security appear to be important.

6.1.1 Research questions: based on the literature, the following three questions were formulated:

(1) What environmental strategies do young people adopt for changing bad mood or prolonging good mood?
(2) How do natural settings compare, over urban and residential settings, as mood regulatory environments?
(3) Do adolescent boys and girls differ in their selection of place?

Chapter 5 captured place selection based on the future aspirations of young people projecting forwards in time; the analysis reported in this Chapter provides a counter-balance, based on present use of settings. The expectation in this study was that everyday places would feature more frequently in the results than faraway places (as found in the previous Chapter). It was also anticipated that the urban environment would feature highly in adolescent preferences.

6.2 Method

Data for the study was collected during a structured interview with young people aged 11-13 (n=45, split: boys 26, girls 19), using the same sample as described in Chapter 5. (See Appendix 6.1 for interview template.)

Participants were asked where they would go, depending on one of 12 mood states. The selection of moods for the study was based upon mood adjectives used elsewhere in the PhD and other research (Korpela 2003). Negative categories were: anger, stress, boredom, indecision, regret and disappointment. Positive categories were: elation (hedonic tone), trust, excitement, adventure, relaxation and energy. In addition, participants were asked to describe their favourite place, real or imagined. Interviews were transcribed and coded and descriptive analysis and means tests were carried out following procedures outlined in Chapter 5 (Section 5.2.2). Two sets of results are reported: percentage frequencies across the full sample and relative mean frequencies for place categories. It is important to note that these patterns do not always mirror each other. This study employs the same hierarchy of place categories as outlined in Chapter 5 (Fig 5.1).

A completely full analysis, across all 12 mood categories, 22 place categories and gender and year group, was beyond the scope of this study. For clarity, analysis was carried out hierarchically in the following sequence:

(1) By two settings (internal *v.* external),
(2) By three settings (internal, external-natural, external-built),
(3) By six settings (generic place categories),
(4) By gender.

This is followed by regression analysis using two key variables (mood and environment).

Owing to multiple significance tests, Bonferroni's correction is applied. Where results are approaching significance, these are also reported, the rationale as defined in Chapter 5.

6.3 Results

6.3.1 Environmental Regulation by Setting

6.3.1.1 Internal v. external settings

Subjects more frequently mentioned the outdoors for regulation of mood and these differences were significant across both mood categories (Mann Whitney, U=21,598, p=0.001 ($p<0.05$[73])) and for both negative mood (U=4678, p=0.001 ($<0.05_{71}$)) and positive mood (U=5622, p=0.001 ($<0.05_{71}$)).

Table 6.1: Relative mean frequencies for internal v. external settings (n=45)

Environment	**Combined Mood Regulation** Mean (SD)	**Negative mood regulation** Mean (SD)	**Positive mood regulation** Mean (SD)
Internal	0.49 (0.15)* ↕	0.48 (.15)* ↕	0.51 (.14)* ↕
External	0.59 (0.14)	0.60 (.14)	0.58 (.15)

* significant differences between settings $p<0.05$ ($_{71}$)

Significant gender differences were not found within a simple external v internal environmental classification.

[73] Bonferroni correction ($p<0.017$).

6.3.1.2 Internal v. External-built v. External-natural

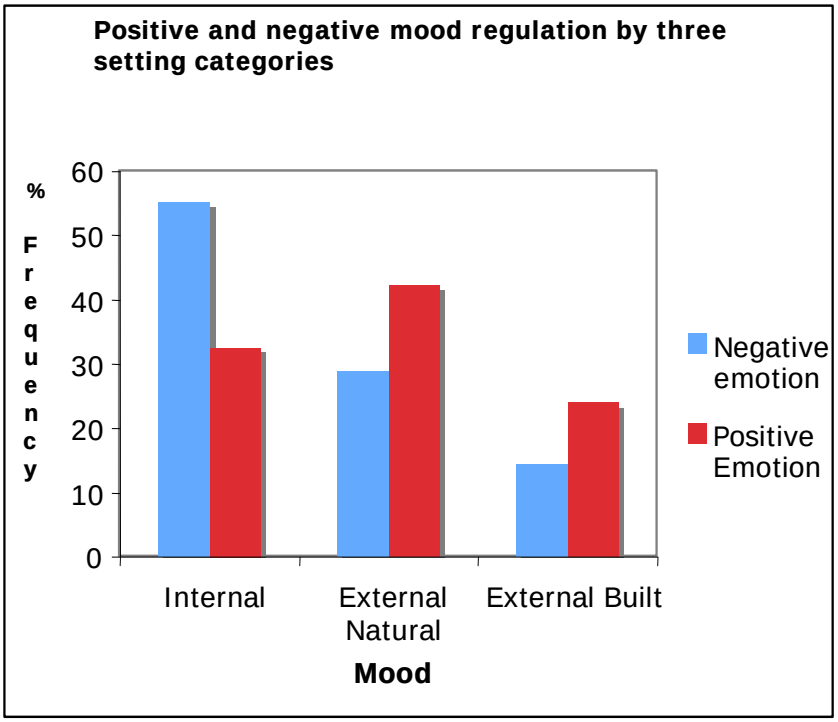

Fig 6.1

(1) Frequencies: negative mood is most frequently mentioned as being regulated in the internal environment (home); "uplift" is most frequently mentioned as being prolonged out-of-doors, in both natural and built environments. In this context the internal environment mostly refers to residential settings (73% of this category).

(2) Significant differences between environments: subjects more frequently mentioned the internal environment for regulation of negative and positive mood and these differences are significant between environments[74] for both negative and positive mood regulation (see Table 6.2).

Table 6.2: Significant differences in relative mean frequencies between 3 setting categories, Mann-Whitney (U), n=45
$p<0.05$ (see footnote note 72)

Environment	**Negative**		**Positive**	
	U	$p<0.05$	U	$p<0.05$
Internal v. external-natural	4396	0.002	3159	0.001
Internal v. external-built	920	0.001	479	0.001
External-natural v external-built	735	0.001	1348	0.001

[74] Bonferroni correction ($p<0.017$).

Within individual environments, subjects mentioned the built outdoors more frequently for regulating bad mood; this difference was significant (U=978, p<0.05[75]). This effect is illustrated in Fig 6.2. The overall frequencies reported in the previous page showed the opposite pattern, but, as outlined in Section 5.2.3, we consider the relative mean frequency scores as more appropriate for comparisons.

Table 6.3: Percentage of subjects mentioning different settings for mood regulation and relative mean frequencies, n=45

	Overall frequencies		Rel. Mean Frequencies (SD)	
Environment	Negative mood %	Positive mood %	Negative mood	Positive mood
Internal	55.2	32.6	.48 (.15)	.50 (.15)
External-natural	28.9	42.2	.41 (.14)	.41(13)
External-built	14.4	23.7	**.29 (.10)***	**.26* (.11)**

* p<0.05 (see footnote 73)

Gender differences were not significant between three settings.

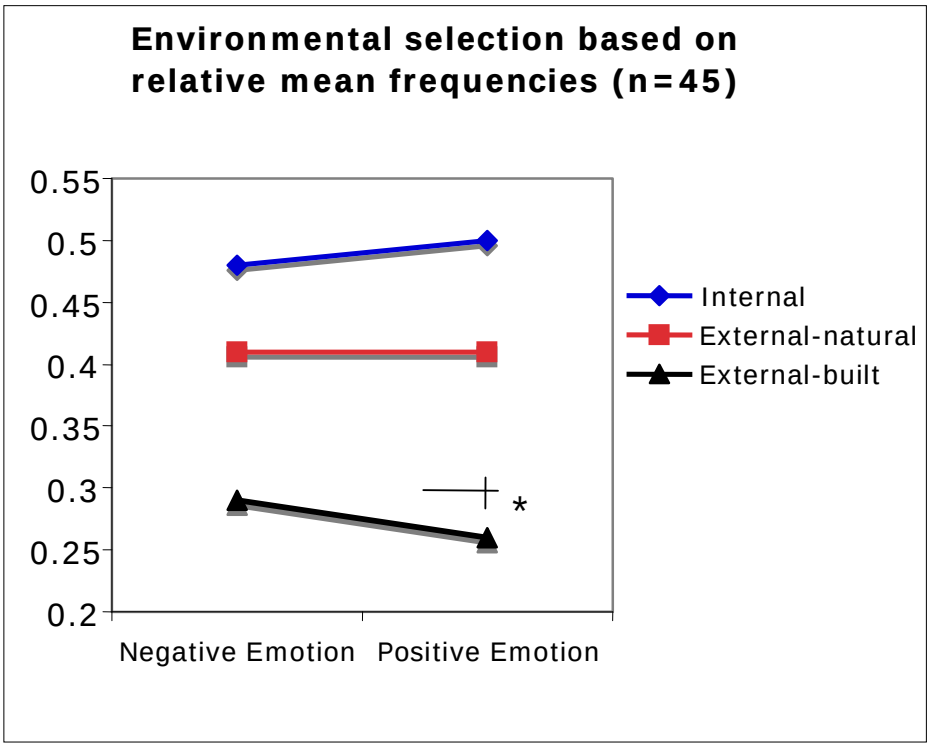

Fig 6.2 *significant difference p<0.05

[75] Bonferroni correction (p<0.017).

Table 6.4: Percentage of subjects mentioning different place categories for mood regulation and relative mean frequencies, n=45					
Simple Place	**Overall frequencies**		**Rel. mean frequencies (SD)**		**Differences between moods**
	Negative mood %	**Positive mood %**	**Negative mood**	**Positive mood**	ns
Home (own, friends, relatives)	47.7	27.2	0.40 (0.15)	0.43 (0.15)	ns
Local outdoors (park, field, wood, block)	24.8	26.6	0.29 (0.12)	0.26 0(.11)	ns
Town context (high st, cinema, rest's)	11.9	19.2	**0.23 (0.08)***	**0.18 (0.09)***	**p=0.029**
School/youth club	6	5.9	0.26 (0.18)	0.24 (0.15)	ns
Sport settings	7.2	12.7	0.16 (0.05)	0.17 (0.08)	ns
Faraway Place	-	2.5	0.11 (0.04)	0.11 (0.04)	ns

6.3.1.3 Six categories of place

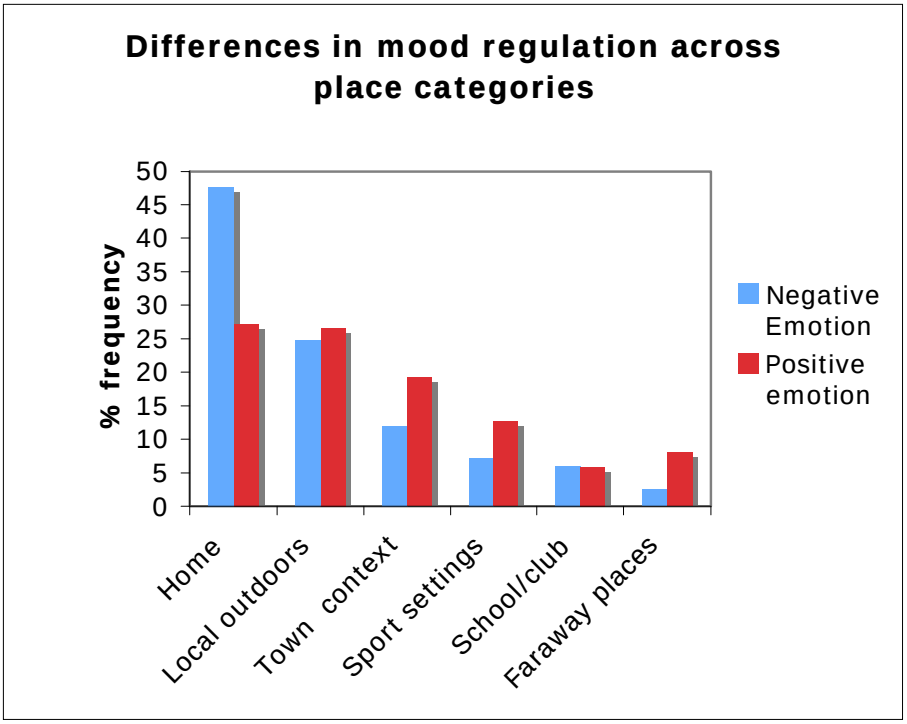

Fig 6.3

(1) *Frequencies*: Overall, percentage frequencies showed that the home was the most frequently-mentioned location for negative mood regulation; the local outdoors and home being most frequently mentioned for "uplift". This pattern reflects results in Section 6.3.1.2. The pattern of results, however, was not mirrored by mean relative frequencies, explored in (3) below.

(2) *Significant differences between places*: analysis of relative mean frequencies by place showed significant differences across combined mood categories (Kruskal Wallis, H(6)=179.03, p=0.001). When explored further, significant differences were found between home and town context (Mann Whitney U=8960, p=0.001 ($p<0.05$[76]) and home and local outdoors (Mann Whitney U=16,740, p=0.002 (<0.05[74]). Subjects mentioned the home more frequently in relation to mood regulation than any other environment.

(3) *Differences between mood categories and place*: when exploring differences between mood categories by place, marginal differences were found in the *town setting* (Mann Whitney U=455, p=0.029), with subjects mentioning this setting more frequently for negative mood than "uplift" (see Table 6.4). This pattern reflects results in Section 6.3.1.2.

Although not statistically significant, it is interesting that school/youth club settings help regulate mood (these settings do not appear in the literature), with boys most likely to mention these settings (see Section 6.3.1.4). Faraway places, although infrequently mentioned, were associated with "uplift", reflecting the above results on natural environments.

6.3.1.4 Gender differences

(1) *Differences in reported selection of place:* percentage frequencies (Table 6.5 below) show similar patterns, but girls mention the natural outdoors more frequently and the internal environment less frequently, than boys in both mood categories. Boys mention using the internal (home) environment more and this difference was statistically significant on relative mean frequencies (see over).

[76] Bonferroni correction ($p<0.003$).

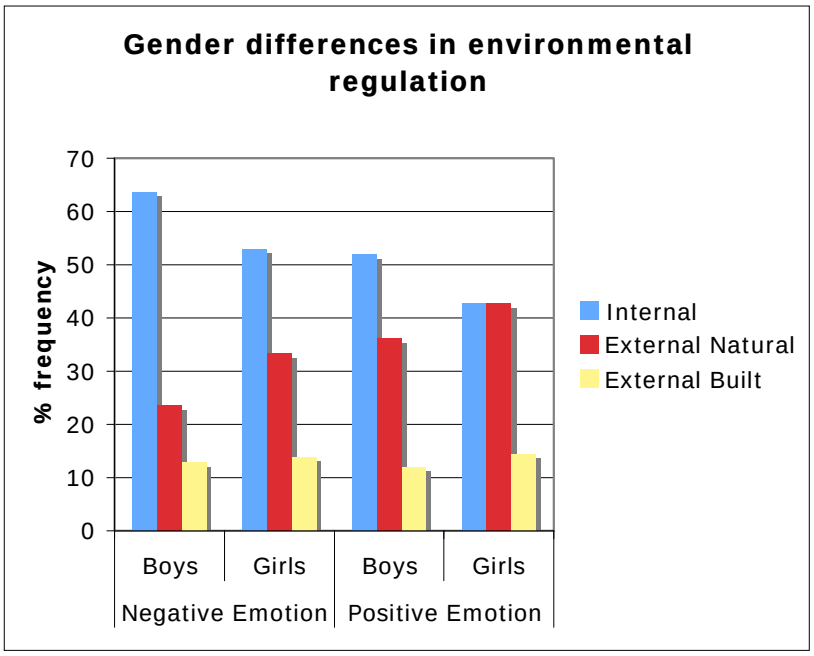

Fig 6.4

(2) *Differences amongst relative mean frequencies* (see Table 6.5)*:* gender differences were not significant between three settings, but were significant between six place categories (Mann Whitney U=28,712, p=0.002 (p<0.05[77])). Boys more frequently mentioned the home (U=2969, p=0.001(p<0.05[75])); town (U=415, p= 0.014 (p<0.10[78])) and sport settings (U=70.5, p=0.001 (<0.05[75])), than girls. Girls more frequently *"more place than one"* (U=336, p=0.015 (p<0.10[76])) suggesting greater independent mobility and exploratory behaviour. Differences in reported preferences for natural outdoor settings were not significant.

Table 6.5: Gender differences in place selection across both mood categories, n=45

Place category	% freq Girls	% freq Boys	Mean Freq (SD) Girls	Mean Freq (SD) Boys
Home	31.8	37.2	**.35 (.13) ****	**.42 (.16)****
Local outdoors	19.4	21.7	.25 (.09)	.28 (.13)
Town context	12.0	14.9	.16* (.08)	.22* (.09)
School/youth club	6.0	4.0	.19 (.11)	.31 (.19)
Sport settings	7.8	6.8	**.12 (.01)****	**.20 (.06)****
Faraway Place	6.5	5.0	.11 (.04)	.10 (.01)
More than one place	14.7	9.9	.28 (.12)*	.20* (.02)

**significant difference with Bonferroni correction *significant difference (Bonferroni not applied)

[77] Bonferroni correction (p<0.007).
[78] marginal result with Bonferroni correction (p<0.014).

(3) *Differences between mood categories*: Girls and boys significantly differed when selecting the home and sport settings to regulate moods. On negative mood, boys were more likely to mention home (U=1227, p=0.005 (<0.05[79])) and town context (U=44.0, p=0.019) and girls *"more than one place"* (U=30.0, p=0.019). On positive, mood boys again were more likely to mention sport settings (U=16.5, p=0.001 (p<0.0577)) and home (U=330.0, p=0.052).

Table 6.6: Gender differences in place selection by separate mood categories				
	Negative Mood		**Positive Mood**	
Place category	Mean Feq Boys (SD)	Mean Freq Girls (SD)	Mean Feq Boys (SD)	Mean Freq Girls (SD)
Home	**.42 (.16)****	**.34 (.13)****	.46 (.16)	.38 (.13)
Local outdoors	.31 (.13)	.26 (.09)	.20 (.06)	.24 (.08)
Town context	.26 (.08)*	.18 (.08)*	.19 (.09)	.15 (.08)
School/youth club	.31 (.21)	.20 (.14)	.31 (.18)	.18 (.10)
Sport settings	.17 (.06)	.14 (.04)	**.21 (.06)****	**.12 (.04)****
Faraway place	.11 (.05)	.11 (.05)	.09 (.03)	.11 (.04)
More than one place	.20 (.09)*	.31 (.11)*	.19 (.13)	.26 (13)

**significant difference with Bonferroni correction * significant difference (Bonferroni not applied)

(4) *Correlations:* significant relationships were found between place and gender. Gender was significantly related to the frequency a place was mentioned for negative mood regulation (r=0.23, p(2 tailed)=0.001 (p<0.05[80])) but not for positive moods. Previous results suggest this relationship is between boys and being at home.

(5) *Summary:* Boys mention using the home more frequently to regulate negative and positive emotion; they mention town more frequently than girls for regulating negative emotion and sport settings more frequently than girls for prolonging "uplift". Girls more frequently mention using more than one place for regulation of both emotion categories. *Reported use of the natural outdoors for mood regulation is similar across gender.*

6.3.2 Discriminate variables between environments

Latent class analysis was used to explore how affective variables discriminate between environments. Several models were generated, two of which are reported below.

[79] Bonferroni correction (p<0.007).
[80] Bonferroni correction (p<0.025).

Results (two-variable model[81])

In the first part of the output, the software found four models, in this case indicating that a two-cluster model was the best fit (BIC(LL)=3107.25). Table 6.7 below shows the significance values for the indicator variables across the two clusters. *Mood* and *environment* were significant discriminators between the two clusters ($p<0.05$).

Table 6.8 shows that Cluster 1 membership equals 57%, with 42% in Cluster 2. The values under the cluster columns are probabilities of being in one variable category or another. Cluster 1 does not show a huge differentiation between internal v. external environments, but there is a greater probability of prolonging "uplift" and of being in a natural environment. Cluster 2 shows greater differentiation and is associated with being in internal environments and regulating negative mood.

Table 6.9 presents similar data, but here the probabilities are inverted i.e. it shows the probabilities of being in a particular cluster, given a particular indicator variable. The internal environment does not discriminate between clusters here, however, the external environment and mood do: there is a 68% chance of falling in Cluster 1 and regulating positive mood in an outdoor environment. By contrast, there is a 50% chance of being in Cluster 2 and regulating bad mood, in an internal environment.

When gender was added to the model it appeared as a significant discriminator in a three-variable model (run with environment and mood). This indicated that boys were more likely to fall into clusters associated with negative mood and the internal environment (63% for boys compared with 36% for girls).

Summary Results replicate earlier analyses, showing an association between regulation of negative emotion with internal environments. Prolonged "uplift" is associated with a much higher chance of being in an external (built or natural) environment. Boys showed a greater chance of falling into clusters associated with negative emotion and internal environments. Distribution amongst girls between clusters was more even.

[81] A third variable, person category, was also explored in this model, as reported in Chapter 7.

Table 6.7: Measures of the significance of difference between clusters for each indicator variable, n=45					
Models for indicators	**Cluster 1**	**Cluster 2**	**Wald**	**p-value**	**R2**
Environment	0.19	-0.19	4.69	**0.03**	0.15
Mood	0.83	-0.83	5.84	**0.01**	0.03

Table 6.8: Probability of indicator variable given cluster membership		Cluster 1	Cluster 2
Cluster Size		0.57	0.42
Indicators			
Environment: Internal		0.49	0.64
	External, built	0.13	0.12
	External, natural	0.38	0.23
Mood:	**Negative**	0.38	0.77
	Positive	0.62	0.23

Table 6.9: Probability of cluster membership given indicator variable		Cluster 1	Cluster 2
Overall Probability: Indicators		0.57	0.42
Environment: Internal		0.49	0.50
	External-built	0.68	0.31
	External-natural	0.67	0.33
Mood:	**Negative**	0.40	0.60
	Positive	0.78	0.21

6.3.3 Summary of quantitative analysis

Young people could easily identify settings for regulating good and bad mood, with 98.7% of the sample citing specific places in response to 12 mood categories.

6.3.3.1 Setting preferences: the outdoors was shown to be a leading mood regulator in young people when both natural and built environments were taken into account. When analysed independently, *the natural outdoors ranked second to residential settings as a preferred environment for mood regulation.* Differences were statistically significant between settings and between mood categories. The built outdoors was least frequently mentioned as a mood regulator in young people but was significant on some variables. Overall percentage frequencies show natural and built outdoor environments were preferred for prolonging good mood rather than relieving negative mood; this difference was significant on relative mean frequencies in the *town setting*.

6.3.3.2 Gender differences: boys and girls significantly differed on place preferences when regulating mood: boys were more likely to frequently mention the home, town and sport settings than girls; girls more frequently selected more than one place.

For clarity, a simplified summary of results appears in Table 6.10, showing how environmental mood regulation consistently differed across three classifications of environment.

Table 6.10: Summary of significant differences in relative mean frequencies

	Int. v Ext	**Int. v Ext-built v Ext-natural**	**Place categories (6 no)**
Differences in mood regulation	✓	✓	✓
Gender differences	×	×	✓

✓significant differences found ($p<0.05$) × no significant differences found

6.3.4 Individual mood categories (qualitative plus quantitative)

> **"***I'd go to my room and look out of the window with my binoculars…I've got really good binoculars, I got them for Christmas and I just look towards, I think it's south, and I can see the Pentland Hills, and I live really far away, and sometimes I can see people on top, so you get quite a good view…"*
>
> Teenage boy from Wester Hailes, on managing indecision

The qualitative evidence integrated into this section illustrates the sheer inventiveness with which young people use their everyday environments for mood regulation. The findings could not have been anticipated: binoculars were useful for managing indecision (as in the above example), trampolines for telling secrets, berry splatting for stress relief and bus rides for chilling out. A full analysis of each mood category was beyond the scope of this study, so several categories were selected for further analysis based on moods relevant to research elsewhere in the thesis (anger, stress, energy and hedonic tone) together with two emotion categories that look particularly interesting from exploratory statistics: trust and regret (feeling sorry). The social context of mood regulatory environments is discussed in Chapter 7, but occasional reference is made in the qualitative analysis in this Section.

6.3.4.1 Relieving negative mood: the patterns reflect earlier results, with the internal environment being the prominent mood regulator of negative emotion categories. Second in importance was the local outdoor context (parks, streets, fields).

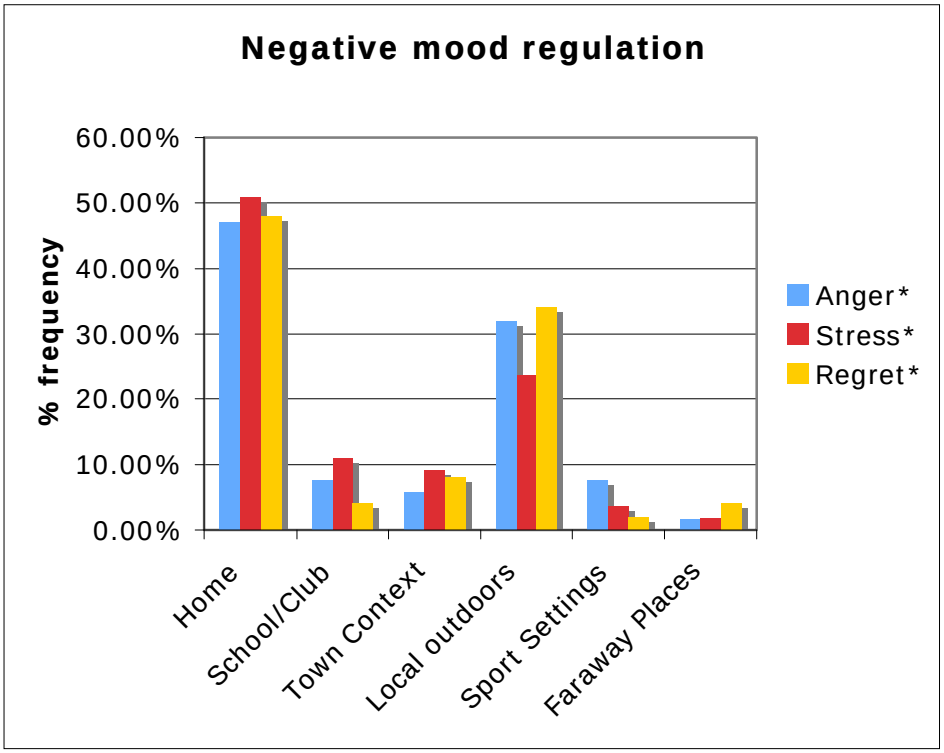

Fig 6.5 *significant differences between settings ($p<0.05$)

(1) Anger

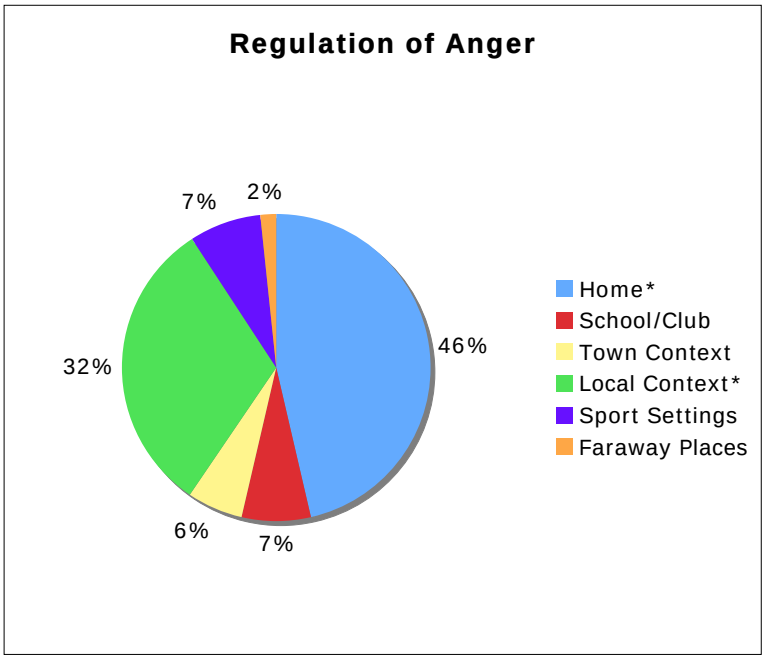

Fig 6.6 *significant differences between settings

Similar patterns were found: relative mean place frequencies were significantly different for anger (Kruskal Wallis H(5)=14.26 p=0.014), with subjects most frequently mentioning the home (mean =0.41) and the local outdoors (mean =0.29). The difference

between the two was significant (Mann Whitney U=61.5, p=0.021)[82]. Anger was strongly associated with the need for privacy. Subjects' home bedrooms were the preferred spaces within the home for relieving anger with warmth and comfort being important attributes: *"I'd go into by bed and just lie in it with the covers over my head and think"*. Lockable spaces (the bathroom, toilets) and hidden spaces (cupboards, under the bed, under the duvet) are important "*cos they're both private and nice and calm*", offering privacy " *no-one can get in"*. Physical features associated with anger management are soft furnishings: bean bags, padded things you can thump and throw about without hurting yourself:

> "[*I'd go somewhere} that's got a lot of like equipment that's soft, so that way I can like punch it and stuff, and like hit it, and take my anger out on that instead of someone else… in school it'd be the gym hall 'cos its got like padding around it…or probably go into my house and punch beanbags on my bed."*

The second most important place for anger management is the local outdoors, where 88% would go *alone* if feeling angry, selecting outdoor parks and fields because they are perceived as quiet, peaceful and empty. The local park is far more likely to be used by girls in relation to anger management (40% compared to 25% of boys). Physical features cited as being important include fresh air and breathing space:

> *"I'd probably go for a walk, and listen to some music. Yeah, just walk up and down the street. Well, it just like lets you have some fresh air and lets you think things over and ... maybe I'd go for a walk in the woods. I'd probably just go on my own because I wouldn't want all my friends getting in my personal space."*

The need for privacy is also reflected in the use of dens and tree-houses:

> *"… because no-one would know you were in there, you're high above the ground, and it doesn't matter if you kick it, apart from the fact it would fall down"*.

[82] Single t-tests carried out per mood category, therefore Bonferroni correction was not applied in this section of results.

Tree houses and fantasy still hold a particular fascination with this age group: *"every time you're angry or something you can always go there (the gang hut) and hang out and do things and it really picks your brains how to do it (build it) and it's really enjoyable. You've never seen a gang hut? You're living in the 21st century of children! It's long, and we call it The Warriors cos I like funky stuff and fighting, sadly… and we got some, paint, we dressed it…"*

(2) Stress

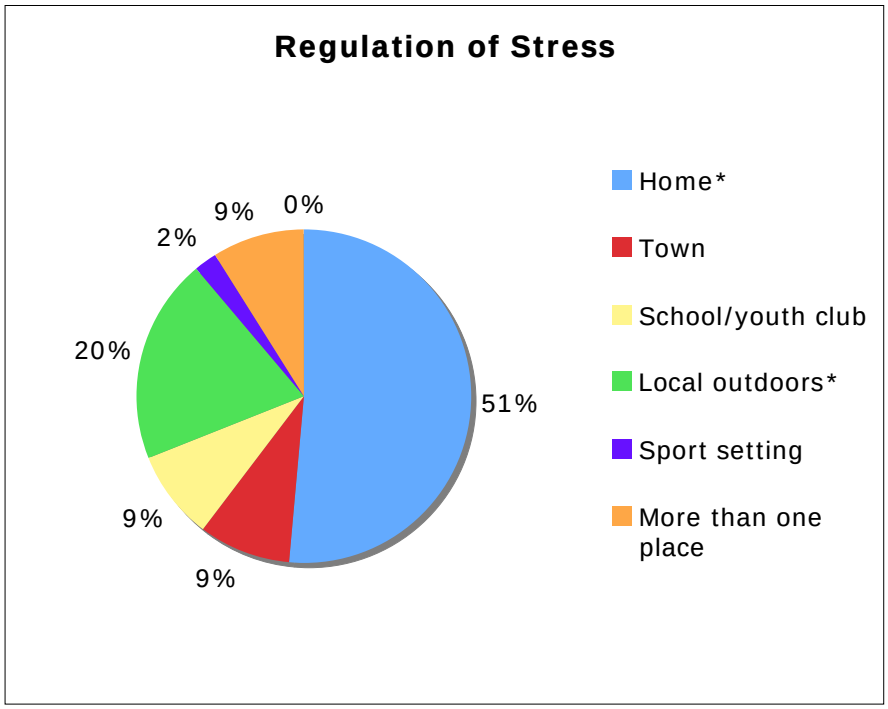

Fig 6.7 *significant difference between settings

Place selection (based on relative mean frequencies) differed significantly for stress regulation (Krsukal Wallis H(5)=14.10, p=0.015). Home (mean=0.37) was most frequently mentioned as the main regulator of stress; the local outdoors was the second most frequently-mentioned category (mean=0.22). The difference between these two settings was significant (Mann-Whitney U=42, p=0.010).

Stress relief was associated with privacy, comfort and hiding with preferences for being at home in bedrooms: *"I could close the curtains, close the door and just sort of think about it and calm down"*. Comfort is important again: *"Just sit and think it over. I like the sofa, it's comfy … I just like being in the living room, it's really one of my favourite rooms in the house"*. Catching up on sleep is a popular strategy for regulating stress in teenagers (and excitement): *"I would probably get a lot of sleep, and sleep on it, not panic, keep cool, don't worry"*. Privacy is a strong theme, again, particularly the need

to escape pestering siblings: *"[I'd go] anywhere where by brother wasn't… my room again, or out somewhere, out skateboarding or rollerblading or something, just try and get away from him!"*. This feeling was prevalent amongst many of the participants.

Home gardens bring relief from the demands of everyday tasks: *"It's one of the places I can just go to anytime and you don't have to plan anything"*; *"there's a tree that I can climb quite high up… because I'm small I can fit through all the bits and I can look in neighbours gardens as well… behind there's this sort of wilderness thing with apple trees and stuff… I've been there a couple of times… I would sit there and think"*.

Young people report a wide variety of local natural environments for de-stressing, including parks, woods and the local block: *"a walk in the park… just sort of clears your mind. Well it's sort of thinking time, and it's relaxing, and it's not in a pressured environment. It's time to think"; "I'd just walk about randomly… maybe go around the next block as well so it's really long, about ten minutes. It's really quiet so you take out your feelings, your bad feelings."* Dens are key places, again offering privacy and the opportunity to reduce worries: *"I'd chill out there a bit ... it's secluded, you can be on your own and think about stuff"; "I'd go to my tree house cos no-one knows about it… I've had it for five years. It's just wooden, it's kinda unstable now cos everything is wearing away. It's high up."* Stress relief is also associated with exploration and mystery in the local outdoors and faraway places:

> *"hiding in the woods… miles away from cars and out in the open… you know in the woods, if you go like go, "what's the way?" and I think it's this way, after couple of miles you get to a road, over the bridge and um…um (interviewer, "get lost"?) Oh yeah, a lot of fun. What's the fun going with no map and not getting lost, come on!"*

Beaches were mentioned as faraway places where young people would seek stress relief: *"hearing the waves, and the sands soft and not hard and jaggy, it's quite relaxing"*. Subjects' recollections of beaches reveal both childish overtones to play and build sandcastles, alongside more mature recognition of the affective dimensions of such landscapes.

In town settings, the café offers opportunities for relaxation, perceived as being peaceful and quiet, reflecting the fact they are frequently used by students for studying: *" I like it (Bean Scene) because there's lots of people studying and it's like quiet. Because then I'd like calm down, and it's quite calm there"; "it's got music and candles, and it's just quiet"*.

Who you are with is sometimes more important than the place, especially amongst the group from Broomhouse who drew heavily on supportive relatives for stress relief: *"I'd go to my Uncle Billy and it was really bad I'd stay with him and muck about with him"*. In this group there was noticeably more emphasis in getting support from youth workers as well. Empathetic friends are helpful in relieving stress in both the local outdoors or town contexts because they simply understand better: *"cos they kinda know what you're going through, cos they're the same age and everything";* and groups en masse are also helpful: *"Well they can help de-stress me… you see everyone else, and there's loads of other different groups of people and they're all smiling and that, so you feel quite happy. Because you forget everything, like all of your tests…"*[83]

Favourite chill-out places: participants were asked to imagine and describe the components of their favourite chill-out place, real or imagined. This part of the research has not been fully analysed, but 73% included some form of the natural outdoors when describing their ideal chill-out space: nature might be the place itself (a tree house, the beach) or integrated via a window with a view. Of those who didn't mention the natural outdoors, 15% would include a sport setting of some kind, particularly a swimming pool. Only 11% preferred their bedroom totally isolated (no windows, lockable) from any aspect of the outdoors environment.

[83] Tests were a major stressor; young people repeatedly associated disappointment most frequently with failure in tests.

(3) Regret

Subjects were asked, *"where would you go if you were feeling sorry about something?"*. Responses to this question significantly differed amongst place categories (Kruskal Wallis H(6)=19.77, p=0.003) with subjects most frequently mentioning home (mean=0.42) and the local outdoors (mean=0.28). Significant differences where again found between these two place categories (Mann Whitney U=55.5, p=0.003). Overall frequencies reflect this result: home was mentioned by 45% of subjects compared with the local outdoors (36%) (see Fig 6.8). Preferences within the local outdoor environment are shown in Fig 6.9 below; the local park is the preferred environment when feeling sorry. Girls again showed a preference for the natural outdoors (46% v. 25%); 47% would go alone, 47% with a friend.

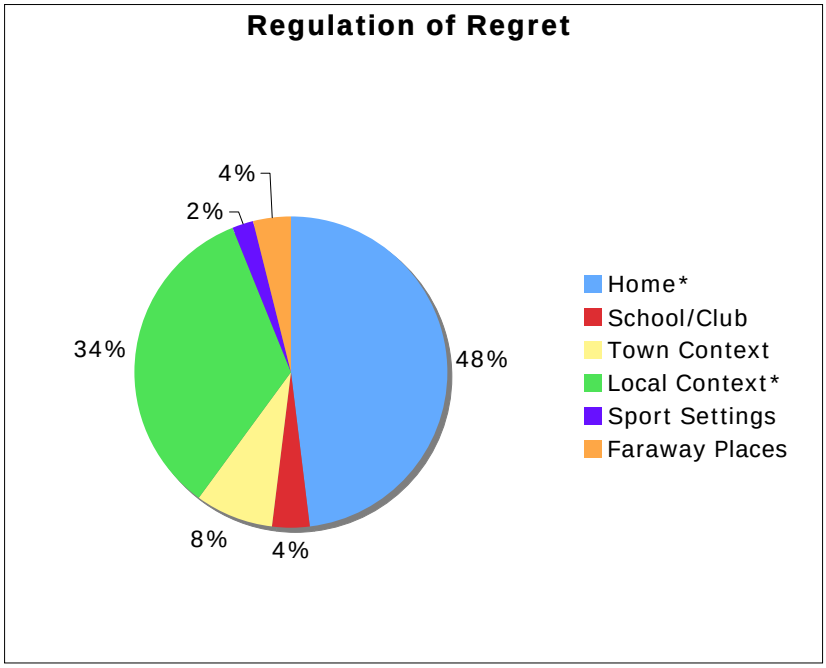

Fig 6.8 *significant differences between setting

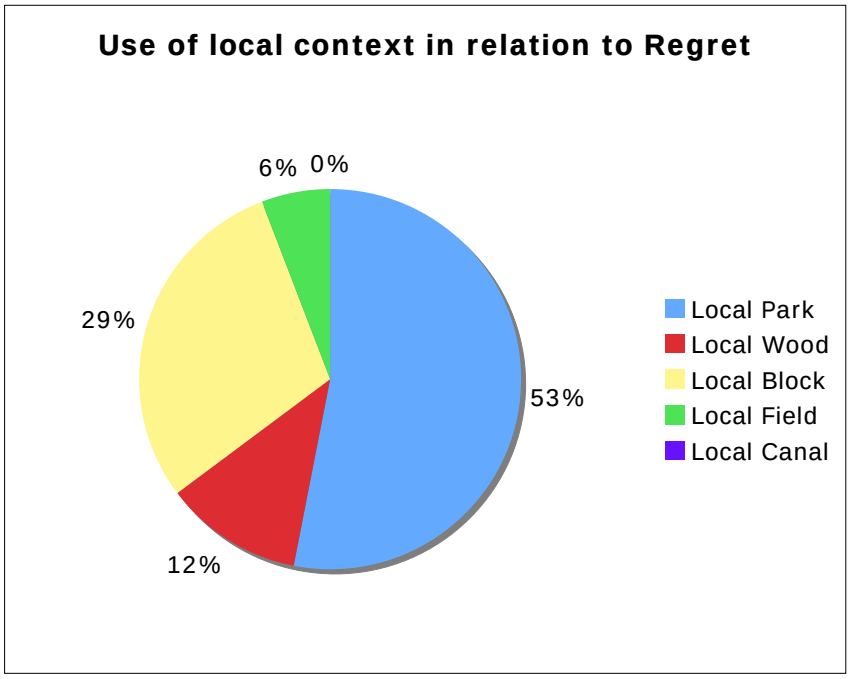

Fig 6.9

Strategies ranged from finding quiet places to think things over (bedrooms mostly) or doing something pro-active to improve the situation (picking up the phone and saying sorry, making or buying the person something, and talking it over with friends). Within the natural outdoors, reflective space included the local street and woods: *"the wood… because if you went there it's unlikely that you would see your friends and it would give you time to just think over what happened and decide what you want to do about it"*. Parks and sport settings were associated with taking your mind off the problem: *"sorry to repeat myself, but maybe play football, just to get out and clear your head. If you realised you've upset someone you can't go back in the past and change it so you've got to realise that and have fun and live your life and they'll forgive you after a while.*

6.3.4.2 Prolonging positive mood

The built outdoors (town and sport settings) was most helpful in prolonging hedonic tone (elation), faraway places for pursuing adventure, and the local natural outdoors for expending energy and confiding in friends.

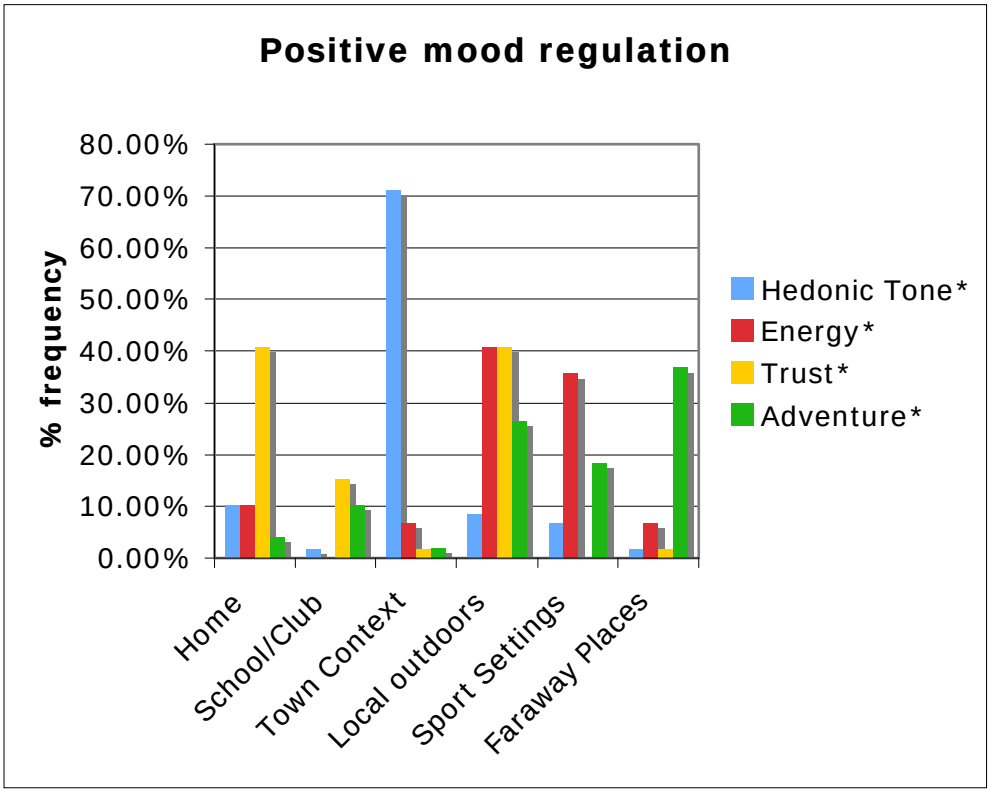

Fig 6.10 *significant differences between settings

(1) Hedonic Tone (elation)

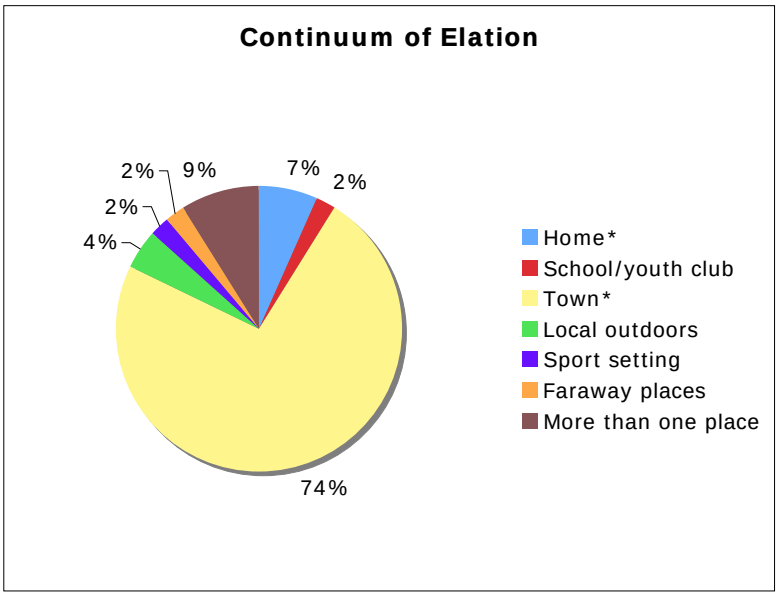

Fig 6.11 *significant differences between settings

The town setting was mentioned most frequently in relation to prolonging exuberance. Differences were significant between home and the built outdoors (Mann-Whitney, U=7, p=0.012), and marginally significant when compared across all six settings (Kruskal Wallis H(5) =10.82, p=0.05). 12% would go to the cinema if they had something to celebrate, 36% to a café or restaurant and 20% to the high street to shop. Elation was associated with having company (planned or unexpected) in both girls and boys. Most would go into town with either family (40%) or with a friend (58%). Being with friends is associated with self-identity *"you're not having to be this other person. It's just about mucking about and being yourself"*. Town is strongly associated with autonomy, freedom, taking responsibility and with surprise: *"you'll meet people and it will be unexpected"*. Public gardens offer variety and in Edinburgh opportunities for new experiences: *"there's always something to do there … bungee jumping, skating, the mini-roundabout*[84]*"*. Town is also associated with being at ease, simply because other people are around: *"I like shopping. I like being around people, you feel comfortable because there are lots of people, I don't like being alone*".

(2) Energy

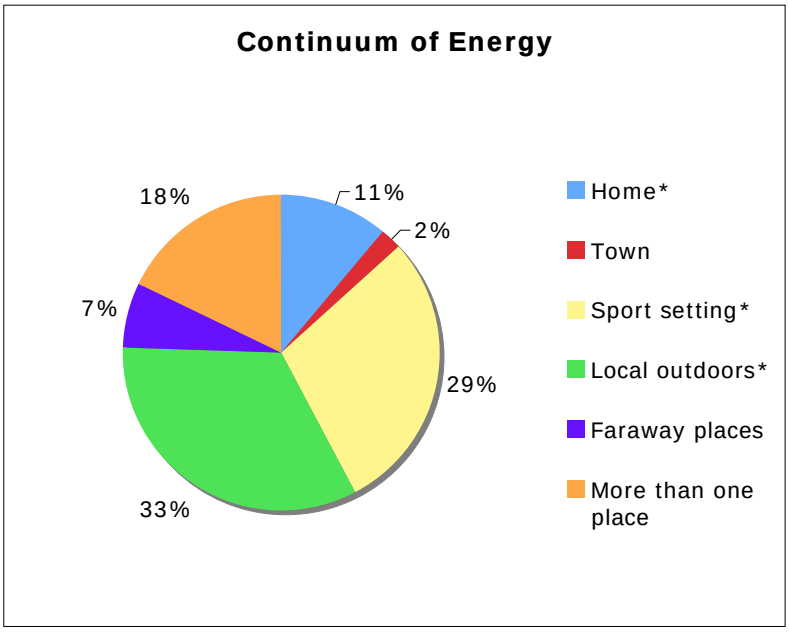

Fig 6.12 *significant differences between settings

Significant differences were found between place categories (Kruskal Wallis H(5)19.48, p=0.002); home was most frequently mentioned for prolonging energy (mean=0.46); the local outdoors was second in importance (mean=0.28) and the difference between these two settings was significant (Mann Whitney U=13.5, p=0.033). The local outdoors

[84] The subject is referring to a seasonal fun fair in Princess Street Gardens.

was mentioned more frequently than sport settings (mean =.16) and this difference was also significant (U=40, p=0.06). Overall frequency ratings show the natural outdoors is the key environmental regulator (see Fig 6.12).

Qualitative reports show freedom and new experiences are key perceived opportunities of the natural outdoors: *"the outdoors is just sort of more free"*. Young people are ingenious in sourcing opportunities for unstructured adventure in the everyday places around them like the street*: "I would just turn a corner that I've never been around before and probably get lost"*. Getting lost and exploration are themes echoed elsewhere (a key theme in identity development), in just going to the woods, "*around-about"* and in discovering and inventing new things:

> *"I would make a boy's little sling-shot, go for a climb and bring my binoculars, and climb up trees and make targets. You put berries in your sling shot and you try and hit the target and watch it splat! Get it on camera, in slow motion. S-p-l-a-t. It's very fun"*.

Others seek structured adventure further afield, accessed with family or with friends, by bus or cycle: *"the park with the really high things, and wooden bits, the really big one, umm (Interviewer: "Dalkeith Country Park?)… yes, things are really big… a really, really, really, really, really big slide. I do like flying off the bottom!"*

The transition between childhood and adolescence is illustrated again in reported needs for play (roundabouts, swings, toys, sand castles) and opportunities for risk in the natural outdoors:

> *"mountain biking in the Pentlands with my dad. We cycle up. Like there's big rocks and big ramps and stuff you can go over, and you can jump rives and the rest of it, thin rivers. I went yesterday, and we went the day before that and the day before that!"*

(3) Trust

Subjects where asked "*where would you go to share a secret with someone*?".
Relative mean frequencies were significantly different between place categories, in response to this question (Kruskal Wallis (H(5)=16.293, p=0.006), with reported preferences for the home (mean=0.44) and local outdoors (mean=0.24) as places to share secrets. The difference between the two settings was highly significant (Mann Whitney U=34.5, p=0.000). Overall frequencies for place categories show the local outdoors was mentioned more frequently (39%) than home (31%) (see Fig 6.13). The immediate local neighbourhood block or street was the preferred local outdoor environment.

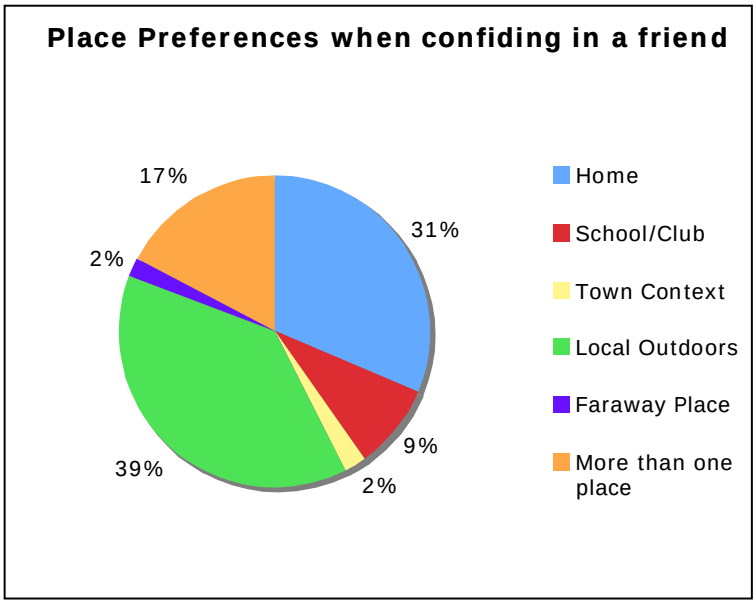

Fig 6.13

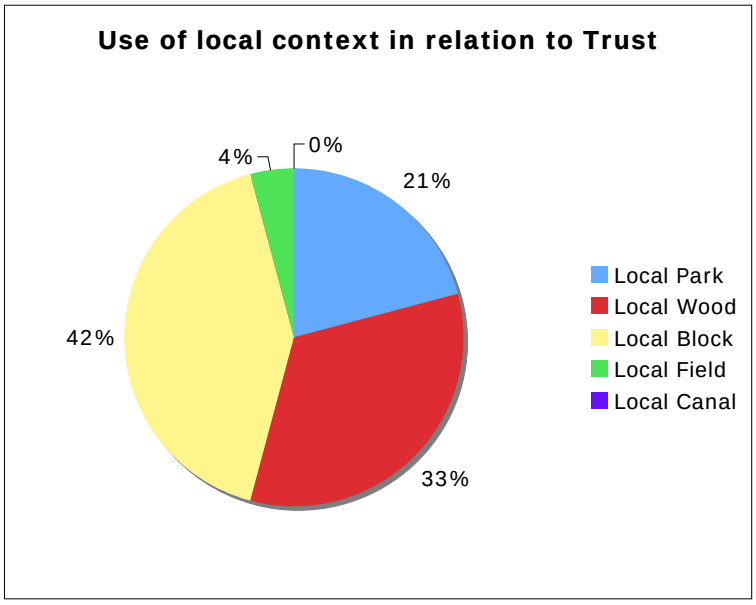

Fig 6.14

Girls showed a preference for sharing secrets in the natural outdoors over boys (57% compared with 31%); boys a preference for confiding in the home (45% compared with 33%). The group diverged on reported preferences for quiet, secluded spots to confide in and noisy, busy places offering opportunities to be less conspicuous. The local park was a popular choice, offering scope for both:

> *"I'd go to the park, in a secret area, but I can't tell you about the secret area cos it's secret!";*
> "*well, there's people around, playing and they don't listen to what you're saying, so you can still like play on something and speak to someone without other people listening*".

Back gardens (including trampolines) were mentioned several times as places to share secrets alongside tree houses and secret dens:

> *"[I'd go to] my secret garden. It's up Broomhouse mid-way. Ken the one that's got the ark beside it? Me and my best friend go there and we've put like plants in it from the shop*."

6.3.4.3 Summary

Analysis of the six emotion categories shows similar patterns to earlier results: preference for being at home when regulating bad mood; and for the outdoors when prolonging good mood. Environmental attributes (physical and social) are summarized in Table 6.11. Comfort, warmth and privacy plus opportunities for peer contact, are key adolescent needs in mood regulatory environments. This Section has also illustrated the extensive resources young people draw upon for mood regulation, from binoculars to tree houses.

Table 6.11: Summary of place affordances for mood regulation						
Place category	**Primary affordances for improving bad mood**	**Primary affordances for good mood**	**Age specific developmental need**	**Dominant space**	**Physical and spatial attributes**	**Social affordance (see Chapter 7)**
Home	Anger Stress Indecision Disappointment Regret	Relaxation Trust Excitement	Privacy Security	Bedrooms, cupboards and bathrooms; under the duvet/pillow; relatives homes	Hide-aways, secure lockable spaces, warmth, comfort. soft furnishings (comfy chairs, mattresses, duvets), gadgetry, personal belongings, quiet, views from windows, binoculars, games/gadgets.	Being alone, escaping siblings,
School/youth club	-	Trust	Socialisation	Bike sheds, toilets, quiet rooms	Isolated and quiet v. noisy and busy	Confiding in friend/s
Town (retail, café, gardens)	Relief, Boredom	Hedonic Tone (elation)	Concentration Relaxation	Cafés	Comfort, nice smells, warmth, secure, candles, music, quiet,	Comfort from having others (anon.) around.
			Autonomy, Socialisation	The street	Space, openness, buzz, variety, visual richness, comfort	Alone or with friends; unexpected encounters
Local outdoors	Regret, Anger	Trust Energy	Autonomy, Risk, Exploration Invention Privacy	Parks, streets, woods, local fields, dens and hideouts	Open, spatious, freedom to roam, privacy, mystery and exploration, fresh air, movement (swings), climbing high, natural materials (berries, flowers)	Alone or with friends
Sports settings	Disappointment	Energy	Self-development	Internal (eg swimming) External (sport pitches)	Sense of scale, space	Alone or with friends/family
Faraway places	-	Adventure/Risk	Risk New Experiences	Beaches, hills, rivers, forests, camping sites	Nice smells (chips and ice-cream), soft and tactile (sand), cold water ("It's nice!"), space (hugeness)	Mostly being with family

6.4 Discussion

This study set out to explore context-specific affordances for restoration and well-being in young people, and asked, are natural environments more helpful in mood maintenance than urban or internal settings? This was not found: the internal environment (home) was mentioned more frequently for regulating mood than any external environment, reflecting Korpela's (1992) findings on environmental self-regulation in adolescents. However, the gap between the natural outdoors and home is much closer in this study; *the natural outdoors is the second most important regulator of negative mood and is more frequently mentioned than internal settings for maintaining good mood*. Results do not exactly mirror findings in adults, but show similarities, adults also indicating preference for natural and residential settings when regulating bad mood (Kopela and Ylén 2007). Amongst the 12 individual mood categories that were explored, overall frequencies (rather than relative mean frequencies) showed that the natural outdoors offers greater opportunities over other settings for relieving regret and facilitating trust. Where outdoor environments were combined for analysis (built and natural), the outdoors was mentioned significantly more often than internal environments for mood regulation. *The effect of the outdoors as a mood regulator is therefore strongest when the built environment is also taken into account*.

As anticipated, the natural settings young people referred to most were "everyday": places (local fields, streets and parks); faraway places were infrequently mentioned. Within the town setting, the high street was most frequently mentioned, alongside public gardens, cafés, restaurants, and cinemas. Some of the local settings (known to the researcher) could not be described as inspirational (aesthetically or recreationally), but the creativity that young people show in adapting them to fit their purposes is ingenious: getting lost by turning a corner, berry splatting adventures, warrior gang-huts and war paint, to name but a few. Statistically, the effect size on differences between environments was most powerful between the internal and the built outdoors.

The effect of good mood regulation on health is a developing area of research, and one new finding from the study is the potential of the outdoors (built and natural), to prolong good mood, particularly hedonic tone, in adolescents. *The outdoors was significantly mentioned more frequently than home for prolonging good mood* with the natural outdoors offering

affordances for vigour, adventure and trust; the town context (retail) affordances for happiness. Previous studies have shown a preference amongst adolescents for retail and urban settings, but have not explored the effects on mood regulation. The above finding reflects Mano's (1999) study of the effects of retail shopping on improving mood in adults (cited in Korpela 2003).

Thurber and Malinowski's (1999) study of mood was carried out exclusively on boys (8-16) in a setting far removed from everyday experiences. A new finding here is gender differences in the selection of everyday contexts for mood regulation. Firstly, on setting: boys more frequently mentioned using the home and town context for improving bad mood; they reported using sport settings more frequently than girls for prolonging good mood. Thurber and Malinowski (1999) have suggested exploration is a concept linked with negative mood regulation, a concept also linked in this research with restoration and identity formation. In this study, exploration is defined in terms of greater independent mobility and using more than one place for mood regulation. Girls significantly differed from boys in relation to this, showing greater capacity in setting selection and moving around. Are girls simply more independent at this age or is the attraction of home more inviting for boys? One of the themes emerging from the qualitative research is the use of games at home for relieving bad mood and prolonging excitement: *"I would probably level up on one of my games on the internet… yeh I'd try and complete a game… so I'd complete something to make the failure seem better"*; an activity barely mentioned by girls. Recent literature (Louv 2005) has suggested that young people are suffering from "nature deficit disorder", a cultural autism, in part perpetuated by the increasing usage of games and internet recreation in young people. Evidence presented by the Woodland Trust Scotland (2007)[85] states that *"72% of young people would prefer to watch a video or play on the computer than go outside"*. The evidence presented here (and in the previous Chapter) suggests that this is not necessarily the case: whilst home is the key regulator of bad mood in young people, they clearly associate the natural outdoors with positive affect, and report using it widely. Girls were more likely to frequently mention using natural environments reflecting Korpela's (2002) findings; but the differences (as with Korpela) were not statistically significant. On some individual mood categories, girls were much more likely

[85] "National Health Service …..better than prescription", seminar held by Scottish Executive, March 2007

than boys to mention the natural outdoors for firstly, confiding in a friend (57% v. 31%) and secondly, when feeling sorry (46% v 25%).

Qualitative evidence supports Korpela's (1992) finding showing that privacy, warmth, comfort and security are important physical affordances of restorative space in teenagers. Relatives' homes offer respite from sometimes tumultuous home environments and irritating siblings; in the natural outdoors, dens and tree houses offer comfort, warmth and security, akin to the affordances of home bedrooms. Providing opportunities for den making and addressing needs for warmth and comfort outdoors is something that recreational policy could address, and has been flagged elsewhere in recent research (Ward Thompson et al 2006).

6.4.1 Parallel findings between the personal project research and place affordances for mood regulation

Place does discriminate in the strategies that young people adopt for mood regulation, as it did in the project system (Chapter 5). A very high proportion of moods were linked with specific settings, as were projects with places. The main difference between the two studies is the appearance, as anticipated, of the built outdoors as a mood regulator, a setting that was of little importance within the project system.

Within the project system, the natural outdoors was aligned with positive affect and reduced stress. A similar association was found here, between the natural outdoors and "uplift", but residential settings were associated more with stress relief. Analysis of discriminate variables between environments showed similar patterns across the studies (Latent Class), with positive affect clustering with the natural outdoors and negative affect clustering with internal settings. Projects offering new experiences and adventure were associated with faraway places, a pattern also reflected here in the association between the natural outdoors and adventure.

Chapter 5 showed how niche environments differ across the age-range when compared to other studies. Here the differences are less marked. The use of natural and residential settings for negative mood regulation appears to be a shared phenomenon between adults

and young people, although adults show a slightly greater preference for natural settings when regulating negative mood (Korpela 2003). On gender differences, some findings are replicated across the two studies; boys' preference for sport settings as project places was reflected in their reported use of sport settings for good mood retention.

In comparison to other data herein, the reported affordances of natural landscapes show parallels with affordance analysis elsewhere in the thesis. Repeated themes are the opportunities the natural outdoors offers to young people for anger and stress reduction, improved vigor and hedonic tone. Affordances for trust, comfort and privacy (in the form of dens) are other themes replicated here.

6.5 Limitations

The major limitation of the study was that findings were based exclusively on anticipated self-reports, some of which may have been idealised (and possibly fantasised), rather than being based on the actual likelihood of frequenting a setting. Owing to possible safety fears, it is questionable whether so many young people who reported going to a wood alone to improve mood, would actually do so. The methodologies used are standard for research in this field, but it is recognised that a wider range of methods is required. However, replication of results elsewhere (e.g. in the affordances captured by ethnographic analysis in Chapter 4) helps reinforce findings.

This study is not a full analysis across all emotion categories. There is potential within the data file to carry out more analysis and to combine some variables (for example, favourite place) with well-being outcomes from Chapter 5 (since the same sample was used in both data files). Conflicts also exist between overall frequencies and mean relative frequencies, which sometime show different patterns (for example, in frequency patterns for the natural outdoors). Further analysis is therefore needed to confirm patterns. Latent gold regression analysis helps confirm key findings on the association (or clustering) of negative mood regulation with home environments.

Was the research biased in any way? The young people were very decisive in their responses; photographic prompts provided in a pilot were completely disregarded by

subjects and were not used subsequently. Information supplied to young people simply referred to a study exploring the use of settings and mood regulation and the researcher did not allude to specific natural outdoor spaces.

6.6 Conclusions

This study is consistent with findings on environmental mood regulation showing the potential affordances of residential and natural settings for regulating bad mood in young people. These settings are restorative since they alleviate negative antecedents (feeling sad, angry etc.). This study has begun to establish the affective affordances of different places and identified some of their physical properties.

This research also suggests that natural and built outdoor environments may be of special value in prolonging and cultivating good mood, but more empirical evidence is required. It provides some support for Frerickson's (2004) hypothesis that positive emotion promotes exploration, creativity and social integration: getting lost, making use of more than one local outdoor environment, being with company (see Chapter 7) are all concepts shown to be associated with positive mood regulation in this study and elsewhere in the PhD. Overall, this chapter suggests the natural and built outdoors have an important role to play in optimising health and well-being in young people, potentially increasing the odds for successful coping and development.

Chapter 7: Solo or with others? Social relationships and potential restorative experiences.

The PhD has explored the effects of restoration in a group context (Chapters 2, 3 and 4) and has speculated that restoration is constrained or aided by the group dynamics in natural settings. In adult walkers, qualitative evidence suggested the social dynamics of walking as a group positively influenced restorative outcomes. In young people in forest settings, video evidence suggested that being with disruptive peers constrained restoration in young people without behaviour problems. In boys with trauma, ethnographic analysis indicated that social cohesion was one outcome of cumulative forest experiences. Further evidence on the impact of other people in restorative processes is explored in this Chapter in young people, aged 11-13. This was a mixed-methods approach, exploring the phenomena via direct questioning and personal project techniques.

7.1 Introduction

The role of social interaction in restoration is a relatively new line of research and to date there is little empirical evidence. Scopelliti and Giuliani (2004), drawing on Canter's (1997) theory of place as a basis for theoretically speculating on the role of the social context within restoration, have shown that sociality is an important aspect of perceived restorative experiences, reporting its importance increase with increased availability of time for restoration, and varies across the age spectrum. Social relationships with friends were significantly more important to young people; being with family significantly more important for adults and the elderly. Restorative experiences have been associated with being alone in green areas in adults (Korpela et al 2008). Another study has shown the impact of company on perceived restoration in students in natural vs. built settings (Staats and Hartig 2004). Company was found to enhance restoration in natural settings but only where perceived safety was a concern. Where safety was not a concern, being alone enhanced restoration. In the urban setting findings were less clear; company enhanced the pleasure of walking in an urban environment but not because it enhanced restoration. The authors suggest that other, as yet unknown, factors appear to influence preference for company in the urban setting.

Research on active-living has shown that company is a co-determinant of physical activity alongside environmental factors (Giles-Corti et al 2005). Sociality (social interaction and cohesion), environment and the relationship with walking and perceived health have been explored by Sugiyama et al (2008). Recreational walking and social coherence were found to be significant predictors of mental health, but sociality did not predict physical health. The social context was therefore found to have more impact on mental health. Further evidence of a link between health, green space and company is found in several studies exploring the relationship between nearby green space and social integration. Common open space and natural settings have been found to enhance social ties and sense of community firstly, in older adults (Kweon et al 1998, Sullivan et al 2004); secondly, in residents of a proto-typical American urbanist community (Kim and Kaplan 2004); and thirdly, in residents of a large public housing development in Chicago (Sullivan et al 2004). Since social interaction and support are concepts linked with health and well-being (Cohen 2004), these findings infer (albeit indirectly) a link between green space, company and health.

The impact of social relationships on health is also a relatively new area of research; social support, social integration and negative interactions have all been identified as significant predictors of health and well-being (see Cohen 2004 for a review). Company is also linked with well-being in the project literature. The presence of others in projects is salutary across the age span (Little 2007) and the company of peers is especially important to well-being and self-identity in young people (Little 1987b). However, the relationship between project places and project assistants is a neglected research field.

Solo or with friends? As place selection varies across the adolescent age span, so too does the need for privacy. Generally, teenagers have a strong social orientation with particular emphasis on peers. Korpela (2002) found that 12-13 year olds were more likely to visit favourite places with friends compared with 8-9 year olds. When self-regulating negative mood, boys (age 8-16) were shown to be more likely to choose places where they can be alone (Thurber and Malinowski 1999). Sommer (1990) and Owen (1988) have also shown the important role of solitary places in adolescence. By contrast, positive mood was much more likely to be associated with being with someone in a particular place (Thurber and Malinowski 1999).

Teenagers have a strong social orientation to be with peers and this chapter hypothesised that relationships with friends would be more important to restorative experiences in young people than relationships with family or being alone. It explored this hypothesis in two contexts: firstly, in perceived restorative settings for mood regulation; and secondly, in project places (construed as niche environments) supporting well-being via the "fit" of person with their intended goals. It asks two main questions:

(1) Is there a greater tendency to be alone in a place when regulating negative mood and to be with friends when feeling happy?
(2) Is company salutary in certain project places and not in others?

Since there is very little information on gender differences in the research field (Thurber and Malinowski's (1999) study was conducted with boys only) the research was also interested in whether social preferences within potential restorative settings would vary between boys and girls.

7.2 Method

An exploratory approach was taken using personal project methods (as described in Chapter 5), and direct questioning of young people aged 11-13. The data for the study was collected using the same sample of young people as described in Chapter 5 (n=45, split: boys 26, girls 19). Direct questioning was in the form of a semi-structured interview, exploring the role of people in potential restorative environments for mood regulation. The project research elicited the "with whom" dimension of projects defined here as "project assistants". Frequencies and relative mean frequencies were calculated following methods defined by Wallenius (1999) and described in Chapter 5 (Section 5.2.3). Analysis was carried out using non-parametric means tests and correlations between place, project assistant and well-being project indicators (enjoyment, stress, self-identity, support and control).

Firstly, social preferences for mood regulation are reported then, secondly, findings from the project research.

7.3 Results

Owing to multiple significance tests Bonferroni's correction is applied; following the rationale described in Chapter 5, marginal results are also presented.

7.3.1 Direct questioning

7.3.1.1 Social preferences for mood regulation

Participants were asked "with whom" would they be in a particular restorative place, identified by the participant to regulate good and bad mood. Responses were categorised according to four social groupings: being alone; being with a friend (s); being with family; and being with a teacher or youth worker. Occasionally animals crept in too.

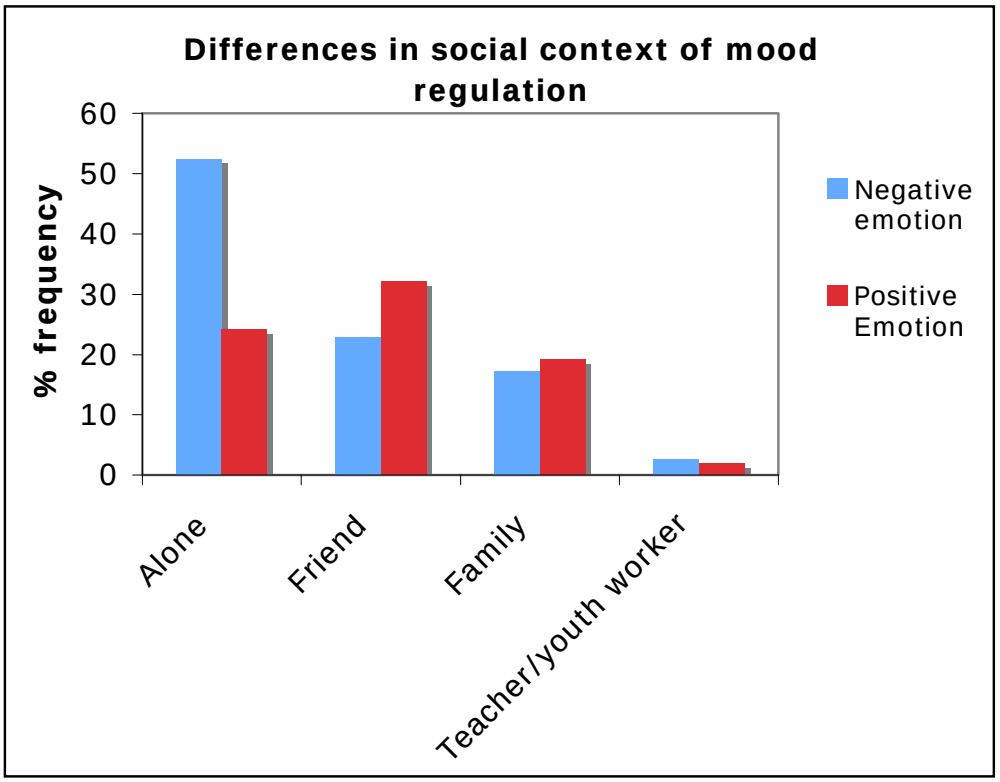

Fig 7.1

Frequencies: Overall percentage frequencies showed that subjects preferred to be alone when regulating negative emotion and with a friend, followed by family, when feeling positive. This result was also reflected in relative mean frequency scores reported below.

Differences in social preferences: subjects were more likely to frequently mention being alone when relieving negative mood; more likely to frequently mention being with a friend when prolonging "uplift". Differences in person category were statistically significant (Kruskal Wallis) for negative mood ($H(4)=103.64$, $p=0.001$ ($p<0.05$[86]) and positive mood categories ($H(3)=60.14$, $p=0.001$ ($p<0.05$[84]). The mean frequency for being alone when regulating bad mood is much higher than for good mood, but differences in relative frequencies between positive and negative mood categories were not significant.

Table 7.1: Percentage subjects mentioning social preferences for mood regulation and relative frequencies

Person category	**Overall frequencies**		**Relative mean frequencies**	
	Negative mood %	Positive mood %	Negative mood Mean (SD)	Positive mood Mean (SD)
Alone	55.2	24.1	.61 (2.23)	.33 (.13)
Friend	22.9	32.2	.36 (.13)	.38 (.15)
Family	17.2	19.2	.19 (.07)	.18 (.07)
Teacher/youth worker	2.5	1.9	.31 (.14)	.18 (.15)

7.3.1.2 Differences in social preferences between environments

Frequencies: subjects mentioned being with a friend in the built outdoors more frequently than any other category; they mentioned being alone more frequently within internal settings. Results for the natural outdoors were evenly distributed between person categories (see Fig.7.2 below). *Differences in person category were not significant within external natural settings* (Kruskal Wallis $H(3)=1.01$, $p=0.80$) indicating subjects feel at ease either alone or with company in this setting.

[86]Bonferroni correction ($p<0.013$)

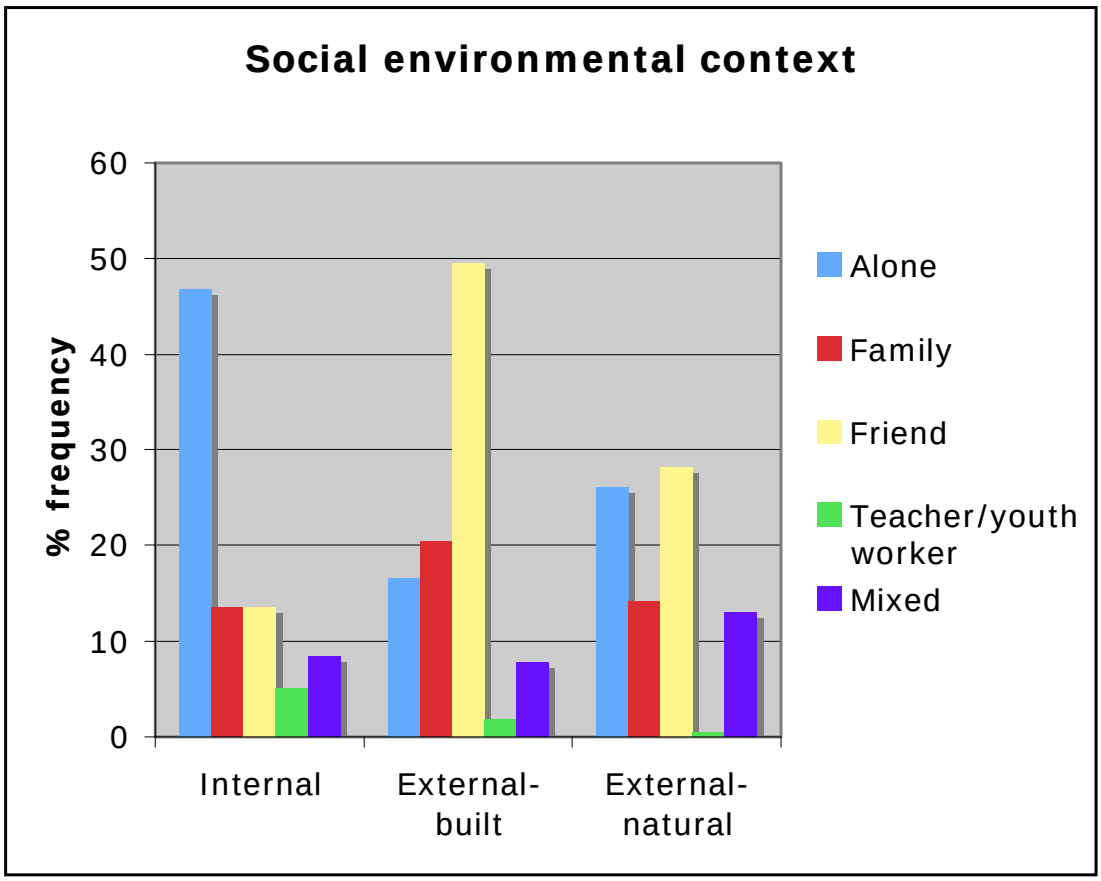

Fig 7.2

(1) Social preferences within individual settings: moods in general

Relative mean frequencies show a different pattern to the overall frequencies illustrated in Fig 7.2. Being alone was consistently mentioned more frequently across all three settings, followed by being with a friend (see Table 7.2), then family. As outlined in Section 5.2.3, these scores offer a more appropriate basis for comparison. These differences were statistically significant (Kruskal Wallis) within the internal environment (H(3)=46.9, p=0.001 (p<0.05)[87]), the built outdoors (H(3)=28.33, p=0.001 (p<0.05[85]) and the natural outdoors (H(3)=46.9, p=0.001 (p<0.05[85]). When selecting company, *adolescents more frequently mentioned being with a friend than with family*, and this difference was very significant (Mann-Whitney) in each setting**,** the natural outdoors (U=214.5, p=0.001 (p<0.05[88]), the built outdoors (U=167.5, p=0.001 (p<0.05 [86]) and internal settings (U=158, p=0.001 (p<0.05[86]). Subjects mentioned more frequently being alone (as compared with

[87] Bonferroni correction (p<0.017).
[88] Bonferroni correction (p<0.008).

being with friends) in the natural outdoors (U=1006, p=0.023) and internal settings (U=1266, p=0.012) but not in the built outdoors. Whilst these differences are *ns* with Bonferroni applied, the data does suggest that *the social context of the external built environment is different to other settings.*

Table 7.2: Relative mean frequencies for social preferences within settings across both mood categories.

Person category	Mean (SD) **Internal**	Mean (SD) **External-built**	Mean (SD) **External-natural**
Alone	0.38 (.13)	0.41 (.19)	0.42 (14)
Friend*	0.32 (.11)	0.34 (.13)	0.36 (.14)
Family*	0.18 (.07)	0.19 (.06)	0.18 (.08)
Teacher/youth worker	0.30 (.14)	-	-

*Significant difference between moods and social preferences p<0.05 (Bonferroni applied)

(2) Social preferences within individual settings: good and bad moods

Differences in mean person frequencies *between moods* were significant in the external built environment but not elsewhere (Mann Whitney, U=64, p=0.001 (p<0.05[89]) (see Table 7.3). *Young people were much more likely to be alone in the built-external setting when regulating negative mood*. This was a surprising result, since the literature suggests that adolescents tend to choose urban environments for social interaction (see Chapter 6).

Table 7.3: External-built environment, differences in relative frequencies for mood regulation

Person category	**Negative Mood** Mean Freq (SD)	**Positive Mood** Mean freq (SD)
Alone	**0.46 (.19)***	**0.33 (.18)***
Family	**0.22 (.05)***	**018 (.06)***
Friend	**0.40 (.14)***	**0.30 (.11)***
Teacher/youth worker	-	-

*Significant difference between moods and social preferences p<0.05

[89] Bonferroni correction p<0.0017

7.3.1.3 Gender differences in reported social preferences

Frequencies: boys and girls were both more likely to be alone in any setting when regulating bad mood, and with a friend when prolonging good mood. Girls were more likely to mention being with family when prolonging good mood (reflected later in results from the project analysis); otherwise the distributions (Fig 7.3 below) are similar.

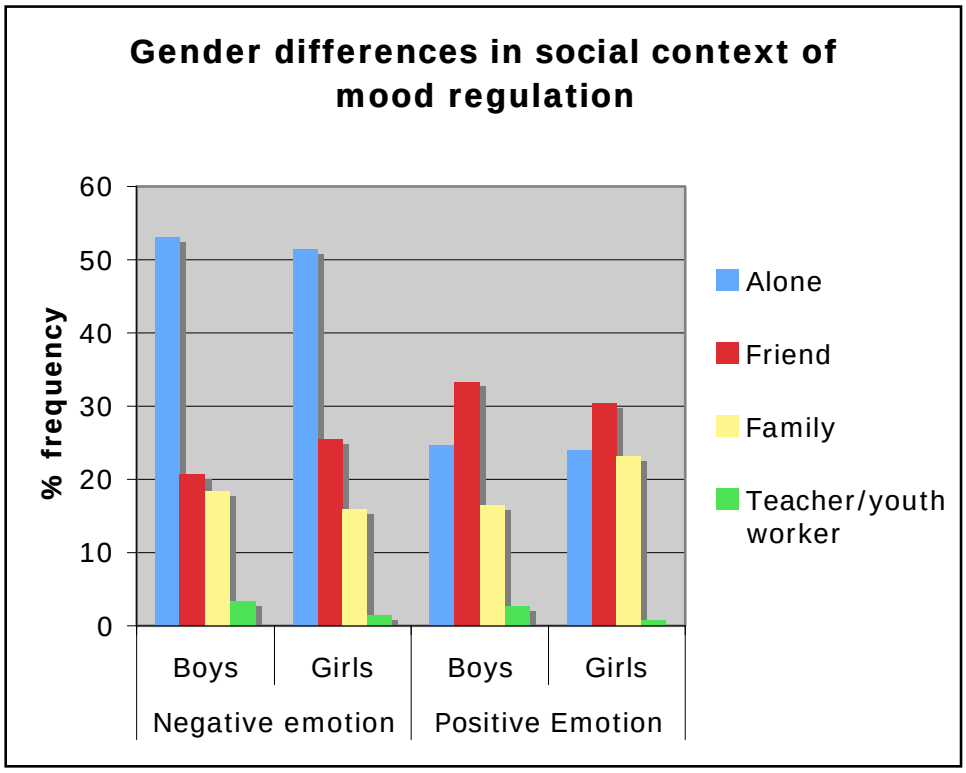

Fig 7.3

Relative mean frequencies: boys and girls differed on social preferences across both mood categories but this difference is marginal (Mann Whitney U=22, 440, p=0.016 ($p<0.05$[90]). However, boys were significantly more likely to mention being with a teacher/youth worker when regulating negative emotion (U=6.5, p=0.012 ($p<0.05$[88]); results were marginal when being with family (U=80, p=0.025 ($p<0.05$[88])

[90] Bonferroni correction ($p<0.013$).

Table 7.4: Differences in relative mean person frequencies for emotion categories				
Person category	Negative Emotion		Positive Emotion	
	Mean (SD) Boys	Mean (SD) Girls	Mean (SD) Boys	Mean (SD) Girls
Alone	0.42 (.14)	0.39 (.12)	0.39 (.16)	0.36 (.12)
With Family	0.22 (.08)*	0.16 (.05)*	0.18 (.15)	0.18 (.06)
With Friend	0.38 (.14)	0.32 (.10)	0.35 (.14)	0.30 (.11)
Youth worker	**0.34 (.15)****	**0.27 (.13)****	-	-

**significant difference p<0.05 (Bonferroni applied) (p<0.05) *significant difference (no Bonferroni correction) applied

7.3.1.4 Relationships between regulatory mood places and social context

Significant relationships (Spearman's correlation) were found between potential regulatory mood places and social preferences. The more frequently subjects mentioned a particular place, the more frequently they mentioned being with a particular person. This relationship was significant for positive emotion (r=0.29, p(2-tailed)=0.001 (p<0.05[91]), marginal for negative emotion (r=0.13, p (2-tailed)= 0.044). Was this relationship influenced by gender? There was a marginal association between gender and person frequency for positive mood categories (r=0.15, p (2-tailed)=0.036) but not for negative mood. Earlier results suggest that the relationship is between girls and being with family.

7.3.1.5 Social context as a discriminator between environments

Cluster analysis (Latent Gold) was carried out, adding social context to the two-variable model (comprising setting and mood) discussed in chapter 6, Section 6.3.2. Person category was a significant discriminator in the model (p (one tailed)=0.04) based on hypothesis posited by earlier analysis; having company clustered with uplift but there was not much differentiation between environments. Being alone clustered with negative mood and internal environments (figures flagged in bold type in Table 7.5 over) reflecting other findings in this Chapter.

[91] Bonferroni correction (p<0.025).

Table 7.5: Probability of indicator variable given cluster membership			
Cluster Size		Cluster 1	Cluster 2
		0.57	0.42
Indicators			
Environment:	**Internal**	0.49	**0.64**
	External, built	0.13	0.12
	External, natural	0.38	0.23
Mood:	**Negative**	0.38	**0.77**
	Positive	**0.62**	0.23
Person:	**Alone**	0.19	**0.79**
	Family	0.25	0.16
	Friend	**0.52**	0.04
	Youth worker/teacher	0.04	0.00

7.3.1.6 Summary

Significant differences were found between setting and social preferences across both mood categories. Subjects preferred to be alone, when relieving negative mood, and with a friend when maintaining "uplift". Subjects more frequently mentioned being alone in all settings; and when regulating bad mood, young people were more likely to mention being alone in the built outdoors. Overall reported frequencies show the natural environment appears to offer more social possibilities with subjects reporting similar preferences for being alone or with company.

7.3.2 Personal Project Analysis

7.3.2.1 Project Assistants

Chapter 5 defined niche environments as places meeting particular goal needs. This Section continues the discussion by asking what role do project assistants (the "with whom" dimension) have in these settings. Results show participants most frequently reported carrying out projects alone or with friends. They would be most likely to be alone in the home context (60%) and with a friend in the school/youth club setting (75%). Differences in relative mean frequencies for person categories were significant (Kruskal Wallis H(4)38.6, p=0.001).

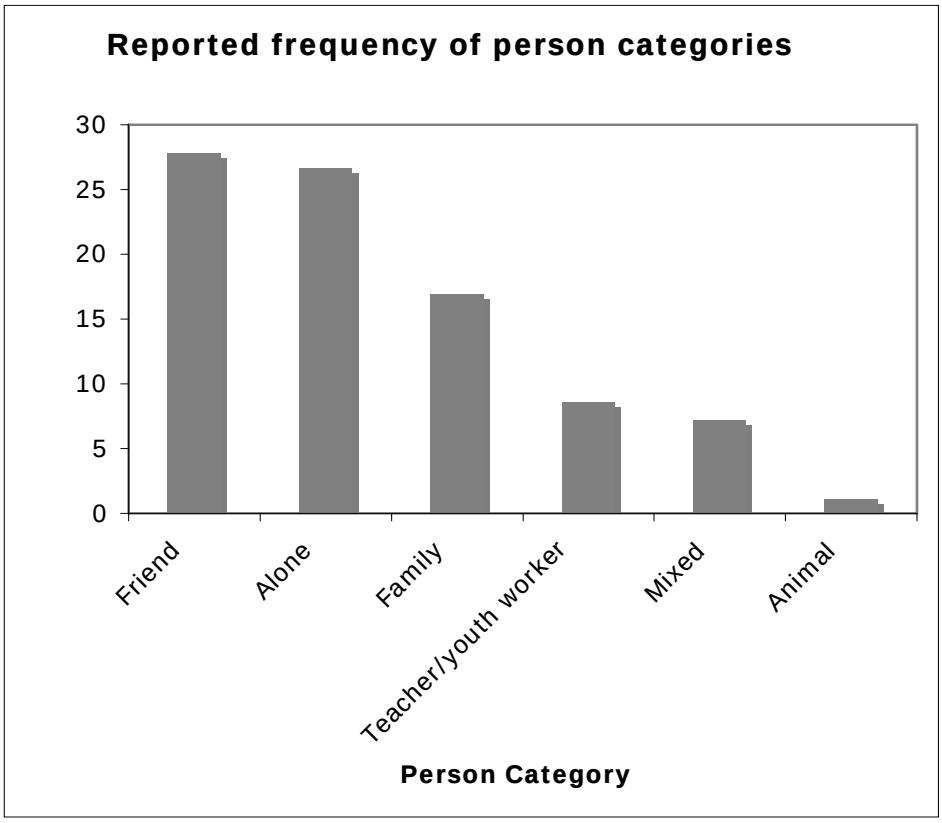

Fig 7.4

7.3.2.2 Relationship between project assistants and project places

(1) Descriptives: reported frequencies (Fig 7.4) show young people were most likely to be unassisted (alone) in projects taking place at home. In other settings they were most likely to choose a friend as a project assistant. In natural settings (the local outdoors and faraway places) the social context is more diffuse (having a greater social spectrum) than, say, school and youth club contexts, where the focus is singularly on friends as project assistants. This suggests more flexible social options in the natural setting (reflecting earlier results). Young people consistently chose friends as project assistants across setting, other than home and town, echoing research findings elsewhere on the importance of peers in adolescent project systems (Little 2007) and supporting the hypothesis in Section 7.1 that being with friends is important to potential restorative experiences in young people.

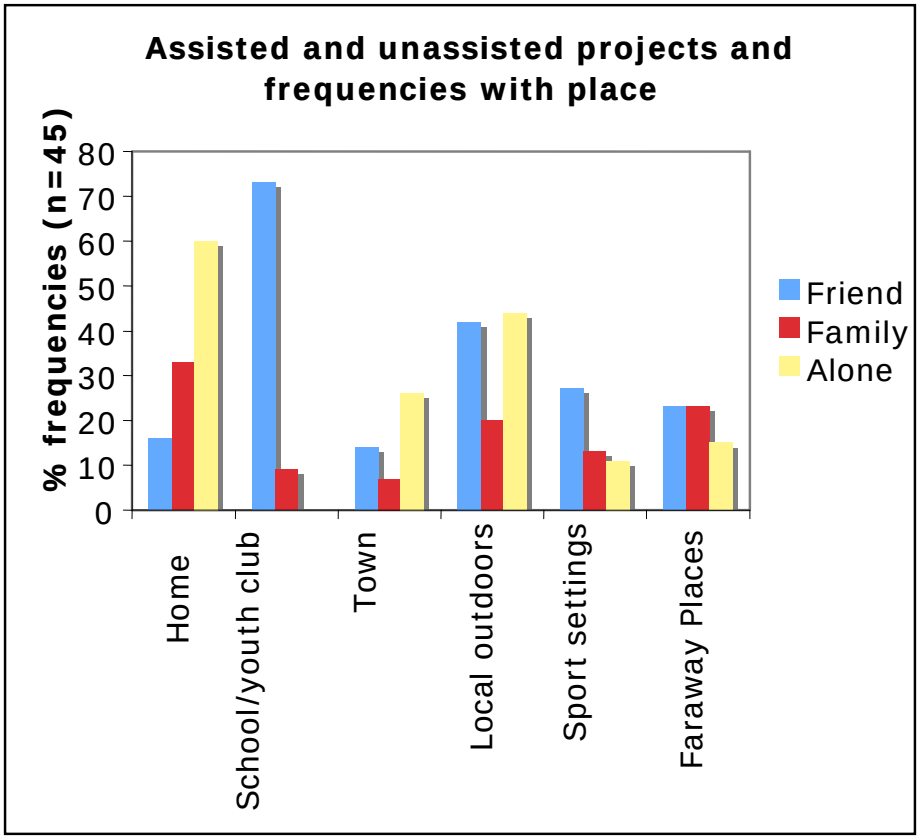

Fig 7.5

(2) **Mean frequencies:** correlation analysis (Spearman) was carried out exploring the relationship between project assistants and project places using relative mean frequencies. The following relationships were found to be significant:

- The more frequently subjects mentioned *home* as a project place the more frequently projects were unassisted (alone) (r=0.74, n=27, p(2-tailed)=0.001 ($p<0.05$[92]));
- The more frequently subjects mentioned *local outdoors* the more frequently they mentioned being with a friend (r=0.65, p=0.002 ($p<0.05$ [90])).

[92] Bonferroni correction ($p<0.008$)

7.3.2.3 Relationships between project places, project assistants and well-being indicators

The following correlations explore the three-way relationships between project assistants, places and well-being dimensions, using mean frequency scores for place and person (see Table 7.6). They are complex but interesting and indicate affective differences in the social context of different settings. Only several results reached significance when Bonferroni correction was applied (marked ** in the accompanying table) and flagged below in italics ($p<0.05$).

Unassisted (Alone)

- The more frequently subjects mentioned being unassisted (alone) in a *home* context (own, relatives, friends) the lower the fun (r=-0.43, p=0.026) and greater the stress (r=0.46, p=0.016*). Being alone in the natural outdoors was associated with less typical of self-idenity (r=0-.64, p=0.003 (p<0.05*[93]*)*, with less fun (r=0.55, p=0.015) and less efficacy (r=-0.57, p=0.010).
- Conversely in the built environment, being alone was associated with fun (r=0.72, p=0.008) and more important projects (r=0.64, p=0.024)

Assisted by Family

- The more frequently subjects mentioned being with family in the local outdoors (wood, field, park, local block) the higher the fun dimension (r=0.76, p=0.016), the lower the importance (r=0.85, p=0.015) and the greater the self-identity (typical self) (r=0.74, p=0.023).
- The more frequently subjects mentioned being with family in a sport setting the higher the efficacy (r=0.85, p=0.033) and support dimensions (r=0.85, p=0.031).
- Conversely, the more frequently subjects mentioned being with family at home the higher the stress dimension (r=-0.54, p=0.037) but the greater the project importance (r=-0.55, p=0.039).

[93] Bonferroni correction (p<0.003).

Assisted by Friends

Significant associations were positive rather than negative:

- *The more frequently subjects mentioned being with friends in a faraway place the greater the fun dimension (r=0.69, p=0.001 (p<0.05 91)).*
- *The more frequently subjects mentioned being with friends in school* or *youth club the lower the stress (r=-0.51, p=0.003(p<0.05 91)) and the greater the sense of a new emergent self-identity (r=0.69, p=0.002 (p<0.05 91).*
- *The more frequently subjects mentioned being with a friend in a home environment, the higher the identity (typical self) dimension (r=0.90, p=0.003 (p<0.05 91))..*

Table 7.6: Social context by place and associations with well-being

Simple Place	Person	% Subjects n=45 *note a*	Mean (SD) *note b*	Fun r	Stress r	Efficacy r	ID by others r	Support r	Importance r
Home (own, friends, relatives)	Alone	60	.50 (.25)	**-.43***	**.46***				
	Family	33.3	.28 (.11)		**-.54***				
	Friend	15	.42 (.15)				**.90****		
School/youth club	Alone	48.9	.41 (.17)						
	Family	8.9	.37 (.10)						
	Friend	73.3	.42 (.14)		**-.51****		**.49****		
	Teacher/ Youth worker	31.3	.21 (.10)						
Town context (high st, cinema, restaurant)	Alone	26.6	.38 (.11)	**.72****					**.64***
	Family	6.6	.34 (.08)						
	Friend	13.5	.43 (.14)					**-.93***	
Local Outdoors (park, field, wood, block)	Alone	44.4	.42 (.23)	**-.55***		**-.57***	**-.64****		
	Family	20	.32 (.12)	**.76***			**.74***		**.85***
	Friend	42.2	.44 (.12)						
Sport settings	Alone	11.1	.46 (.10)						
	Family	13.3	.34 (.10)			**.85***		**.85***	
	Friend	26.6	.35 (.12)						
Faraway Place	Alone	15.5	.55 (.18)						
	Family	23	.32 (.10)			**-.47***			
	Friend	17	.40 (.14)	**.69****					

**p (Bonferroni correction <0.05)
* p< 0.05 uncorrected
note a: person categories mentioned calculated as % of total number of subjects
note b: means for relative frequency scores (calculated for each subject by dividing number of person categories mentioned by total number of projects mentioned per subject = 8 per subject)

Summary: the context influenced the affective connotations of being with particular project assistants. Firstly, family assistants were associated with fun, stress and efficacy outside of the home (the natural outdoors, sport settings) but with stress in a home context. Secondly, assistant friends were associated only with positive dimensions across settings (home, educational and recreational) and results were most significant in this category. Being unassisted (alone) was associated with less fun and more stress at home and in the natural outdoors, but the reverse was found in the town context. *Overall these are interesting findings supporting the notion that the presence of company in projects is salutary, supporting well-being and positively associated with recreational settings.* Friends appear to be important to emergent and existing self-identities.

7.3.2.4 Gender differences in reported social preferences

The frequency with which girls and boys mentioned project assistants was significantly different (Mann Whitney U=9930, p=0.001). On exploration of different settings and person categories it was found that *boys significantly mentioned more than girls being with a friend in a natural setting* (Mann Whitney U=11, p=0.031[94]). Other differences were marginal and, since this is exploratory research, are flagged in Table 7.7 below. Two interesting results were that firstly, boys more frequently mentioned *teacher/support worker*s (school/youth club contexts) and, secondly, girls more frequently mentioned family (home, youth club and town contexts) reflecting a leaning towards inter-personal family projects (see Chapter 5). Girls were more likely to be *assisted by a friend* in faraway places. Boys were also more likely to mention being alone at home but this difference was *ns.*

Summary: The major significant difference (with Bonferroni applied) was in relation to the use of friends, more frequently reported by boys in the natural outdoors. Elsewhere boys more frequently mentioned being unassisted (alone); family were more frequently mentioned as project assistants in girls across a variety of settings. Youth workers were more important as project assistants in boys' project systems as compared to girls.

[94] *ns* on Bonferroni correction ($p<0.003$).

Table 7.7: Person preferences within project places by Gender					
Place	**Person Category**	*% subjects Boys = 26*	*% subjects Girls = 19*	Mean Freq (SD) *Boys*	Mean Freq (SD) *Girls*
Home (own, friends, relatives)	Alone	100	21.0	.54 (.27)	.38 (.17)
	Family	34.6	31.5	.24 (.09)*	.35 (.11)*
	Friend	7.7	16.3	.54 (.05)*	.38 (.15)*
School/Youth club	Alone	57.7	36.8	.44 (.18)	.36 (.13)
	Family	3.8	15.8	-	.34 (.08)
	Friend	65.4	84.2	.45 (.12)*	.40 (.16)*
	Teacher/ youth worker	34.6	26.3	.23 (.10)*	.17 (.09)*
Town context (high st, cinema, restaurant)	Alone	11.5	47.4	.39 (.02)	.38 (.14)
	Family	0	15.8	-	.34 (.08)
	Friend	11.5	21.0	.38 (.12)	.46 (.17)
Local Outdoors (park, field, wood, block)	Alone	38.5	52.6	.43 (.22)	.40 (.25)
	Family	11.5	31.6	.33 (.14)	.30 (.12)
	Friend	57.7	21.0	**.46 (.10)****	**.35 (.15)****
Sport settings	Alone	15.4	5.2	.45 (.11)	-
	Family	15.4	10.5	.38 (.10)	.25 (.00)
	Friend	23	31.5	.34 (.15)	.37 (.08)
Faraway Places	Alone	26.9	0	.55 (.19)	-
	Family	42.3	63	.33 (.08)	.31 (.11)
	Friend	42.3	31.5	.37 (.14)	.46 (.13)

** significant difference, Bonferroni applied
*significant without Bonferroni correction

7.4 Discussion

There was evidence to support the hypothesis that young people were more likely to choose the company of friends in potential restorative environments. This Chapter did not attempt to predict differences across settings, but found that preference for peer-company was strongest outside of the home.

When choosing environments for mood regulation, results were consistent across a series of statistical tests, showing preference for the company of friends when regulating positive mood. Being alone, however, was preferred when regulating bad mood. This confirms Thurber and Malinowski's (1999) study in boys and extends the research by replicating findings in girls. Adolescents are more likely to choose places where they can be alone when regulating bad mood, and this pattern is consistent across settings and gender. Thurber and Malinowski's (1999) study was carried out in a remote setting, far removed from everyday experience. This research has shown that similar patterns apply to everyday contexts. Research to-date has shown preference in adults for being alone when regulating bad mood (Korpela 2003); this research suggests this pattern is a shared phenomenon across the age span. On differences between settings, subjects were most likely to mention being alone at home and having company in other settings. Two interesting patterns emerged. Firstly, the natural setting appears to offer greater social equanimity: young people feel equally comfortable with being alone, or with friends or family. Secondly, the urban environment was found to offer far more potential for solitary engagement than this research anticipated, particularly amongst boys, who reported regulating negative mood alone in a town context.

Findings were supported by the projective research: friends were most frequently mentioned as project assistants in settings outside of the home. Being unassisted was associated with home projects. A strong relationship was found between well-being and having company (friends and family) in natural settings (the local outdoors, faraway places). The presence of others in these places was salutary, as anticipated by other literature (Little 1997). Company was also found to be supportive of self-identity in young people (Little 1987b). In contrast, being alone was associated with lower affect and

reduced efficacy in residential settings. This research therefore provides some evidence of a link between well-being and social integration.

This research did not predict, but found, several gender differences. Girls and boys significantly differed on social preferences across negative mood categories. Boys were more likely to choose company (youth workers, family) in this context than girls. However, girls mentioned more frequently being with family, when prolonging good mood. This was mirrored by the project research, showing that girls were more likely to choose family to assist with interpersonal projects (highly rated on well-being); boys more frequently mentioned being unassisted (alone) in every place category apart from town contexts. The reliance on family is suggestive of a developmental need in this particular age group (11-13).

An interesting result was the relationships between the frequency of visiting a place and social context. As the frequency of a particular setting increased, so did frequency of being alone (unassisted), suggesting that frequent visiting of a place is associated with ease, which in turn, may promote restoration. Another interesting finding was in relation to social preferences in different settings. In the literature, peer-company in adolescents is associated more with urban environments than natural ones, but this was not confirmed by the data. Participants were more likely to mention being with a friend in natural environments than in urban settings. Across both studies, the research shows that young people engage with urban environments alone and unassisted.

Another finding from the project research, related to restoration and sociality, is the importance of societal projects to young people, indicating a desire to integrate with society at a local and global level. Since social integration is known to enhance well-being in terms of developing identity, purpose, self-worth and positive affect (Cohen 2004), this finding is important, and suggests that environments supportive of societal projects (local outdoors and faraway places) offer health potential, via the sociality aspect. In addition, social capital has been linked with improved health within communities, although the mechanisms remain unclear (Kawachi et al 1999).

7.5 Limitations

Much of the analysis reported in this Chapter relies on correlations, indicating relationships between people, place and well-being, but providing no causal evidence of these associations. The analysis is also based on projected rather than actual findings; whether the young people in this research would behave as reported is questionable. Across the two studies, findings were replicated, but in terms of method, was one more informative than the other? The project research went further, in establishing links between people and well-being in potential restorative environments, and more successfully elicited the transactional dynamics of person-environment relations. Approaching the research question indirectly in this way helped eliminate possible bias in the sample. It was also a process in which young people readily engaged, and therefore shows great potential in this research domain.

7.6 Conclusions

The social dimension of restoration is a developing area of research: there is very little evidence with which to compare findings. This Chapter has confirmed that, firstly, social relationships are an important feature of potential restorative experiences; and that, secondly, as anticipated, the company of peers is important to young people in a variety of contexts. It has also contributed new evidence to indicate that solitary engagement with natural and built settings, outside of the home, may mediate in restorative experiences in adolescents. Other results lend weight to the notion that, for restoration, natural settings offer greater social equanimity and flexibility over other environments. A key question for future research is how feeling at ease in one's environment can help promote potential restoration.

Chapter 8, Conclusions

The main focus of the PhD was to explore the 'felt' dimension of natural environments, using restorative theory as an analytical framework. This Chapter aims to synthesise findings across health and age groups, focusing on parallels and differences in restorative experiences, and highlighting anticipated and surprising outcomes. The first section reviews empirical evidence supporting the PhD's main hypothesis, on the link between nature and restoration. The second section reviews evidence supporting two theoretical conceptualisations, postulated in respect to challenge and resilience, and discusses the emergent theme of curiosity and well-being. The third section reviews exploratory research, where outcomes were not anticipated, including the effect of social relationships on potential restoration. To simplify discussion across participant groups, walking in a natural setting or forest school activity is referred to as "activity in a natural setting" [95].

8.1 Evidence of psychological restoration

8.1.1 Discrete restoration in natural settings

This aspect of the research explored the ability of natural settings to promote short-term psychological restoration, across the age spectrum, in groups with varying states of mental health. The PhD anticipated that natural settings would be more effective at restoration than urban settings, but made no hypothesis in relation to group outcomes, with respect to either age, or to mental health state. Differences between settings and groups are discussed in Section 8.1.2 but, firstly, were natural settings restorative, as anticipated? The research showed that this was the case on some but not all variables.

Mood: the study found substantial evidence to support the link between natural settings and short-term psychological restoration, in adults and young people, with and without mental health problems. Across the spectrum, irrespective of age or health status, a series of studies found that mood (i.e. UWIST MACL and affective dimensions of personal projects), significantly improved after activity in a natural setting. This research reflects

[95] It is worth re-iterating at this point that the distinction between 'good' and 'bad' health or behaviour was simply employed a means of distinguishing between groups.

findings elsewhere on self-reported mood in healthy adults (Hartig et al 2003a, Pretty et al 2005).

Self-esteem: results were mixed and not as anticipated. Activity in a natural setting significantly improved self-esteem in healthy adults, reflecting findings by Pretty et al (2005). The same results were not found in adults with poor mental health, a result that conflicts with Peacock (2007). Nor were significant improvements found in young people of either health category. This latter result was surprising, since self-esteem is one of the most consistently monitored outcomes of adolescent well-being, in outdoor and wilderness activity programmes. However, these programmes are typically more intensive and challenging than the activity measured in this study, suggesting that time and type of activity mediate in this construct. Elsewhere, the PhD has speculated that self-esteem and challenge may share some underlying dimension, a concept discussed at more length in Section 8.4.1 of this Chapter.

Manageability of life tasks: this aspect of the research took forward one component from the Kaplans' cognitive framework (1989), which has received little attention since its original conception, i.e. the concept of reflection on life tasks. Results were again mixed: in both adult health groups this dimension significantly improved from activity in a natural setting, but results were not significant in young people. The pattern of change, however, was in the same positive direction, and the research has speculated elsewhere that the use of a shortened scale in young people may have reduced sensitivity to statistical differences and is therefore worth re-testing. This result may also indicate (as found in the personal projects component of this research) that the project system varies according to age group.

Key (and unanticipated) findings

(1) **Between health groups**: a consistent outcome across ages was the increased mental equilibrium amongst health groups that resulted from activity in a natural setting. That is, there were far less differences between groups after the natural setting experience than before. This is an interesting finding, and suggests that activity in natural settings has the potential to promote mental equilibrium amongst health groups.

(2) **Between age groups:** outcomes in adults were more consistent with restorative theory than in young people. This suggests that other factors are at play in different age groups (such as self-identity) and is elucidated further by the project research discussed in Section 8.3.2.

8.1.2 Discrete restoration in different settings

The PhD anticipated that natural settings would be more effective at producing restoration than built settings. This was found: the natural environment was significantly more effective at promoting restoration than the built (external and internal) environment across the age spectrum and between health groups.

Whilst this research did not anticipate differences between health or age groups, interesting differences were found. Firstly, across health groups: two findings suggest that restorative processes are operating differently:

(1) *The urban setting has restorative potential in poor health groups*

The urban setting permitted restoration in adults with poor mental health, although the natural setting more actively promoted it. By contrast, the urban setting was detrimental to outcomes in healthy adults, a finding consistent with restorative theory. Mixed results were found in adolescents: the built (internal) setting improved energy and stress (but not anger and hedonic tone), in young people with behavioural problems, suggesting that they are more volatile in their response than adults. Outcomes in the young people without behavioural issues were consistent with restorative theory, i.e. the built setting was not advantageous.

2 *Restorative experiences in the natural setting were more intense in poor health groups.* Change data (pre- to post-activity) consistently matured at a faster rate in the poor health groups. In the larger sample of walkers (n=123), initial states were different between group, for example, stress levels were higher in the poor health group (see Fig 2.18, Chapter 2), and this might therefore explain the difference. The poor health group moved more on outcome measures than the good health group. The results support recent findings that higher anxiety and worry leads to more intense "restorative" experiences (Korpela et al 2008, Ottosson 2007).

In terms of developing recreational policy for people with poor mental health, these are potentially important findings. Owing to small participant numbers in the current studies, further research is warranted. If people with mental illness could be persuaded and supported to walk locally, there could be cumulative restorative benefits. Walking locally also has economic policy implications, reducing facilitator input and the need for transportation. It should be stressed that the urban settings in this research were reasonably high on hard fascination (interest), and included elements of soft landscape (street trees). At the same time, the natural setting had greater restorative potential in this population, suggesting a balanced approach be taken in developing recreational policy, with provision to walk in both attractive rural and urban settings.

Secondly, differences in response to the built environment were found between age groups. External built settings promoted positive outcomes in adults. By contrast, internal built settings (school) had a detrimental effect on mood (anger and hedonic tone) on a very significant scale in young people. Is this comparison between built (external and interval) viable? Possibly not (given one was an institutional setting), but the notion of equanimity between built settings is supported by findings in the healthy groups, in which outcomes were consistent across the age span. The built environment (internal and external settings) consistently depressed mood in healthy groups of varying age.

Thirdly, differences in gender were found on stress outcomes. Stress relief in the natural setting was more effective in women with poor mental health. This difference was not anticipated, but has interesting implications, since stress is linked with depression, and

depression is known to be more of a problem in women (Donaghy 2007). It is also known that women with depression are more sensitive to environmental factors such as seasonal climate change (Hartig et al 2007).

Fourthly, differences in groups with poor mental health were found: the urban setting was detrimental to outcomes in psychotic males, supporting findings by Ellett et al (2008), but this evidence should be viewed with caution owing to small participant numbers.

8.1.3 Evidence of reduced anger in natural settings

This variable was explored only in young people and is therefore considered separately in this section. It was anticipated that the natural setting would reduce anger in young people (in line with the hypothesis on mood) and this was consistently found across two studies. A surprise finding of concern was the extent to which mainstream school aggravated anger in young people with behaviour problems, an outcome not anticipated. Activity in natural settings reversed this trend, and since reduced anger is associated with improved behaviour (see Chapter 3) this is a promising outcome warranting future research (see Section 8.5).

Table 8.1: Significant (p<0.05) evidence of discrete restoration in natural settings

Outcome	Age	PMH	GMH
Mood	**Adults**	√	√
	YP	√	√
Self-esteem	**Adults**	**x**	√
	YP	**x**	**x**
Manageability of life tasks	**Adults**	√	√
	YP	**x**	**x**

Table 8.2: Significant (p<0.05) evidence of discrete restoration in built (internal/external) settings

Outcome	Age	PMH	GMH
Mood	**Adults**	√	x
	YP	**mixed**	**x**
Self-esteem	**Adults**	**x**	**x**
	YP	**x**	**x**
Manageability of life tasks	**Adults**	√	**x**
	YP	**x**	**x**

MH = mental health, YP = young people

8.2 Evidence of instoration from natural settings

This aspect of the research explored the longer-term benefits of repeated exposure to natural settings in adults and young people with mental health problems. This research was exploratory since there was little research evidence on which to base a hypothesis. The quantitative component of the research supports the notion that natural settings can promote repeated restoration; advantageous outcomes in natural settings were consistently found when measured on two consecutive occasions in adults with poor mental health and across both health groups in young people.

The qualitative research (carried out in poor health groups only) provides support for a link between instoration (the building of internal resources) and natural settings. In both young people and adults the data suggests long-term exposure to natural settings increased behaviour options in terms of exploration and social interaction and, in young people with trauma, helped build creativity and expand thinking in terms of recall. These outcomes were not anticipated by the research but theoretically they are linked with positive affect (Fredrickson 2004) (see Chapter 1, Section 1.2.2).

Firstly, on exploration: in boys with trauma findings (mapped over time) showed evidence of increased exploratory activity in forest settings in some individuals. This exploratory behaviour pattern is echoed in research with adults who frequently reported walking helped mobilise and increase motivation ("get up and go") and expressed a preference for exploring further a field from home as opposed to the local, known environment.

Secondly, on socialization: many individuals in this research were socially marginalised by their health state. Boys with trauma had been physically removed to a remote (and secure) residential setting; adults with depression reported enforced isolation, stigmatisation and a physical incapacity to get out of the home. Across both groups there was evidence that group activity in natural settings can promote re-socialization. Long-term exposure to forest settings improved social integration in boys with behavioural problems (also mapped over time); in adults with mental health problems the social benefits of walking possibly outweighed any other, "*the chemistry is the magic of the people*".

Thirdly, in boys with trauma the ability to think more flexibly, use resources creatively, and expand mindset (by recalling past events) were observed outcomes in the forest setting. Whilst forest activity is contributing towards the process of recovery from trauma, the presence of other factors/strategies being applied at the same time means associations can only be speculative. Similarly, in adults with depression, other factors are present in the recovery process, but many perceive their recovery as being attributable to the synergistic benefits of walking, combined with medication. Across both groups, activity in natural settings promotes a form of 'accidental' therapy, allowing therapeutic processes to occur naturally, without professional intervention. This happens by chance in the flux and flow of engaging with the outdoor environment and also with other individuals; as in the case of the boy working out his anger on the bracken (Chapter 4), or in the natural motions of walking where an adult finds they can either chat more openly to a peer or else retreat (Chapter 1). A natural part of this process is the reformed relationships between professionals and the "cared for" that occur outside of an institutional setting. Hierarchical relationships relax, opening opportunities for more natural, open conversations and recall. This change was particularly noticeable in boys with trauma, where adult-child relationships have broken down.

In summary, evidence of instoration was found across the age spectrum in adults and young people with mental health problems. Activity in natural settings promoted increased capacity for: (1) trust and recollection; (2) exploratory behaviour; and (3) social cohesion. Synthesis of these findings with quantitative evidence support Fredrickson's (2004) hypothesis that positive affect can expand individuals' options for activity.

The instorative outcomes of activity in natural settings might therefore be termed 'therapeutic', but, elsewhere this research has cautioned on labelling this 'eco-therapy', for fear of deterring adults sceptical of traditional health paths, and of medicalising a natural process. The success of activity in natural settings is partly attributable to offering a 'normal' set of experiences, denied to participants in the past, through either circumstance or mental incapacity. This process synergistically aids recovery but it cannot be singularly attributed to the setting.

8.3 Evidence of person-environment fit

8.3.1 Niche environments supportive of mood regulation

This aspect of the research was explored in young people only. Findings were consistent with research on negative mood regulation, confirming that residential and natural settings are important regulators of bad mood in young people. Results, read in conjunction with the literature, suggest that this is a shared phenomenon across the age span, although adults have shown a greater preference for natural settings when regulating bad mood (Korpela and Ylén 2007). Based on Korpela's (1992) findings in young people, it was anticipated that home would be the preferred environment for regulating negative mood, and this was confirmed by the research. A surprising finding, however, was that natural settings were mentioned almost twice as frequently for regulating bad mood, compared with the 1992 study (29% compared with 15%).

Owing to the lack of empirical evidence, no hypothesis was formed in relation to setting preferences for good mood retention, although the literature on adolescent preferences (see Chapter 5) suggested that the urban built environment would feature quite highly. This was confirmed; the built outdoors (town contexts and sport settings) were important in facilitating good mood retention in young people, particularly in relation to exhilaration and celebration (especially shopping and eating in restaurants and cafés). However, natural environments were mentioned significantly more frequently in relation to positive mood retention than other settings (external-built or internal). In particular, natural settings offered greater reported opportunities over other settings for facilitating trust, mirroring research elsewhere in the PhD. Interestingly, the outdoor environments in combination (built and natural) had more statistical effect when compared with internal settings, than the natural setting in isolation. The role of the outdoors as a mood regulator in young people was therefore strongest when both the natural and built external context were considered.

Qualitative evidence shows that privacy, warmth, comfort and security are important physical attributes of restorative space in teenagers, consistent with Korpela (1992). Young people expressed remarkable ingenuity in adapting outdoor environments to meet their needs – shelters, tree houses, dens – offering the domestic equivalent of residential

bedrooms, personalised with flowers, "tribal" decorations etc., and offering comfortable environments in which to retreat, to eat, reflect and socialise, a finding also reflected in the ethnographic research in boys with trauma. These are 'niche environments', meeting individual developmental needs and facilitating person-environment fit, a concept explored further via young people's project systems.

8.3.2 Niche environments supportive of personal goals

This aspect of the research was developed in young people only. Adolescent-environment fit was conceptualised as '*supportiveness of the environment in connection with age-related developmental needs*', and it was anticipated that environments supporting these needs (urban "hang out" places and wild-adventure space) would therefore feature strongly within young people's project systems. This was partly found: the natural outdoors emerged as a niche environment supporting new experiences and societal projects. However, the built outdoors did not emerge as a niche environment for any particular project category. The two project categories associated with the natural outdoors (societal/new experiences) are consistently linked with well-being in the literature, and support specific developmental needs in young people for autonomy, social integration, novelty and self-identity. Indirectly, a link between the project place and well-being can also be made, but does a supportive project setting necessarily constitute a restorative setting? Based upon the restorative concept of '*compatibility*' (Kaplan and Kaplan 1989), a supportive setting matches an individual's inclinations and therefore offers the potential for restoration. It could also be argued that both these settings offer scope for '*being away*' (temporary escape) and '*extent*' (a sense of connectedness/being part of a larger whole), two other dimensions in the Kaplan restorative matrix.

8.4 Evidence to support theoretical hypothesis

8.4.1 The challenge hypothesis

The thesis posited the notion that challenge in an environmental context could feedback into everyday life tasks and reduce the perceived challenge of those tasks, a dimension explored via the project system (visualised in Fig 1.5, Chapter 1). No prediction was made as to differences between health groups. There is evidence to support the hypothesis in

healthy adults, but results in people with mental health problems are more ambiguous. Results also suggest challenge shares relationships with other well-being indicators not anticipated by the research and that this varies between health groups.

Firstly, on the hypothesis given above, statistical analysis (correlations and Latent Gold analysis) indicates that the relationship between the two challenge dimensions was as predicted in healthy adults only. Post-walk, this group reported being challenged by the outdoor activity and felt significantly less challenged by everyday projects in daily settings. This relationship was statistically significant: the pattern was reversed in adults with poor mental health (i.e. they were not challenged by the outdoor activity but felt significantly more challenged by the prospect of everyday projects after the experience). Latent Gold analysis showed that the 'challenge' project indicator significantly discriminated between the two health groups, with increased challenge in life tasks clustering with poor mental health. Since the walks were of similar duration and physical exertion, this suggests that the challenge dimension is operating differently between health groups. Data reduction suggests that challenge may share some underlying relationship with self-esteem in the poor health group but not in the good health group. This was a surprising finding also supported by regression analyses, showing challenge and pre-walk self-esteem to be significant predictors of differences between groups.

Based on these findings, the research speculates that challenge may feedback into inadequacies of self-esteem in poor health groups. Contextual factors may also account for results, i.e. the context of the walk is so unusual that it bears no relevance to the everyday context of people with mental illness, and cannot therefore promote positive feedback. A stronger fear of failure in people with mental illness may also account for the differences, i.e. the additional challenge of daily tasks post-walk is because they fear failure (further feedback for them on inadequacy and self-esteem). Alternatively, we could speculate that being more challenged after the experience is a positive outcome, in the poor mental health group, drawing on the positive conceptualisation of challenge as something that can help build personal resources (see Section 1.2.2, Chapter 1). Mental health patients report being disconnected from reality and sometimes lack insight into the challenges of life. Exposure to the walk and then feeling challenged may have awakened them to the challenge of everyday life, i.e. it is part of the process of re-connecting with reality.

Elsewhere in the research there is some evidence to suggest challenge and self-identity share a relationship in young people. This was not anticipated and was contrary to the project literature. Within young people's project systems, stress was significantly associated with development of 'non-typical' self and with projects offering risk and new experiences. In this context, therefore, stress could be construed as a positive dimension nurturing new identity. However, stress was also discernable in routine projects associated with the home (interpersonal and education projects) but had no statistical relationship with identity. Exploring these relationships further requires a simple modification to the research design. In the quantitative research in young people, the challenge dimension was dropped in favour of a self-identity indicator, and whilst the rationale was sound for this (self-identity emerged as a key dimension in the data), it was unfortunate that the relationship between challenge and self-identity could not be developed.

The subject of stress and challenge is a sensitive one in mental health contexts; the PhD is wary of advocating challenge as a rehabilitation strategy, simply speculating that certain kinds of challenge in supervised contexts may be helpful, i.e new experiences away from the routine environments.

8.4.2 The "broaden and build" hypothesis

Theoretically, the concept of resilience was explored using Fredrickson's (2004) "broaden and build" hypothesis. This hypothesis links positive affect with expanded mindset (as measured by the cognitive project indicators) which, in turn, increases coping resources. Although a direct link between mindset and mood could not be established, correlations and data reduction across the research studies consistently showed a positive relationship between these dimensions, lending support to the hypothesis that they are related phenomena.

An interesting finding was that the relationship appears to be stronger in people with poor mental health. For example, the data on adult walkers showed efficacy and hedonic tone were significant discriminators between the two mental health groups in a two-cluster model. Firstly, improved hedonic tone clustered with increased efficacy in the poor mental health group. Secondly, less positive outcomes in these two variables clustered with the

healthy group. This relationship is supported by a highly significant correlation (positive) between efficacy and hedonic tone ($p<0.01$) and the factoring of efficacy and enjoyment indicators in the poor mental health group only. These associations were not significant in the healthy group. This suggests a stronger relationship between affect and manageability of day-to-day tasks in people with mental health problems. This is an interesting finding in the light of data elsewhere, indicating that restorative experiences are potentially more intense in this health group and, in turn, posits speculation that raising mood via walking in natural settings could potentially have a greater effect on coping resources in this group than in healthy adults.

8.4.3 Curiosity and well-being

Fredrickson (2004) has speculated that curiosity and increased exploratory behaviour are an outcome of positive affect, and whilst this research can prove no direct link, there is evidence of associations between these two dimensions. The support is strongest in the project research, where untypical, surprising project categories significantly correlated with well-being indicators (enjoyment and manageability). Elsewhere in the research, curiosity consistently emerged as a key affective response to the landscape. Whilst the link with well-being cannot be proven in the PhD, the relationship is identified elsewhere as an important but neglected process in the pursuit of well-being (Kashdan and Steger 2007), and of particular importance to well-being in young people (NEF 2004). Curiosity is distinct from fascination, the effortless and involuntary response to natural settings known to promote restoration (Kaplan and Kaplan 1989), and is classified as a distinct emotion category (Kashdan and Steger 2007), promoting purposeful, exploratory behaviour. Exploratory emotions (curiosity, surprise, wonder) have been linked with anticipatory coping (Lazarus et al 1980); personal growth (Kashdan and Steger 2007); openness to new ideas (Fredrickson 1998); skill and knowledge acquisition (Izard 1993); and with absorption and ‘flow’ (Csikszentmihályi 1990). Given this evidence, it would therefore be interesting to explore the relationship between challenge, resilience and curiosity in natural settings, by integrating outcome measures of these dimensions in future research.

Exploration emerged as a significant theme in the research with young people. Firstly, increased exploratory behaviour was one outcome of continued exposure to natural settings

in boys with trauma. Secondly, exploration featured highly in adolescent goal systems reflected in the desire for new experiences, contextually placed in natural settings, offering novelty and adventure. An interesting gender difference emerged in this context: girls showed evidence of greater exploratory behaviour, selecting significantly more settings compared with boys, to regulate mood, especially bad mood. The qualitative component of this research suggests that boys' novelty needs are partly being met by computer games played at home. But this does not mean that the natural setting is without novelty for boys. Consistently across genders the natural landscape was associated with projects that are fun and novel, rather than with projects of great meaning (importance). Curiosity is a dimension known to fall away in younger people at secondary school (NEF 2004). Natural settings may therefore offer scope to retain and promote this quality.

In adults, the whimsical dimension of natural settings is reflected in the number of unexpected, misplaced objects captured on camera by adult walkers, prompting humour and enquiry as to '*what is that doing there?'*. Curiosity also emerged as a strong theme from semi-structured interviews and the desire to seek out new places to walk. In order to further explore relationships between this dimension and well-being (and challenge), it is recommended that future research integrates an outcome measure of curiosity.

8.5 Exploratory research

The research developed some innovative methods in an attempt to further elicit the affective dimensions of environment:

8.5.1 The personal project system: no particular hypothesis was developed, although it was anticipated that places supporting successful (enjoyable, well managed etc.) projects in young people would be associated with positive affect. This was confirmed; projects facilitating well-being in young people (new experiences and societal projects) were contextually placed in the natural outdoors and were associated with higher enjoyment, greater support, increased self-identity ('non-typical self') and reduced stress, but less meaning (importance). The first four indicators all correlate in the project literature with well-being. Conversely, internal settings were associated with education, intrapersonal and interpersonal projects, which were associated in this research with reduced enjoyment and

higher stress, but more meaning (importance). The association of positive affect with the natural outdoors was consistent across a series of statistical tests. Regression analysis, for example, showed that affect was a significant discriminator between settings (internal, external-built and external-natural), while Latent Gold analysis showed that affect significantly discriminated between settings, with positive affect clustering with natural environments.

8.5.2 Mapping of affective responses to setting: the spatial mapping of affective responses (using the circumplex model of emotion and physical site context) indicated patterns of changed behaviour over time and a positive shift in affective responses to context. This research also illustrated the complexity of environmental affect, as in the case of the anger and the boy beating the bracken (Chapter 4, Section 4.3.2.2).

8.5.3 Participatory visual methods: this research aimed to complement quantitative research and give participants a participatory voice in the research process. Two main themes emerged. Firstly, the photographic camera exercise in adults with mental health problems showed that curiosity was a key affective response to the landscape; the quizzing by participants of odd, misplaced objects suggesting fascination with the whimsical, mirroring findings from the personal project research. Secondly, the participatory video exercise in young people (YP) in mainstream school showed a preoccupation with the social context of the natural setting, and flagged concerns about mixing groups with and without behaviour problems. In the residential school context, the resulting DVD provides further evidence of the affective themes within the PhD and illustrates the complexity and individuality of these experiences. As a method, participatory visual research has much to offer:

(1) It opened a door for communication in withdrawn young people who took on a distinctly more communicative and outgoing persona behind the camera. It therefore gave shy individuals a voice and fostered inclusion in a way other research cannot.
(2) It gave the research a dialogic voice and offered the YP and adults with mental health problems some control in shaping issues of importance to them. Everyone had equal access and the process particularly empowered YP with behaviour problems.

(3) It's an attractive technological tool which really engaged the participants. The video tool was a very immediate medium – owing to the playback facility – and YP could respond to what they'd created immediately.

On the minus side, the video medium generated hours of unusable footage and it took a very long time to edit the short films supporting this thesis.

8.5.4 The impact of social context on restorative experiences

Repeatedly, the data suggests that social context mediates in the restorative experience, potentially constraining restoration in some cases and aiding the process elsewhere. This was most evident in the research in Chapter 3 (mainstream school) where young people with and without behavioural problems were mixed in the natural setting. The video data showed that being with disruptive peers affected the mood and comfort of those without behaviour problems. This is reflected in measurements of hedonic tone in this group in the natural setting (see Fig 4.3, Chapter 3). Whilst outcomes elsewhere in this group were consistent with restorative theory, the data does generate speculation as to whether more intense restoration might have been achieved had this group not been mixed with disruptive peers. This data is not conclusive and requires longitudinal research to clarify whether being with disruptive peers is constraining restoration.

In adults with mental health problems, the social context appears to support restoration. Participants were emphatic in expressing preferences for walking with people with similar mental health problems as opposed to walking with healthy groups. Qualitative data suggests that the peer dynamic is having a large impact on restorative outcomes but this requires further research and measurement of green activity undertaken alone versus a group context. Contradictions in data (i.e. positive mood outcomes in settings mental health patients emphatically dislike) suggest personal preferences do not necessarily dictate outcomes. Elsewhere in the research, a mixed walking group (i.e. adults with and without mental health problems) did not constrain restoration in the poor health group[96]. This

[96] Interestingly, this group was originally conceived for patients with mental health problems but the popularity and local presence of the group grew to such an extent, that healthy adults expressed a desire to

suggests future research explores single and mixed group dynamics further to clarify outcomes.

Elsewhere, the research showed the company of family and friends is important to young people when seeking out restorative settings to regulate mood. Across a series of statistical tests, company was associated with the natural outdoors and positive affect. Being alone was consistently associated with negative mood regulation and being at home. Findings on negative mood regulation reflect Thurber and Malinowski (1999), indicating adolescents choose places to be alone when regulating bad mood. The results, in conjunction with the literature, suggest that this is a shared phenomenon across the age span; Korpela (2003) also found that adults prefer to be alone when regulating negative mood. What is not known is whether adults would similarly choose company in natural settings to prolong good mood.

8.6 Implications for Policy

8.6.1 Adults with mental health problems: Since GPs are increasingly turning towards exercise as an intervention in the treatment of depression (MHF 2008) can this research point to one setting over another in that process? Activity in natural settings promoted more intense restoration in adults with mental health problems and, in conjunction with empirical evidence elsewhere, suggests policy focuses in this direction. Urban settings were also shown to facilitate restoration, and whilst this finding potentially offers practical and economic advantages, further evidence is required. The exception to this was in male psychotics where the research indicated that walking in urban settings was disadvantageous to mood.

The research indicates that adults with poor mental health do not feel sufficiently challenged by activity in natural settings and speculates this may also be the case in young people with behaviour problems, but the evidence is much less conclusive. Is there a tendency, therefore, to cosset and treat mental health patients with excessive caution, when directing physical activity in the natural outdoors? Individual requirements vary, and

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join. Mental health patients are possibly more comfortable with this process of integration than joining "healthy" groups were they are a minority.

walk programmers tend to structure walking activity around those with the least physical capability. This research strongly suggests that a greater range of experiential challenges are needed out-of-doors.

8.6.2 Adults with good mental health: walking in urban settings did not promote restoration in this health group and the research suggests that recreational policy focuses on improving access and opportunities for activity in natural settings which do promote restoration.

8.6.3 Young people with behaviour problems*:* forest settings were shown to reverse the detrimental effect school settings have on anger in young people with behaviour problems. This research has consistently shown, in groups with moderate-to-severe behaviour problems, that forest experiences can produce restorative outcomes, but it makes no link between this and improved behaviour. Elsewhere, research points to relationships between reduced anger, better behaviour and improved health (see Chapter 3, Section 3.1.3) but further longitudinal research is required. Whilst forest school shows promise as a strategy for reducing anger in disruptive adolescents, forest personnel require support and training in order to develop the strategy within mainstream secondary schools in Scotland, owing to the perceived difficulties of managing pupils in this context.

8.6.4 Young people with good mental health: Societal projects and new experiences are two project categories that support well-being in young people and can potentially promote engagement with the natural outdoors. Policy therefore needs to address how best to support young people in these goals, and exploit the potential to build social capital, a dimension associated with improved health. Whilst the personal project research indicates that young people from all walks of life are flourishing, some of these young people, especially from the most deprived backgrounds, will not fulfil their goals (and potential) without external support. Interestingly, societal goals were most avidly expressed amongst the poorest communities, a thought-provoking finding.

8.7 Implications for future research

This research has explored many aspects of restoration but identifies the following areas as priorities for future research:

8.7.1 Evidence of direct mental health benefits: this research attempted to integrate simple outcome measures of direct mental health benefits, but this was only partially successful. It is therefore crucial to consider the type of method likely to succeed in this context, and the sensitivity that facilitators may have in response to it (in terms of extra demands on time, for example). As a priority for future research, the following is suggested:

8.7.1.1 **In adults with mental health problems**: longitudinal research is recommended with randomised trials of participants with specific conditions, comparing repeated exposure to natural settings *versus* no environmental intervention. Outcome measures might be medication rates, hospital re-admissions, frequencies of GP visits. Short-term indicators could include sleep patterns on the day of the intervention or the ability to complete a previously difficult or unachievable task.

8.7.1.2 **In young people with behavioural problems**: longitudinal research is required, to explore the repeated effect of activity in natural settings, on behaviour outcomes and school attendance.

8.7.2 Evidence of indirect mental health benefits

8.7.2.1 **Setting:** further research on differences between health groups is required, particularly in relation to the urban setting and on gender differences and specific mental illnesses. Ideally, this research would include a control group (going into neither setting) and randomised selection of participants.

8.7.2.2 **The social impact of green activity**: this research has suggested that being part of group may constrain or assist restoration. An obvious next stage is to explore the same outcomes and settings across health groups in the context of being alone versus being in a group.

8.7.2.3 **Additional indicators of well-being**: it is recommended that further research includes measures of challenge and curiosity to allow theoretical speculation on the relationship of these dimensions with well-being to be tested empirically.

8.7.2.4 **Mood regulation:** the research on mood regulation in young people should be repeated in adults and between health groups to highlight differences. There is a

particular need to progress research on good mood retention and its effect on mental well-being.

The singular challenge in taking this research forward is in sourcing and engaging sufficient numbers of participants with specific mental health problems to generate a larger evidence base and facilitate randomised trials. Similar research to date has worked on equally small participant numbers (Peacock et al 2007, Ellett et al 2008) suggesting that the evidence base will grow slowly over time.

8.8 Limitations

Owing to confounding variables, the major challenge in this research field is in proving a direct link between landscape and health. The subject of 'real life' versus laboratory research has been debated in the field for some time. This research opted for a quasi-experimental approach with greater ecological validity over internal validity and control, based on the premise that, if links between landscape and mental health are to be established, there is a need to explore the phenomena in people with real-life mental health problems in their everyday contexts. People's needs for restoration vary but, to date, much of the work has been carried out on student populations. By contrast, this research explored outcomes in marginalised sections of the population. However, this did present a number of practical problems including lengthy ethical procedures, small participant numbers necessitating non-equivalent group design, lack of available control groups, messy data, plus a whole host of confounding variables, including climatic conditions and group dynamics. Attempts were made to control for some of these confounding variables by maintaining similar group configurations across experiences of setting and by measuring outcomes in consecutive weeks to minimise other external influences. The repeat measurement of variables across age and health groups, and the replication of findings, also contributed greatly towards building an evidence base. Research with small participant numbers arguably needs large statistical effect sizes to contribute to the evidential research base. The contribution of the PhD in this respect is best judged by other professionals but the research has shown some large statistical effects of setting on mood, most noticeable in the research with young people with behaviour problems.

This PhD has taken an expansive approach in exploring psychological responses to natural landscapes. Was the breadth and scope of the research too wide? The approach taken was justified on two premises. Firstly, capturing 'feeling' is a complex process, potentially coming from many different directions, internal and external. Whilst the external stimuli can be detected from participant reactions (verbal and physical), the internal construal of a situation and sub-conscious element is much harder to reach, justifying an exploratory and expansive approach across ages and health groups. Secondly, the approach is supported by the rationale for mixed methods research (see Chapter 1, Section 1.5.1). Another possible criticism of the research is the reliance on self-reported health and the focus on indirect health benefits, rather than direct physiological health benefits (blood pressure, cortisol, etc). Self-reporting of perceived health benefits is an accepted method in the field and people's perception of their mental health state is arguably as important as the physiological. A mixed method approach also helped to build a more substantive evidential base that supported and helped illuminate quantitative findings, for example, on the social dynamics of the context.

Were the samples biased? This is always a problem where participants are self-selected. Bias was more likely in the healthy adult groups, whose cognitive awareness of the research was arguably greater than in other health and age groups. The consistency of findings within and across the five main studies of the PhD, combined with data triangulation across methods (described elsewhere), helped minimise this problem. In addition, personal project methods were used with young people, to elicit relationships between landscape and affect that may not have arisen as a result of direct questioning. In this way the research was able to illuminate underlying thought processes that were perhaps not immediately obvious to participants.

Hartig (2007) has highlighted the need to select appropriate outcome measures, and measurement periods, based upon study participants' specific needs for restoration. Since coping and the concept of resilience are integral concepts within mental health care, the research integrated measures of manageability of life tasks to address this. However, was the application of similar measures across ages and health groups appropriate? This facilitated replication of findings but, arguably, the restorative needs of a boy with behavioural problems are different from someone with depression. This was partly

addressed by the inclusion of anger as a mood measure in young people, and in the adjustment of the project well-being indicators, but was the choice of a personal project scale appropriate? Two factors suggest this was justified: firstly, resilience is as big a driver of mental health policy in young people as it is in adults; secondly, the project research in Chapter 5 demonstrates the adolescent personal project system is a useful construct by which to gauge person-environment transactions.

8.9 Developing New Ground

The PhD has made a contribution across three levels of research.

Firstly, it has contributed to the existing empirical evidence base linking natural settings with discrete restoration. It has shown that people with variable mental health differ in their potential for restoration, both in the intensity of the experience and in response to the places in which this process occurs. It has also developed the evidence base for research on the social context of restoration, and shown that built environments are potentially restorative amongst certain health groups.

Secondly, this research has taken forward several theoretical concepts that have to date received little empirical attention:

(1) The concept of environmental affect, explored within the framework of core affect and the circumplex model of emotion (Russell 1988).
(2) The cognitive concept of reflection (Kaplan and Kaplan 1989) explored via personal projects with evidence of a link between activity in natural settings and improved manageability of life tasks.
(3) The concept of restorative environments as *supportive* environments for mood regulation and person-identity fit. This research has extended existing research by showing (1) natural settings support the continuum of good mood (as well as negation of bad mood) and (2) natural settings support age specific needs in young people for new experiences and community cohesion, two dimensions linked with well-being.

Thirdly, the PhD has contributed towards developing methodologies for exploring the affective dimension of environment:

(1) Building on Russell's methods (1988, 2003) it has developed an analytical framework for recording and mapping affective responses to setting,
(2) It has developed personal project methods to illuminate the psychological dimensions underlying the relationships between place, people and well-being. This enabled these relationships to be explored quantitatively and qualitatively and economically in terms of time and cost. It offers much potential as a method for exploring the transactional components of person-environment relationships and engaging participants in the research process.

Finally, this research has shown that mixed methods research can work across a range of ages and mental health states, and has successfully integrated visual participatory methods, to give marginalised groups a research voice.

8.10 Summary

The thesis has shown that the natural outdoors has an important role to play in promoting mental health and well-being in adults and young people, potentially increasing the odds for successful coping and management of life tasks. The research has shown that activity in natural settings can bring about mental equanimity across individuals with variable mental health. The research has also shown that people differ in their potential for restoration, both in terms of the intensity of the experience, and in the places restoration can occur. The ability of the built outdoors to promote restoration in adults with mental health problems is an important finding, with potential economic and social impact. Future studies should continue to explore restoration, in built as well as natural environments, and aim to develop definitions of restoration based upon specific age and health needs.

APPENDICES

Appendix 2.1: Walkers' Post Walk questionnaire (pre walk questionnaire was similar with exclusion of Part 4).

OPENspace Research Centre, Heriot Watt University & Edinburgh College of Art

After Walk Questionnaire

Name _____ Date_____

PART 1: tick the response which best describes your feelings **right now**.

UWIST MACL Shortened version[97]	**Definitely**	**Slightly**	**Not Much**	**Definitely Not**
Active (EA)				
Contented (HT)				
Edgy (TA)				
Energetic (EA)				
Happy (HT)				
Nervous (TA)				
Calm (TA)				
Sluggish (EA)				
Sad (HT)				
Relaxed (TA)				
Sorry/Regretful (HT)				
Passive (EA)				

Part 2: Tick the box that best describes how you feel about yourself **right now.**

Rosenberg Self Esteem Scale, shortened version	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
At times, I think I am not much good				
I have a number of good qualities				
I am able to do things as well as most people				
I feel useless at times				
I am a person of worth, on an equal plane with others				
I feel a bit of a failure sometimes				

[97] The shortened scale employs four dimensions from three mood domains: Energetic Arousal (EA), Hedonic Tone (HT) and Tense Arousal (TA) (Stress).

Part 3:
Using the same two projects you generated in the first questionnaire (before the walk) answer the following questions by ticking the box below that best describes how you feel about each project.

PROJECT 1 **Name:**	**Definitely**	**Slightly**	**Not much**	**Definitely Not**
Do you think it will be fun to do?				
Are you the one driving it along?				
Do you think you'll get stressed out doing it?				
Do you think you'll be able to do it well?				
Will it be challenging to do?				

PROJECT 2 **Name:**	**Definitely**	**Slightly**	**Not much**	**Definitely Not**
Do you think it will be fun to do?				
Are you the one driving it along?				
Do you think you'll get stressed out doing it?				
Do you think you'll be able to do it well?				
Will it be challenging to do?				

Part 4
Please take a moment to tell us what was special about your walk today?

Did you find it challenging? Yes/No
If Yes, what was challenging?

THANK YOU
Jenny Roe, OPENspace, Heriot Watt University/Edinburgh College of Art

Appendix 2.2

Information Sheet

June 2007/Version 2

Effects of walking in natural landscapes on psychological well being

We would like to invite you to participate in a PhD research study exploring the effects of walking in the countryside on psychological well being.

What is the aim of the project?
The purpose of this study is to identify the psychological effects of walking in green open space using (*insert name of weekly walking group*) over a 6 week period and to explore more generally people's experience of natural landscapes.

Why is the project important?
This research aims to increase understanding and promote awareness of the health benefits of being out-of-doors in natural landscapes.

If I choose to participate, what will I have to do?

1. Complete a simple well being questionnaire before and after at least two of the walks. This will only take a few minutes of your time.

2. The questionnaire incorporates a section on your current personal projects/tasks and asks you to record how you feel about them. We hope this aspect of the research will be personally informative.

The Researcher would like to walk with the group each week and ask a few simple questions during the walk. We would like to record what is said, if possible, as a reminder of the dialogue but would keep everything anonymous as detailed below. All audio tapes will be destroyed after transcription.

An additional activity you might like to participate in is photographically recording features that you like, dislike or of general interest to you during a walk.

Before we start, we would ask you to complete and sign the consent form.

How will the information that is collected be used?

All the information provided will be kept entirely confidential. The collected information will be evaluated and used for publication and to make recommendations to the Forestry Commission on recreational policy but your name will not be used in any reports. We would be happy to present our findings to you once the information has been evaluated.

Please contact the Researcher if you have any queries:
Jenny Roe, OPENspace, Edinburgh College of Art/Heriot Watt University,
Lauriston Place, Edinburgh EH3 9DF, Tel: 0131 221 6192, M: 0794 1798171

Appendix 2.3

CONSENT FORM

Title of Project: The Psychological Benefits of Walking in the Countryside

Name of Researcher: Jenny Roe

1. I confirm that I have read and understand the information sheet dated June 2007 (version 2) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
3. I am happy to be interviewed by the Researcher and for the interview to be recorded.
4. I understand that at no time will my identity be disclosed or in any subsequent professional publications of the results of this study.
5. I agree to take part in the above study.

_____	_____
Name of Participant	Date and Signature
_____	_____
Researcher	Date and Signature

Appendix 2.4 Spectrum of affective responses to natural settings in adults with mental health problems

Positive and negative emotion associated with a walk, n=24, NVivo 7 analysis, in the poor mental health group, n =24.
Bracketed figure refers to total number of references in each primary emotion category.

Primary Emotion	**Spectrum**	**Sources**	**References**
Dislike (3)	Boredom/ Annoyance	3	3
Fear (11)	Apprehension	7	11
Trust (44)	Affection:		
	-Camaraderie	13	19
	-Support	9	14
	-Revelation	7	8
	-Respect/Courtesy	3	3
Joy (82)			
	-Zest	6	7
	-Triumph	18	37
	-Freedom	12	23
	-Awareness	4	8
	Serenity		
	-Calm	8	12
	-Comfort	3	4
Anticipation (28)	Curiosity	12	16
	Contemplation	6	7
	Vigilance	2	5

Appendix 3.1: young people's questionnaire

OPENspace Research Centre,
Heriot Watt University & Edinburgh College of Art
Mood and Feelings Questionnaire – Pre Experience

Part 1: how are you feeling today? Tick the box which best describes how you feel **right now**.

UWIST MACL Shortened scale[98]	**Definitely**	**Slightly**	**Not Much**	**Definitely Not**
Lively (EA)				
Happy (HT)				
Anxious (TA)				
Excited (EA)				
Frustrated (A)				
Content (HT)				
Fidgety (TA)				
Tired (EA)				
Angry (A)				
Fed up (HT)				
Calm (TA)				
Bored (EA)				
Upset (HT)				
Relaxed (TA)				

[98] 4 adjectives from three mood domains: Energetic Arousal (EA), Hedonic Tone (HT) and Tense Arousal (TA) (Stress), plus two from Anger (A)

Part 2: How are you feeling about yourself today?
Tick the box that best describes how you feel about yourself **right now.**

Rosenberg Self-Esteem Scale (shortened scale)	**Definitely Agree**	**Agree**	**Disagree**	**Strongly disagree**
At times, I think I am not much good				
I have a number of good qualities				
I am able to do things as well as most people				
I feel useless sometimes				

Part 3: Now can you to think of a few little projects you hope to be doing over the next few weeks? It might be an activity you like to do, like football or basket ball, a part-time job you do, or maybe working on getting along with someone a bit better.

Can you pick out one project that's really important to you?

What is it? _____

Now, can you answer a few questions about it by ticking the box below that best describes how you feel about it?

PROJECT 1	**Definitely**	**Slightly**	**Not much**	**Definitely Not**
Will it be fun to do?				
Are you the one driving it along?				
Do you think you'll get stressed-out doing it?				
Do you think you'll be able to do it well?				
Do you feel encouraged to do it?				
Would other people be surprised to see you do this?				

Appendix 3.2

Parent/guardian Feedback

It would be very helpful to know whether you have noticed any improvements in your child's behaviour, confidence or mood since starting Forest School. This information is entirely confidential and there is no need to identify your child by name.

If you are happy to proceed, please answer the following questions by putting a tick in the box that best answers each of the questions below.

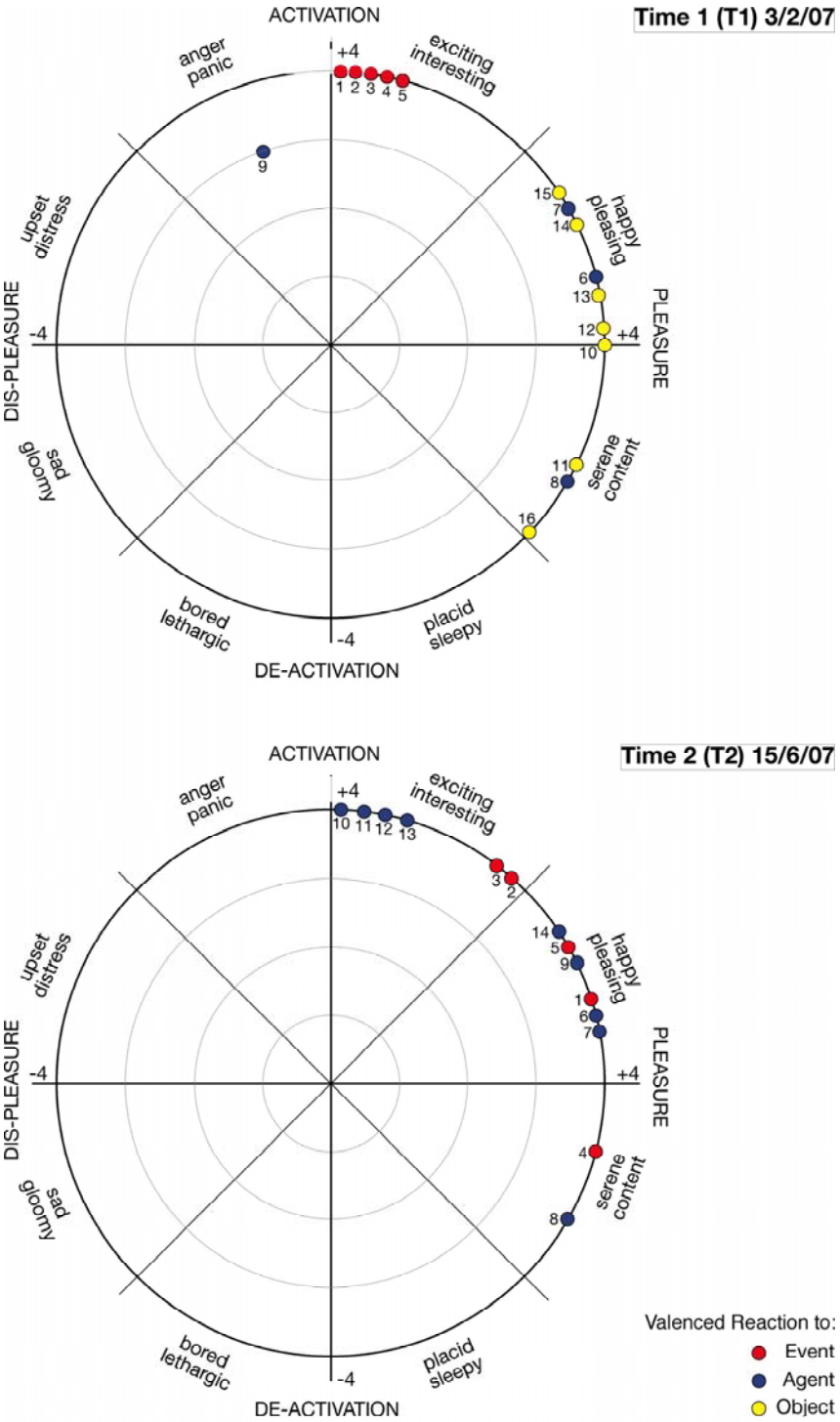
	Definitely	**A Little**	**Not much**	**Definitely Not**
1 Is your child any more talkative?				
2 Have you noticed any improvements in your child's confidence?				
3 Has your child shown any more initiative in getting on with something?				
4 Has your child's mood improved at all?				
5 Has your child's general health improved in any way?				
6 Has your child been more co-operative in any way?				

Please write down below anything else that springs to mind that might have benefited your child from attending forest school.

Please return this form in the freepost envelope provided. Thank you.

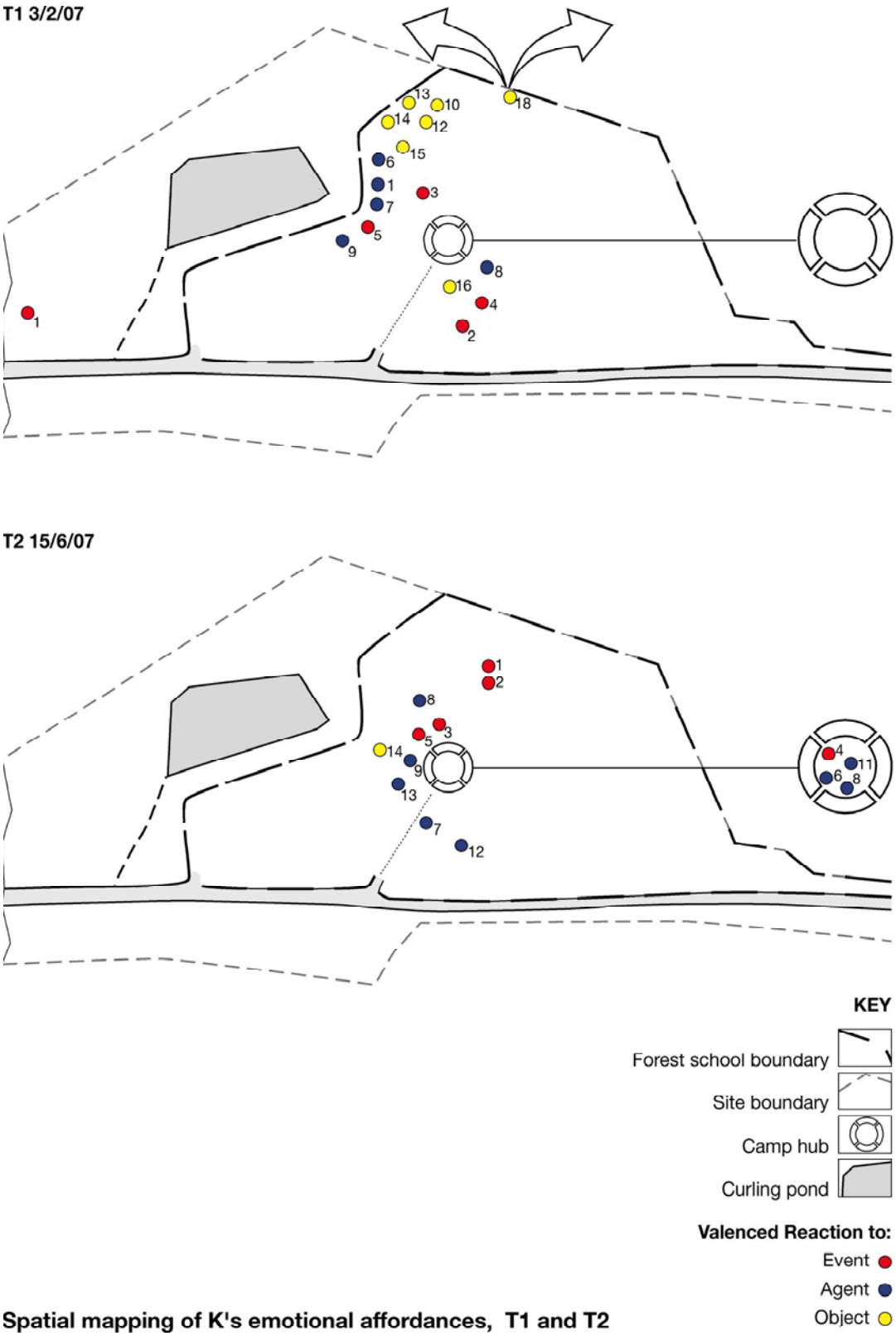
Jenny Roe, OPENspace, Edinburgh College of Art/Heriot Watt University.

APPENDIX 4.1 Case Study 2, Time 1 and Time 2 observations



K's Spectrum of Emotions at T1 and T2

Fig 4.17



Spatial mapping of K's emotional affordances, T1 and T2

Fig 4.18

Table 4.14: K's valenced reactions to Events, Agents and Object, Time 1, 03.02.07					
Key	**Primary Stimuli**	**Core Affect**	**Affective Quality of O, A, E**	**Cognitive component "best guess"**	**Expression**
🔴	**EVENT (E)**				
1	A game: Race the clock (Clatter bridge)	Pleasure (4) Arousal (4)	Desire Joy	Can I beat my best time? Can I beat C.?	Run, smile, zeal, satisfaction
2	A game: Run, Rabbit, Run	Pleasure (4) Arousal (4)	Desire Joy	*"You can't catch me!"*	Run, laugh, tease, taunt, squeal with delight, satisfaction
3	A game: Kung Fu through the bracken	Pleasure (4) Arousal (4)	Pride	*"Are you watching?"* Show my skill, mimic my brother	Expand and advance: martial arts manoeuvres, demand attention, *Watch!* Invent (*I'm a black belt!).* Repeat *"I like the sound of the wood cracking"*
4	A game: racing up and down the slope	Pleasure (4) Arousal (4)	Pride Joy	To win *"You can't beat me!"*	Iterative demands: *"Time me"*, *"Come on!"* Triumph *"I'm walking on sunshine. Whoa!"*
5	A game: making the bracken squeal	Pleasure (4) Arousal (4)	Joy	*"What's it saying?"*	Thrash it, make it speak, iterative demands, *"You say!"*, roar with laughter
🔵	**AGENT (A) SELF**				
6	Self as Discoverer	Pleasure (4) Arousal (1)	Fascination, Security Trust	*What does my hair look like?*	Pause, remove hat, touch head, pause, explore
7	Self as Protector (Agents C and J)	Pleasure (4) Arousal (2)	Desire to please Pride	Make safe/lead	Follow me, protect *"Halt, I have to make it safe for you"*, advance, lead, beat down the undergrowth
9	Self as Commander (Agent J.)	Displeasure (-1) Arousal (3)	Power Irritation	Exert control	Frustration, *"No, you don't do it right!"* demand, show, *"Jump when I tell you …I'll show you"*, repeat,
🔵	**AGENT(A)OTHER**				
8	Staff C.	Pleasure (4) Arousal (-2)	Desire Comfort	To feel secure	Advance, cuddle, squeeze

Table 4.14 cont: K's valenced reactions to Events, Agents and Object, Time 1, 03.02.07					
Key	**Primary Stimuli**	**Core Affect**	**Affective Quality of O, A, E**	**Cognitive component**	**Expression**
○	**OBJECT (O)**				
10	The ice house	Pleasure (4) Arousal (0)	Curiosity	*"It's a church*" a reverend place where treasure awaits	Explore, advance slowly, invent
11	A bench with a view	Pleasure (4) Arousal (-2)	Desire	Recollect *"Come and see this …* *I've walked up that hill*"	Expansive gesturing, excitement, sit still, pensive for a while
12	A bone	Pleasure (4) Arousal (0)	Curiosity	*"Could it be human?"*	Apache Indian Call Expand into fictional world. Show it to B.
13	Red mushrooms	Pleasure (4) Arousal (1)	Curiosity	*"Are they poisonous?"*	Squat down, pick, search for more
14	A rill and some sand	Pleasure (4) Arousal (2)	Curiosity Security	This is familiar (from the classroom)	Manipulate, mix, stir, splash
15	The mossy tree	Pleasure (4) Arousal (2)	Comfort Security	A place to hide – be a monkey	Climb, hide, touch the soft downy moss Sing: *"I'm walking on branches!"*
16	A mossy seat (a rabbit burrow) and a view south	Pleasure (4) Arousal (-3)	Comfort Wishful ness	I've been over there (I want to go again) Be hopeful.	Gesture with hands, locate, recall, sit, imagine.

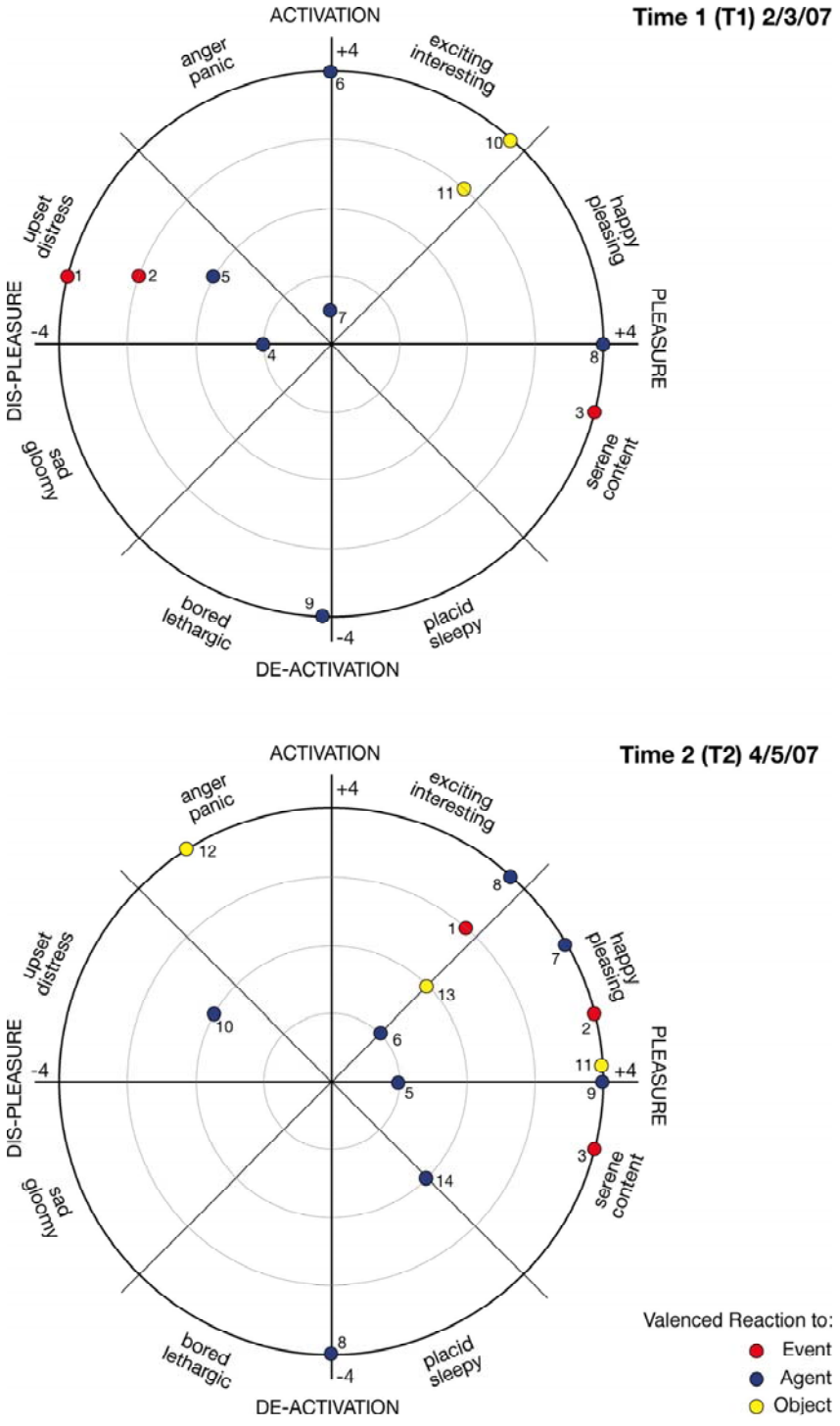
Table 4.15 K's valenced reactions to Events, Agents and Object, Time 2, 15.6.07					
Key	**Primary Stimuli**	**Core Affect**	**Affective Quality of O, A, E**	**Cognitive component**	**Expression**
●	**EVENT (E)**				
1	Going on holiday to France	Pleasure (4) Arousal (1)	Anticipation Joy (Zest) Pride	Tell everyone	Jump for joy, rush around, anticipate and plan: "*I have to go to bed at 8pm and get up at 3am!"*
2	A game: travel by plane on O (swing)	Pleasure (4) Arousal (3)	Joy	Anticipation Recall	Twist and turn, spin, pretend to be sick. Laugh out load. Repeat
3	A game: a break-in (the willow dome)	Pleasure (4) Arousal (3)	Joy (Zest)	Mimic a recent event?	Elaborate, set off alarms and bells. *"Intruder alert, intruder alert!"* open-shut the windows/doors; sound effects, alarm ringing, cord pulling.
4	A meal from the fire: scrambled egg and pancake	Pleasure (4) Arousal (-1)	Curiosity Comfort	What this?	Hesitate, sample, pause, repeat
5	A task: a 10 minute fire	Pleasure (4) Arousal (2)	Pride Comfort Control	Copy Jo, do it alone.	Create it, light it, keep it going. Get a time check from T., repeat (keep alight for 10 mins). Warm hands, sit back and admire.
●	**AGENT (A) OTHER**				
6	Peer J. (P)	Pleasure (4) Arousal (1)	Admiration	Be cool to copy	Attention, watch, mimic and make potion
7	Staff T. (A)	Pleasure (4) Arousal (1)	Pride	Desire to please	Walking backwards uphill:*"Tony will be sparkle when he sees me!"*
8	Researcher (P)	Pleasure (4) Arousal (-2)	Trust	To share knowledge	*"do you want to know something?", '..and do you know what?", "shall I tell you something?".*
●	**AGENT (A) SELF**				
9	Self as Commander	Pleasure (4) Arousal (2)	Power	Desire to control/lead	Instruct, demand, gesture with arms,*"Get this …. get that…"*
10	Self as Inventor	Pleasure (4) Arousal (4)	Desire	Recall my home before I came here.	Create a time machine, walk backwards, slow down, speed up, stop, re-start. *"I'm going back home … I'm going to stop at 2005"*
11	Self as Magician	Pleasure (4) Arousal (4)	Joy (Zest)	This could be magic	Rush around, forage, pick, mix, stir, smell, sing, repeat, exuberance, glee, jump for joy: *"hubble bubble … hubble bubble!"*
12	Self as Forager	Pleasure (4) Arousal (4)Arousal (4)	Curiosity	What can I find?	Seek out, pick, and share out (fungii)

13	Self as Photographer	Pleasure (4) Arousal (4)	Control	Direct, take control	Seize the camera, run around: *"I want some good shots, some action shots!"*

Table 4.15 cont: K's valenced reactions to Events, Agents and Object, Time 2 15.6.07

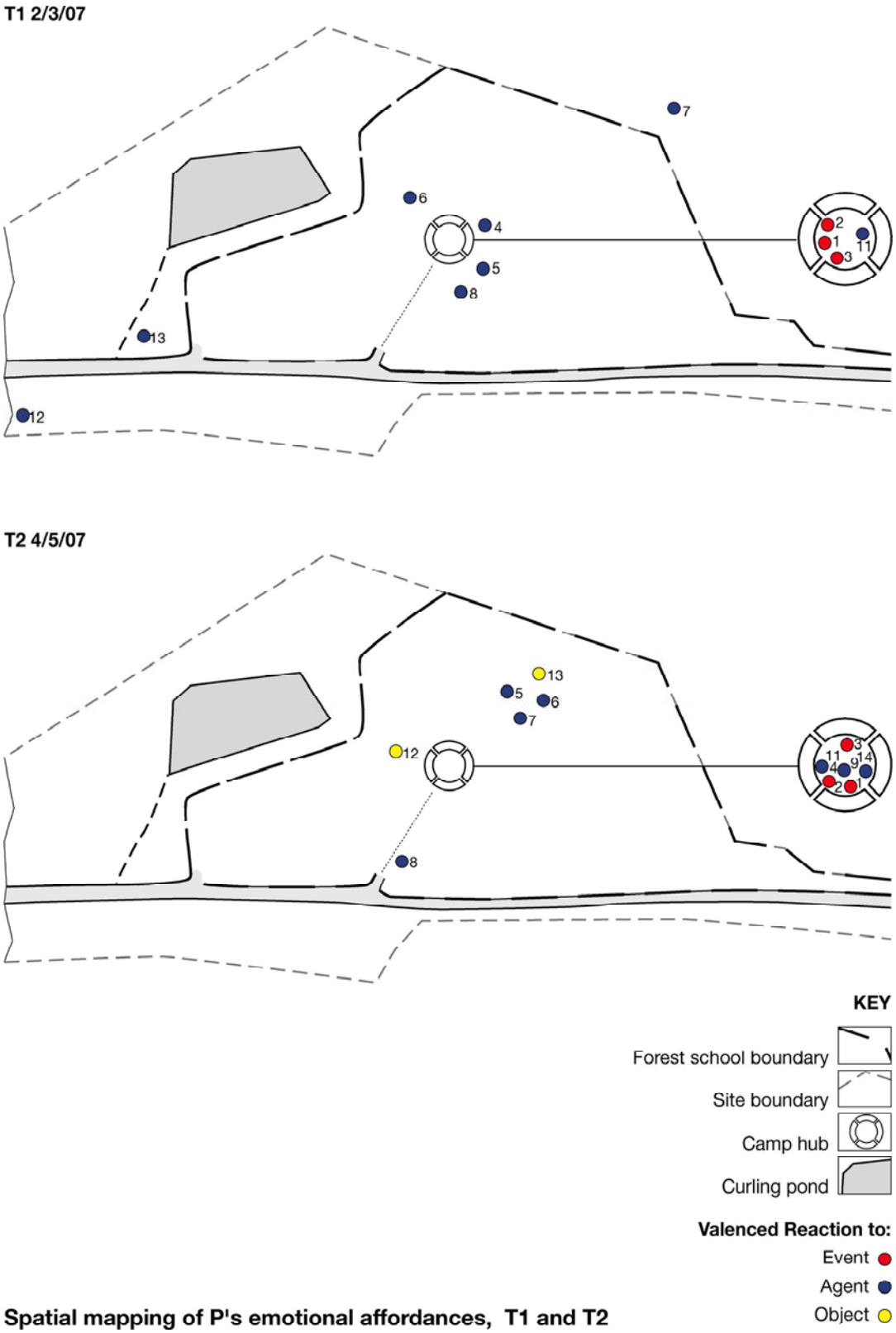
Key	Primary Stimuli	Core Affect	Affective Quality of O, A, E	Cognitive component	Expression
◯	**OBJECT (O)**				
14	Axe and tree stump	Pleasure (4) Arousal (2)	Dislike	Anger-out, vent frustration	Repeatedly brings down the axe.

Appendix 4.2: Case Study 3, Time 1 and Time 2 observations



P's Spectrum of Emotions at T1 and T2

Fig 4.19



Spatial mapping of P's emotional affordances, T1 and T2

Fig 4.20

Table 4.16: P. Valenced reactions to Events, Agents and Objects Time 1, 02.03.07					
Key	**Primary Stimuli**	**Core Affect**	**Affective Quality of O, A, E**	**Cognitive Component "best guess"**	**Expression**
🔴	**EVENT (E)**				
1	The camp fire	Displeasure (-4) Arousal (1)	Insecurity, Anger.	Anger-out	Repetitive behaviour: jump up, swear, menacing facial and body expression, grasp stick, advance, sit down, pause and repeat.
2	The camp fire	Displeasure (-3) Arousal (1)	Insecurity, Boredom	Anger-out	Jump up, throw a punch, rest, repeat.
3	The camp fire (E) eating a sausage sandwich (O)	Pleasure (4) Arousal (-1)	Comfort	To savour	Contentment, chat, offer information, be still.
🔵	**AGENT (A) Other**				
4	An upset peer who has runaway to an out-of-bounds part of the forest	Displeasure (-1) Arousal (0)	Concern	To coax back	Scan the horizon, captivate: *"Chris …sausages will be ready in 5 mins!"*, absorption
5	An upset peer whose gone of in a huff	Displeasure (-2) Arousal (1)	Concern	To coax back	Captivate: "I've found you a good gun!"
6	An exuberant peer (A) performing in the willow dome (O)	Pleasure (4) Arousal (4)	Admiration	To accompany, attract attention	Exuberance, jump about, sing out *"I'm having a good time!"* Extend.
7	A mischievous peer	Pleasure (0) Arousal (4)	Provoke	To accompany, test boundaries, draw attention to.	Headstrong, defiant behaviour, go beyond the stile, sing loudly whilst doing so.
8	A member of staff	Pleasure (4) Arousal (0)	Pleasure	Comfort	Hug legs, clings on.
🔵	**AGENT (A)SELF**				
9	P. is often lethargic the cause of which appears be internal.	Displeasure (-4), Arousal (-4)	Sadness	Lack of interest, anger-in	Slump down, be still, withdraw.
🟡	**OBJECT (O)**				
10	A peacock	Pleasure (4) Arousal (3)	Fascination Excitement	Desire to mimic	Creative, expression (he copies the body movements and sounds), absorption.
11	Footprints in the mud	Pleasure (2) Arousal (3)	Fascination	Desire to follow	Approach, explore, extend.

Table 4.17: P. Valenced reactions to Events, Agents and Objects Time 2, 04.05.07					
Key	**Primary Stimuli Core Affect**		**Affective Quality of O, A, E**	**Thinking Or Wish**	**Expression**
🔴	**EVENT (E)**				
1	Splitting logs	Pleasure (2) Arousal (3)	Arousal	Complete the task	Communicate, co-operate, enthuse, be vigorous
2	To make a gift from an antler (O)	Pleasure (4) Arousal (1)	Pride	To please	Absorption (file, polish, repeat).
3	Around the fire	Pleasure (4) Arousal (-1)	Security	To share, reveal	Communicate, share information, be still, and savour.
🔵	**AGENT (A) OTHER**				
4	Key worker J. (at fire)	Pleasure (4) Arousal (-4)	Security	Savour the company, comfort	Leans on torso, eat biscuit, offer conversation, retain.
14	Agents A. and J (at fire)	Pleasure (2) Arousal (-2)	Security	Savour company	Chat, inform, inquire, be still, savour the fire
5	An upset peer who is afraid of a bee	Pleasure (1) Arousal (0)	Concern	To protect	Re-assure: *"a bee only has so many stings"*, shield
6	A reluctant peer	Pleasure (1) Arousal (1)	Concern	To assist, retain company of.	Captivate: *"I'll get you bacon sandwich"*, be vigorous (run), deliver, repeat.
7	Group of peers (on swing)	Pleasure (4) Arousal (2)	Jollity	To play, join in	Co-operate: take turns, be patient, push someone, watch and wait.
🔵	**AGENT (A) SELF**				
8	As a bird	Pleasure (4) Arousal (3)	Pride	To mimic	Flap arms, bird like sounds, wiggle body
9	As a shark	Pleasure (4) Arousal (0)	Jollity	To mimic	Open jaw, bare teeth, shark like sounds.
10	As agitator	Displeasure (-2) Arousal (1)	Irritation	To provoke	Extinguish fire, throw bread, be gleeful.
🟡	**OBJECT (O)**				
11	An antler	Pleasure (4) Arousal (0)	Curiosity	To enquire	Examine, query, scrutinise.
12	The bill hook	Displeasure (-2) Arousal (4)	Boredom Anger	To test strength	Thrust, fling and wack, repeat.
13	The swing	Pleasure (2) Arousal (2)	Curiosity	To explore	Hesitant approach, grimace, cautiously push off, swing legs, extend, ask for help, repeat, relax.

Appendix 5.1 Interview Template

Can you list eight personal projects, things you might be currently working on or would like to be planning to do over the next few weeks or months?

Now rate your projects on a scale of 1 to 8 for importance, 1 being the most important, 8 the least important.

For each project can you tell me:

- Where would you go to do that project?
- Who would you do it with?
- How much fun would it be? (definitely, slightly, not much, definitely not)
- How much stress would it be?
- Do you think you could do it well?
- Do you think people would be surprised to see you do this?
- Do you feel encouraged to get on with it?

Prompts where respondents are unable to answer:

- Is there something about yourself you might like improve or be more confident at?
- Is there someone you might like to help or get on better with?
- Is there a new activity or hobby you might like to try?
- Is there some aspect of your school work you might like to improve?

Appendix 5.2: Well-being means and SD's for place categories							
Place (simple category)		Fun	Stress	Efficacy	New ID	Support	Importance
Home	**Mean**	**3.0417**	**2.4915**	**3.3583**	**3.0000**	**2.7833**	**3.3400**
	Std. Deviation	1.11345	1.08870	.92559	1.20732	1.30308	2.13436
School/youth club	**Mean**	**3.2588**	**2.3706**	**3.3000**	**2.9167**	**2.9643**	**4.0976**
	Std. Deviation	1.05957	1.09966	.91677	1.19445	1.20687	2.29121
Town context	**Mean**	**3.4000**	**2.5000**	**3.3400**	**2.6800**	**3.1600**	**3.9583**
	Std. Deviation	.86603	1.10335	.92105	1.24900	1.06771	1.98865
Local outdoors	**Mean**	**3.3559**	**2.4068**	**3.2881**	**2.9322**	**2.6610**	**4.5000**
	Std. Deviation	1.01306	1.08467	.85199	1.15765	1.28130	1.90084
Sport settings	**Mean**	**3.6471**	**1.8529**	**3.2121**	**2.5758**	**3.0303**	**5.4848**
	Std. Deviation	.84861	.95766	1.05349	1.32359	1.28659	2.23776
Faraway Places	**Mean**	**3.5873**	**2.2787**	**3.1190**	**3.0159**	**2.4032**	**5.1552**
	Std. Deviation	.85449	1.14209	.99480	1.15692	1.29892	2.32305
Other	**Mean**	**3.4375**	**2.1875**	**3.5000**	**3.0625**	**3.0625**	**3.5000**
	Std. Deviation	.96393	.98107	.73030	1.23659	1.23659	2.20294

Appendix 5.3: Well-being means and SD's for project categories							
Project		Fun	Stress	Efficacy	New ID	Support	Importance
Interpersonal family	**Mean**	**3.2245**	**2.3878**	**3.2551**	**2.8367**	**2.7551**	**2.9268**
	Std. Deviation	1.00551	1.13314	.93610	1.31255	1.29953	1.79430
Interpersonal friend	**Mean**	**3.0476**	**2.3810**	**3.5238**	**2.5714**	**2.5714**	**4.0476**
	Std. Deviation	1.07127	1.20317	.60159	1.32557	1.39898	1.93588
Intrapersonal	**Mean**	**2.7361**	**2.7361**	**3.1944**	**3.1667**	**2.8857**	**4.4286**
	Std. Deviation	1.20408	.99632	.98036	.97101	1.20712	2.06206
Societal	**Mean**	**3.5313**	**2.1935**	**3.3438**	**2.7500**	**2.7419**	**4.3103**
	Std. Deviation	.80259	1.16674	.93703	1.21814	1.21017	2.07198
Sport/health	**Mean**	**3.8413**	**1.8730**	**3.3226**	**2.8710**	**2.7903**	**5.1000**
	Std. Deviation	.51451	.94172	.95427	1.19403	1.33229	2.15265
Education	**Mean**	**2.5152**	**2.9091**	**3.3333**	**3.3333**	**2.9394**	**3.1250**
	Std. Deviation	1.20211	.94748	.81650	.95743	1.24848	2.10606
Career	**Mean**	**3.6552**	**2.5517**	**3.5690**	**2.7241**	**3.5517**	**3.9655**
	Std. Deviation	.66953	1.05513	.59348	1.22172	.73612	2.39766
Hobby	**Mean**	**3.7143**	**1.9048**	**3.1667**	**2.4500**	**2.9524**	**5.3889**
	Std. Deviation	.78376	1.17918	1.21792	1.35627	1.16087	2.22655
New experiences	**Mean**	**3.6875**	**2.2553**	**3.0521**	**3.1042**	**2.4792**	**5.4889**
	Std. Deviation	.77614	1.01012	1.00127	1.13437	1.32070	2.36088
Autonomy	**Mean**	**2.6000**	**2.2500**	**3.2000**	**2.2000**	**1.4000**	**4.0000**
	Std. Deviation	1.14018	.50000	1.09545	1.64317	.54772	.81650

Appendix 5.4: Ranked order of importance of projects	
Project Type	% Most Imp
Interpersonal family	22
Education	22
Career	17
Intra personal	12
Sport/health	10
New Experiences	7
Societal	5
Interpersonal friends	2
Autonomy	0
Hobby	0

Appendix 6.1: Interview Template

Where would you go if you were feeling ….
Tell me a few things you like about that place …

1 grumpy and cross with someone
2 you have done well at something and want to celebrate
3 you are worried or wound up about something – you can't get it out of your mind
4 you want to tell a friend something secret
5 you feel restless and bored
6 you feel really excited about something
7 you can't make your mind up about something
8 you feel like some adventure
9 you feel disappointed in yourself about something
10 you're totally chilled and relaxed and want to stay that way
11 you feel sorry about something you did or said
12 you feel wide awake and full of energy

Describe you ideal chill out place, it can be a real place or imagined.

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