

The immediate and sustained effects of the .b mindfulness programme on adolescents' social and emotional well-being and academic functioning.

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The immediate and sustained effects of the .b mindfulness programme on adolescents' social and emotional well-being and academic functioning

Abstract

Sixty eight adolescent students from typical, mixed-gender secondary schools took part in the .b mindfulness training programme (Burnett, Cullen & O'Neill, 2011). In this controlled mixed-methods longitudinal study, students completed pre-course, post-course and six-month follow-up questionnaires to assess immediate and sustained changes in mindfulness, ego-resilience and well-being. Statistical analyses established significant differences between participant and control groups' mindfulness, ego-resilience and well-being, and that immediate effects were exceeded by sustained effects. Students', teachers' and parents' post-course interviews permitted a triangulated exploration of the internally experienced and externally observable effects of cultivating mindfulness. Thematic Analysis (Braun & Clarke, 2006) revealed effects on adolescents' awareness, self-regulation and psychological characteristics. Self-Determination Theory (Deci & Ryan, 2000), and Self-Efficacy (Bandura, 1977) provided theoretical frameworks within which to describe the effects of mindfulness training on motivation and confidence, competence and effectiveness.

Introduction

Mindfulness, which is a natural and cultivatable cognitive skill, is associated with psychological well-being in adults and adolescents (Kabat-Zinn, 1982; Brown & Ryan, 2003; Miners, 2008). Mindfulness is characterised by awareness and acceptance of present moment thoughts, emotions and physical sensations (Kabat-Zinn, 1982), and can be deliberately developed using secular techniques derived from Buddhist meditation practices. Mindfulness training programmes have been extensively trialled in adults, and to a lesser extent with children and adolescents (Grossman, Neimann, Schmidt & Walach, 2003; Burke, 2009). The realisation that mindfulness has the potential to promote young people's social and emotional functioning (Miners, 2008) and improve their academic performance (Semple, Reid & Miller, 2005; Beauchemin,

Hutchins & Patterson, 2008) has led to the development of programmes to teach mindfulness in schools.

Mindfulness and well-being in adolescence.

Adolescence can be broadly described as the transition from childhood to adulthood. It entails emotional, psychological and physiological changes, and generally occurs between the ages of 11 and 19 (Conger, 1979). Adolescence can be a period of academic and inter-personal pressures (Compas, Connor-Smith, Saltzman, Thomsen, Wadsworth, 2001), and although the majority reach young adulthood in good health, adolescents are vulnerable to potentially life-long psychological illnesses. Whilst cause and effect relationships are beyond the scope of this study, clinical depression (Zizook et al, 2007), self-harm, eating disorders, and risky social behaviours, including alcohol and drug abuse, can begin during adolescence (Royal College of Psychiatrists, 2010). These conditions are related to poor social and academic functioning and impaired psychological and physiological well-being (Beauchemin et al, 2008). Conversely, good functioning and well-being are associated with the cognitive skill (Wallace & Shapiro, 2006) of mindfulness. This is both an enduring dispositional trait and a temporary state, and individuals vary in their propensity towards, and utilisation of, mindfulness (Brown, Ryan & Creswell, 2007).

Mindfulness is characterised by deliberate and non-judgemental awareness of the present moment, and purposeful attention to inner states, i.e. thoughts, emotions and physical sensations (Kabat-Zinn, 1982). This awareness is the inverse of being unfocused, distracted or on “auto-pilot” (Thompson & Gauntlett-Gilbert 2008), and is conceptualised as the antithesis of mindlessness by Brown and Ryan (2003).

Miners’ (2008) investigation of the effects of trait and state mindfulness in adolescence established that the former is associated with adolescents’ social and emotional well-being. It correlates positively with positive emotion, popularity and friendship-extensiveness, and negatively with negative emotion and anxiety. Trait mindfulness is also negatively correlated with impulsivity (Peters, Erisman, Upton, Baer & Roemer, 2011), which may relate to risky behaviours.

Mindfulness can be deliberately cultivated, and an explanation of techniques for this is warranted.

Cultivating mindfulness

The cultivation of mindfulness originates in ancient Buddhist meditation practices. Its purpose is to relieve self-induced suffering caused by maladaptive responses to experience, and it has been practiced for over 2,500 years. Regular mindfulness meditation practice incrementally creates and maintains present-moment awareness and sustained attention. Practices focus on naturally occurring phenomena to which people have easy and immediate access, including sensations of breathing, eating, movement, sound and daily activities. Developing meta-cognition of inner states creates awareness of the automatic reactions they induce, which in turn supports modification of the habitual cognitive, emotional and behavioural patterns which create and maintain self-induced suffering (Hanh, 1991).

Anecdotal and research findings about the efficacy of meditation in reducing deleterious psychological symptoms triggered Western science's interest in mindfulness as a healthcare intervention in the 1970's (Smith, 1975).

Mindfulness training programmes

Jon Kabat-Zinn introduced the first structured mindfulness skills training programme to patients experiencing distress relating to chronic physical health conditions. Secular and practical, Mindfulness-based Stress Reduction (MBSR) is an eight-week systematic course designed to develop mindful awareness (Kabat-Zinn, 1982), and it is taught internationally (Cullen, 2011). Mindfulness-Based Cognitive Therapy (MBCT) combines mindfulness practices with elements of cognitive behavioural therapy for patients with recurrent clinical depression (Segal, Williams & Teasdale, 2002).

The effects of cultivating mindfulness for adults

A rigorous meta-analysis of controlled studies concluded that MBSR is useful in a diverse range of clinical illnesses which induce or arise from psychological and/or physiological stress (Grossman et al, 2003), and stress is moderated by mindfulness

(Kabat-Zinn, 1982). Carmody and Baer (2008) established that improvements in psychological distress and symptoms are completely mediated by increases in mindfulness, which is also related to relief from sleep-related problems (Winbush, Gross & Kreitzer, 2007). Mindfulness training has sustained benefits - the immediate effects on stress and well-being are maintained after three years, and the majority of subjects continue their formal mindfulness practice over this period (Miller, Fletcher & Kabat-Zinn, 1995). MBCT has shown reliable, significant effects in reducing clinical depression relapse (Teasdale et al 2000, Ma & Teasdale, 2004).

MBCT participants report an improved sense of control, enhanced relationships and deepening acceptance of experiences (Shapiro, Carlson, Astin & Freedman, 2006). Acceptance is not the learned helplessness and passivity in aversive situations ascribed by Peterson and Seligman (1984) as contributing to depression, and which is amotivational to learning (Stipek, 1988). Rather, it is a willingness to accept present-moment experience as it truly is, without denying or resisting the facts (Kabat-Zinn, 1990). Proponents of mindfulness do not claim that it changes life events or automatic, immediate reactions to them. Their assertion is that it enables people to recognise and accept their unpleasant cognitive, emotional and physical reactions to events without perpetuating their negative affects through self-recrimination or rumination (Allen, Bromley, Kuyken & Sonnenberg, 2009). Cullen (2011) describes the explicit emphasis in Mindfulness-based interventions (hereafter MBI) on using experience as a "laboratory" (p.189) within which to investigate the internal factors which engender happiness and unhappiness, allowing moderation of the cognitive and behavioural patterns which create and perpetuate the latter.

The benefits of mindfulness training are not restricted to people with psychological and physical illnesses. Typical people's depression, anxiety and stress scores also improve significantly (Schreiner & Malcolm, 2008). MBSR benefits working memory and improves ability to orientate and sustain attention (Jha, Krompinger & Bairne, 2007; Chambers, Chuen Yee Lo & Allen, 2008). Mindfulness increases resilience to physical discomfort (Perlman, Salomons, Davidson and Lutz, 2010), and to unpleasant events (Ostafin et al, 2006), protects memory and reduces emotional reactivity in high-stress contexts (Jha, Stanley, Kiyonaga, Wong and Gelfand, 2010). Cultivating

mindfulness has diverse benefits on well-being (Shapiro, Oman, Thoreson, Plante & Flinders, 2008), and there is a growing trend to move mindfulness training into the mainstream because of its practicality and effectiveness in reducing stress, and improving social and cognitive functioning (Mental Health Foundation, 2010), although it is neither a panacea nor an instant remedy.

Mediators of effect

The incremental cognitive effects of skill-acquisition are underpinned by gradual physiological brain changes which accumulate through neuroplastic response to task repetition (Chang, Hou & Mattson, 2010). Whilst the neurological study of the effects of mindfulness is beyond the scope of this study, fMRI (a brain imaging technique) provides evidence that concentration of left hippocampal gray matter increases during MBSR. This area is associated with learning and memory, self-referential processing, perspective-taking and emotional regulation (Hölzel et al, 2009).

Mindfulness studies report positive correlations between practice time and improvements in clinical anxiety and depression symptoms, mindfulness and well-being (Carmody & Baer, 2008). Whilst this suggests that repetition determines the immediate and enduring therapeutic effects of mindfulness, there is no clinical evidence that practice time determines symptom improvement. Whilst clinical programmes last eight weeks, shorter mindfulness programmes also generate positive effects. Five days of twenty minute meditation reduced anxiety, depression, anger and fatigue, improved immune-reactivity and decreased cortisol (Tang et al, 2007); four days of mindfulness training was sufficient to improve mindfulness, visuo-spatial memory, working memory and sustained attention (Zeidan, Johnson, Diamond, David & Goolkasian, 2010), and Semple (2011) established that increases in sustained attention were not mediated by practice time. Moreover, May (2011) demonstrated that pre-task meditation improves attention task performance more than daily practice alone, i.e that it is state, not trait, which supports task engagement. This raises the question as to which factors other than time may contribute to developing mindfulness.

Whilst mindfulness training is not a therapy (its therapeutic effects are consequences of mindful awareness), research into factors which mediate the outcome of therapeutic programmes is pertinent. Fennell and Teasdale (1987) established that individual's initial response to the cognitive-behavioural therapy rationale, and engagement in homework tasks between sessions 1 and 2, predict therapeutic outcome. Individual differences may also determine when, indeed if, the internal shift towards developing a resilient and a self-compassionate response to naturally arising unpleasant thoughts, which Kuyken et al (2010) argue ameliorates patterns which perpetuate negative affect (mood and emotion), occurs. Furthermore, it has been suggested that only by embodying mindfulness can teachers promote it in their students (Segal et al, 2002; Gold et al, 2010), and the relationship between teacher and student has potential effects on inclination to practice techniques and on outcomes (Kocsis et al, 2009).

Individual differences in existing strengths and challenges may determine which combination of these factors contribute to developing mindfulness, which is likely to be mediated by motivation to engage in training and to practice. This can be explored within the framework of Self-Determination Theory (Deci & Ryan, 2000). The effect of over-coming the challenges to self-discipline of developing and maintaining a mindfulness practice is reported by MBCT patients (Allen et al, 2009) which, coupled with increased resilience to negative events (Farb, 2010), may contribute towards increased self-efficacy (Bandura, 1977), which Grossman et al (2003) identified as an effect of MBSR. A brief explanation of these models is warranted.

Theoretical framework for self-determination

Different factors enhance or impair individuals' motivation, and Deci and Ryan's (2000) Self-Determination Theory of motivation, (hereafter SDT), recognises the importance of mindfulness to intrinsic motivation. Intrinsic motivation is autonomous, and originates in self-generated interest and personal goals. It creates the incentive to act volitionally, which is more predictive of positive psychological outcomes and persistence than extrinsic motivation. The primary elements of intrinsic motivation are autonomy, competence and relatedness to others. Social response to an individual's

activities generates informational feedback (Deci & Ryan, 2008). Positive feedback reinforces autonomous motivation (Deci, Koestner & Ryan, 1999), whereas negative feedback may diminish it, and can create amotivation (a lack of motivation to act) (Vallerand & Reid, 1984), or the diminishment of behaviours which fail to elicit the desired reaction. Extrinsic motivations emanate from society or individuals and can be internalised if they are concordant with intrinsic values. However, modifying behaviour in accordance with non-concordant extrinsic influences can create a sense of being externally controlled, incompetent and disconnected from others - the antithesis of SDT components - which is deleterious to psychological well-being (Deci & Ryan, 2000). Pertinent to this applied study is that the classroom can be a place of imposed control on students (Lees, 2009).

Theoretical framework for self-efficacy

A person's self-efficacy is their belief in their ability to develop and master specific skills, and to influence specific events in their life (Bandura, 1977). Self-efficacy relates to the effectiveness of mindfulness training because it moderates the translation of intentions into behaviours (Stretcher, McEvoy-DeVellis, Becker & Rosenstock, 1986). Moreover, students' self-efficacy engenders motivation to behave in ways which support achievement of educational and personal goals (Schunk, 1990).

Mindfulness for children and adolescents

Some research has been undertaken with typical and atypical children. It is important to recognise that these studies are based on age-appropriate protocols, rather than full MBSR/CT programmes.

In non-school programmes, adolescents diagnosed with attention and behaviour-control deficits reported that mindfulness training led to significant increases in personal goals, sustained attention, happiness and mindful awareness, and this was ratified by their parents (Bogels, Hoogstaf, Van Dun, De Schutter & Restifo, 2008). Adolescents with heterogeneous mental health diagnoses reported decreases in anxiety and depression, and improved sleep and self-esteem (Biegel, Brown, Shapiro &

Schubert, 2009). The concentration of typical 9 to 13 year-old children improved significantly (Semple, Lee, Dinelia & Miller, 2010), and an intervention which promotes concentration in children has promise in educational contexts.

Mindfulness training in schools

School mindfulness programmes led to improvements in highly anxious 7 to 10 year-olds' attention-deficit behaviours, test-anxiety and selective attention (Napoli, Krech & Holley, 2005), and students with learning difficulties experienced benefits in anxiety, social skills and academic achievement (Beauchemin et al, 2008). 11 to 13 year-olds reactivity reduced, and well-being, calm, sleep and self-care improved after a tai-chi/MBSR programme (Wall, 2005). Chronically stressed and disadvantaged American high school students enjoyed and appreciated the benefits of a twelve-week mindfulness/yoga programme, and reported reduced stress-induced emotional arousal, rumination and intrusive thoughts (Mendelson et al, 2010).

The "Inner Kids" mindfulness-skills programme has been taught around the world. Evaluation of a school-based programme for 7 to 9 year-olds produced parent and teacher-rated improvements in executive function, and those with lower pre-course self-regulation were observed to experience greatest improvements in behavioural regulation, meta-cognition and global executive control (Flook et al, 2010). The "MindUP" programme fosters the development of well-being traits using social, emotional, attentional and self-regulation strategies, including mindfulness exercises. Teachers noticed improvements in 9 to 13 year-olds' behaviour, attention and focus (Schonert-Reichl & Hymel, 2007; Schonert-Reichl & Lawlor, 2010).

Studies with a defined MBSR/CT-derived training strategy have greater value in understanding the generalisable effects of school-based mindfulness programmes. The "Learning to BREATHE" curriculum is an MBSR-derived mindfulness programme (Broderick & Metz, 2009). A study conducted with a year group of 17 to 19 year-old students in an American independent girls' school established decreases in negative affect, and increases in calm, relaxation, self-acceptance, emotional regulation, awareness and clarity. Huppert and Johnson (2010) reported the outcomes of the Mindfulness in Schools Project's (hereafter MiSP) pilot mindfulness programme with 14 to 15 year-old male students. Conducted in two English independent boys' schools, a four-week mindfulness training produced non-significant effects on mindfulness, ego-resilience or well-being. However, students with lower initial emotional stability

reported significantly greater increases in well-being than their more emotionally stable classmates, as did those with greater agreeableness or openness to experience, leading to the suggestion that less stable, and more open students, had greater potential for improvement. Increases in mindfulness and psychological well-being were significantly related to the amount of home practice.

Identifying the requirement for a formalised curriculum for the teaching of mindfulness in schools (Burnett, 2009), MiSP developed an eight lesson course, derived from MBCT, to train adolescents in practical mindfulness skills, resulting in the “.b” (stop and breathe) programme (Burnett, Cullen & O’Neill, 2011). Whilst adult mindfulness training programmes are designed to increase daily moment-to-moment mindfulness through at least eighty hours of practice time, .b expects no more than fifteen minutes practice each day, totalling a maximum four hours.

In summary, mindfulness programmes are associated with immediate quantitative benefits for adolescents who are students in schools which encompass a spectrum including single-sex independent schools and mixed-sex deprived-area schools, but outcomes in typical secondary schools are not well established.

Rationale for the study

The aim of the current study is to investigate the effects of teaching the MiSP .b programme in mixed-sex state secondary schools. I will use quantitative measures to compare the immediate effects of .b on mindfulness, resilience and well-being to existing research, and explore the effects of gender and age group. Sustained effects have been established in MBSR patients, and I will retest students at six months to investigate whether .b is associated with sustained effects in typical adolescents. Going beyond the statistics and existing research, I will use interviews to investigate students’ individual experiences of how mindfulness affects their daily lives, and how this manifests in ways which are observable by their peers, teachers and parents.

Method

Participants

The criteria for participation was defined as mixed-gender, typical-intake, state secondary schools within Oxfordshire. Eligible schools were invited by e-mail and telephone to take part in this study. Three schools were recruited, and their written permission to conduct the study was attained (Appendix 1) after Oxford Brookes University granted ethical approval (Appendix 2).

Senior managers at Schools 1 and 2 selected classes to take part in the study, based on their expectation of potential benefit, and subject to time-table constraints. (It is important to note that while there may have been greater potential for improvement in these groups, there may have been greater-than-typical challenges to teaching the course and to students' ability and/or willingness to engage with it; see Deci & Ryan, 2000.) Schools selected other classes, matched on year and scheduled lesson, against whom normal change over the trial period were assessed. School 3 offered the course as an optional activity; 10 students volunteered, and the school selected a control group matched on year and gender.

Table 1: Participating and control groups by school and academic year.

School	Year Group	Participant group	Control group
1	10 (age range 14-15)	22 (m= 5, f=17)	25 (m= 12, f=13)
2	7 (age range 11-12)	23 (m=12, f=11)	20 (m=8, f= 12)
2	10 (age range 14-15)	13 (m=6, f= 7)	14 (m=7, f=7)
3	12 (age range 16-17)	10 (m= 9, f=1)	10 (m= 9, f=1)
	Total = 137	68 (m=33, f=35)	69 (m=36, f=33)

Consent process

Parents at Schools 1 and 2 were sent information about the study, and asked for their written consent for their children's data to be used in the study. Parents indicated willingness to be interviewed about observable effects of mindfulness on their children. They were advised of their right to withdraw their children's data at any

point during the research (Appendix 3.) If parents did not consent, their child’s data were not analysed. Parental consent was not required for the students at School 3.

Each student met the researcher prior to the course. They read an information sheet about the study, and had the opportunity to ask questions. Written consent was obtained from each student indicating their understanding of the purpose of the research, their voluntary participation, and their awareness of their right to withdraw at any time. Student consent for interview data to be analysed and reported was attained when the interviews occurred. They agreed to the interview being digitally recorded, and to the use of anonymised quotes within publications (Appendix 4).

The .b programme

The mindfulness course was “.b”, which is the MiSP’s training programme (Appendix 5). It was taught to each class by the same mindfulness teacher.

Table 2: Teaching schedule

School	Academic Year	Term
1	2009/2010	6
2	2010/2011	2
3	2010/2011	2

Quantitative measures

Mindfulness was assessed using the Cognitive and Affective Mindfulness Scale-Revised (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2006) which measures ability to regulate attention, awareness, and acceptance of experience. Resilience was measured using the Ego-Resilience Scale (Block & Kremen, 1996), which assesses capacity to respond appropriately or to situational contexts and demands. Well-being was assessed using the Warwick-Edinburgh Mental Well-being Scale (Tennant et al, 2007) which measures affective-emotional, cognitive-evaluative, and psychological aspects of well-being (Appendix 6). The questionnaires were completed immediately prior to the course, as soon as possible afterwards, and six months after the courses

concluded. Students who completed all three questionnaires were included in the statistical analysis. This was conducted using SPSS.16, a computer software package.

Table 3: Quantitative Data (all 3 questionnaires)

School	Year Group	Participants, & % of all	Controls, & % of all
1	10	14 (63%) (m=4, f=10)	16 (64%) (m=7, f=9)
2	7	19 (83%) (m=9, f=10)	12 (60%) (m=4, f=8)
2	10	13 (100%) 13 (m=6, f= 7)	9 (64%) (m=5, f=4)
3	12	7 (70%) (m= 6, f=1)	9 (90%) (m= 8, f=1)
	Total = 99 (73%)	53 (78%) (m=25, f=28)	46 (67%) (m= 24, f=22)

Qualitative measures

Fifty interviews were conducted as soon as possible after the courses concluded. Eight School 3 students participated in a six-month follow-up group interview; these interviews did not occur in School 1 or 2 due to time-table constraints. Interviewing School 1 teachers and parents provided external perspectives on the effects of participation in the programme. Eligible School 2 and 3 parents and teachers did not offer to participate. Student interviews lasted 3 to 20 minutes; teacher and parent interviews lasted 25 to 45 minutes.

Table 4: Qualitative data sample

School	Year Group	Participant group, % of all	Parents	Teachers
1	10	14 (63%) (m=2, f=12)	3	2
2	7	15 (65%) (m=7, f=8)	0	0
2	10	12 (92%) (m=6, f= 6)	0	0
3	12	9 (90%) (m=8. f= 1)	0	0
	Total	50 (74%) (m= 23, f=27)	3	2

Interview questions were designed to elicit students' accounts of their personal experience of learning mindfulness, and the effects of this on their daily lives. Teacher and parent interviews enquired about the observable effects for participants, and the impact of this on classroom and home dynamics.

The participant profile and established effects of mindfulness were taken into account when designing the interview. A pilot study refined the questions and established that single interviews were more effective than group interviews in eliciting detailed responses. The latter is more time-effective, and was employed in the “sustained effects” interview.

The interview had three sections (Appendix 7), in accordance with Wengraf’s (2001) protocols for qualitative research interviews. The format is “semi-structured” - partly pre-determined, partly prompted by the narrative. The opening question was designed to elicit full narrative disclosure of personal experiences of mindfulness. The second section of ‘narrative-pointed’ questions followed up on replies to the opening question, (e.g. “You said that it’s enabling you step back before you act; can you tell me more about that?” (Dom)). The structured third section was pre-determined questions derived from the literature. It was designed to integrate theoretical perspectives with individuals’ personal accounts, whilst allowing for further enquiry.

Thematic Analysis (hereafter TA) (Braun & Clarke, 2006) was employed to analyse transcribed data to discover the common and the unique themes expressed amongst accounts. TA is a foundational method of qualitative analysis, and provides a framework within which to analyse data and identify the themes within it. A theme “captures something important about the data in relation to the research question” and “represents some level of patterned response or meaning within the data set” (Braun & Clarke, 2006, p.82).

Inductive analysis, which is a bottom-up, data-driven approach, was used to attain a full picture of the interview data, rather than one orientated by a-priori assumptions, although it is acknowledged that coding does not occur in an “epistemological vacuum” (Braun & Clarke, 2006, p. 84). Themes can be described as a semantic - straight from the text, or latent - an interpretation which goes beyond semantics and suggests which psychological concepts underpin the experiences described in interviews.

Following Braun and Clarke's (2006) instructions, initial ideas for themes were noted whilst reading through the data, after which systematic coding of interesting items occurred across the entire data set. Coding was conducted in NVIVO, a qualitative data-analysis computer software package (see Appendix 8 for a sample coded interview). The generated codes were grouped into potential themes, and a thematic map of the dataset was produced (Appendix 9). Each theme was refined and specified, and clear names were created for each. The rootedness of the master themes was validated by checking the internal homogeneity of participants' theme-specific accounts. Several themes were disregarded because they were irrelevant to the research (Appendix 9). Finally, extracts which illustrated each theme were selected.

Analysis and Findings

Quantitative Results

This study investigated the immediate and sustained effects of the three independent variables (group, gender and year) on three dependent variables (mindfulness, ego-resilience and well-being). Independent tests demonstrated no significant pre-course differences in dependent variables (Appendices 10.1 to 10.10). Tests confirmed the normality of the data, except sustained well-being (Appendices 11.1-.11, 12.1, 12.6, 13-16.1).

The outcomes are discussed by independent measure. All significant quantitative results are reported, but non-significant results are included only where they inform significant results. Within-subjects effects are within each group, gender and year. Between-subjects effects compare groups, genders and years. The plots indicate between-group main effects only, and merely inform interactions and within-group effects.

Mindfulness

Table 5: Immediate Mindfulness analysis

Immediate Mindfulness	Group and gender only						
Effect	Df	F	P	η^2	Ref	Appendix	
ANOVA Between Group and gender	1,93	4.98	0.03	0.05	1	12.3	
Pairwise	Diff	p	95% CI				
Male participants v controls	-2.92	0.06	-5.92	0.08	2	12.4	
Female participants v controls	1.89	0.22	-1.16	4.94			
Control females v males	-1.29	0.42	-4.43	1.84		12.5	
Participant females v males	3.52	0.02	0.60	6.43	3		
<u>Plot of main effects</u>	Participant	Control				Plot	
Group	Increase	Decrease				4	12.1
Gender	Steady	Steady				5	12.2

There was a significant between-subjects interaction between group and gender on immediate mindfulness ($F(1,93)=4.98$, $p=.03$, $\eta^2 = .05$)(1). Male participants' average mindfulness significantly reduced in comparison to controls (2). Within participants, females significantly improved in comparison to males (3). Participants' scores increased and controls' decreased (4), whereas scores were consistent by gender alone (5).

Table 6: Sustained Mindfulness analysis

Sustained Mindfulness	Group, gender and year					
Effect	Df	F	P	η^2	Ref	Appendix
ANOVA Within Group	1,168	3.10	0.05	0.04	6	13.2
ANOVA Between Group	1,84	0.57	0.45	0.007	7	13.3
Pairwise compare participants to controls	diff	p	95% CI			

Within Time 1	-0.60	0.72	-3.88	2.69		13.4(1)
Within Time 2	1.00	0.59	-2.67	4.67		
Within Time 3	3.03	0.08	-0.34	6.04	8	
participants v controls Between	1.15	0.45	-1.86	4.16		13.4(2)
<u>Plot of main effects</u>	Participant	Control				Plot
Group	Increase	Decrease			9	13.1

There was a significant within-subjects main effect of group ($F(1,168)=3.1, p=.05, \eta^2 = .04$)(6) on sustained mindfulness, but effect between-groups was non-significant (7). The marginally significant Time 3 change (8) indicated post-course differences in the groups' average mindfulness. Participants' scores increased at each point, and controls' decreased (9).

Ego-resilience

Table 7: Immediate Ego-resilience analysis

<u>Immediate Ego-resilience</u>					<i>Ref</i>	<i>Appendix</i>
	Df	F	P	η^2		
ANOVA Within Group and year	2,85	5.74	0.005	0.12	10	14.2
ANOVA Between Group	1,84	5.06	0.03	0.06	11	14.3
Group and gender	1,84	9.50	0.003	0.10	12	
Pairwise	Diff	P	95% CI			
compare participants to controls	3.41	0.03	0.40	6.43	13	14.4
compare participants to controls by gender						
Control females v males	-2.71	0.22	-7.05	1.63		14.5(1)
Participant females v males	6.65	0.002	2.46	10.85	14	
Males participant v controls	-1.27	0.41	-4.30	1.77		14.5(2)
Females participant v controls	8.10	0.003	2.87	13.32	15	
compare participants to controls by year						
Year 7 part v control	2.54	0.19	-1.24	6.32		14.6(1)
Year 10 part v control	-0.32	0.83	-3.20	2.57		
Year 12 part v control	8.02	0.04	0.31	15.74	16	

<u>Plot of main effects</u>	<u>Participant</u>	<u>Control</u>		<i>Plot</i>
Group	Steady	Steady	17	14.1
Male	Decrease	Steady	18	14.2
Female	Steady	Steady	19	14.3
Year 7	Decrease	Increase	20	14.4
Year 10	Increase	Steady	21	14.5
Year 12	Increase	Decrease	22	14.6

There was a significant interaction within immediate ego-resilience, group and year ($F(2,85)=5.74$, $p=.005$, $\eta^2=.12$) (10), between groups ($F(1,84)= 5.06$, $p= 0.03$, $\eta^2=.06$) (11), and between group and gender ($F(1,84)= 9.5$, $p= 0.003$, $\eta^2=.10$) (12). Participants scored significantly higher than controls (13), and female participants scored significantly higher than participant males (14) and control females (15). Year 12 participants scored significantly higher than their controls (16). Plots indicated that the groups' resilience remained steady (17), and that factors within groups were meaningful. Participant males' scores reduced whereas controls' remained steady (18), as did females in both groups (19). Year 7's resilience reduced for participants and increased for controls (20). Year 10 participants' scores increased, whereas controls' remained consistent (21). Year 12 participants' scores increased, whereas controls' decreased (22).

Table 8: Sustained Ego-resilience analysis

<u>Sustained Ego-Resilience</u>						
	<u>Df</u>	<u>F</u>	<u>p</u>	<u>η^2</u>	<u>Ref</u>	<u>Appendix</u>
ANOVA Within						
Group and year	4,168	2.90	0.02	0.07	24	15.2
ANOVA Between						
Group	1,84	8.35	0.005	0.09	25	15.3
Group and gender	1,84	8.50	0.005	0.09	26	
Group and year	2,84	3.66	0.03	0.08	27	
Group, gender and year	2,84	3.81	0.03	0.08	28	
Pairwise	<u>diff</u>	<u>P</u>	<u>95% CI</u>			
compare participants to controls	3.92	0.005	1.22	6.60	29	15.4

compare participants to controls by gender					
Control females v males	-1.98	0.31	-5.84	1.89	15.5(2)
Participant females v males	5.92	0.002	2.17	9.66	30
Males participant v controls	-0.04	0.98	-2.74	2.67	15.5(1)
Females participant v controls	7.86	0.001	3.2	12.52	31
compare participants to controls by year					
Year 7	2.78	0.10	-0.58	6.15	15.6(1)
Year 10	-0.24	0.85	-2.35	2.83	
Year 12	9.19	0.009	2.32	16.07	32
compare participants to controls by gender and year					
male, year 7, part v control	-2.53	0.32	-7.58	2.51	15.7(1)
male, year 10, part v control	-0.29	0.88	-4.17	3.58	
male, year 12, part v control	2.72	0.29	-2.31	7.76	
female, year 7, part v control	8.10	0.001	3.64	12.55	33
female, year 10, part v control	-0.19	0.91	-3.61	3.24	
female, year 12, part v control	15.67	0.02	2.88	28.54	34
control, year 7, female v male	-4.30	0.11	-9.59	1.00	15.7(2)
control, year 10, female v male	0.04	0.98	-3.58	3.66	
control, year 12, female v male	-1.67	0.73	-11.33	8.00	
participant, year 7, female v male	6.33	0.003	2.18	10.49	35
participant, year 10, female v male	0.14	0.94	-3.55	3.84	36
participant, year 12, female v male	11.28	0.024	1.51	21.04	37
<u>Plot of main effects</u>					
Group	Participant	Control			<i>Plot</i>
Male	Increase	Steady		38	15.1
Female	Reduce then increase	Reduce		39	15.2
Year 7	Steady	Steady		40	15.3
Year 10	Decreased then return to origin	Increase		41	15.4
Year 12	Increase	Steady		42	15.5
	Increase	Decrease		43	15.6

There were significant interactions within ego-resilience, group and year ($F(4,168)=2.90, p=.02, \eta^2=.07$) (24), between groups ($F(1,84)=8.35, p=.005, \eta^2=.09$) (25), group and gender ($F(1,84)=8.50, p=.005, \eta^2=.09$) (26)), group and year ($F(2,84)=3.66, p=.03, \eta^2=.08$) (27), and group, gender and year ($F(2,84)=3.81, p=.03, \eta^2=.08$) (28). Participants' sustained ego-resilience change was significantly higher than that of controls (29). Participant female differences were significantly larger than males' (30), and female controls (31). Year 12 participants changed significantly more

than controls (32). In Year 7 and 12, female participants changed significantly more than female controls, (33, 34). Year 7 and 12 females changed significantly more than males (35, 36). The pattern across years was inconsistent, although the tendency was for participants' scores to increase (35-37). Sustained ego-resilience was consistent by group alone (38). Participants' scores increased at each point, whereas controls' decreased, and point 3 was the greatest relative increase between controls and participants. Male participants' sustained ego-resilience reduced at point 2, and increased to higher than origin by point 3. Controls were steady at points 1 and 2, and reduced at point 3 (39). Females' sustained ego-resilience was consistent at each time-point (40). Year 7 participants' decreased at point 2 and returned to origin at point 3, whereas controls increased (41). Year 10 and 12 participants increased, whereas controls remained steady or decreased (42 & 43).

Well-being

Table 9: Immediate Well-being analysis

Immediate Wellbeing						
ANOVA Between	Df	F	p	η^2	Ref	Appendix
Group	1,85	3.40	0.07	0.04	44	16.3
Group and gender	1,85	3.91	0.05	0.44	45	
Group and year	1,85	3.50	0.03	0.08	46	
Pairwise	Diff	P	95% CI			
compare participants to controls	4.26	0.07	-0.33	8.45	47	16.4
compare participants to controls by gender						
Male part v control	-0.31	0.89	-4.92	4.30		16.5(1)
Female part v control	8.83	0.03	0.89	16.77	48	
Control females v males	-3.26	0.33	-9.86	3.34		16.5(2)
Participant females v males	5.88	0.07	-0.50	12.26	49	
compare participants to controls by year						
Year 7	5.47	0.06	-0.27	11.21	50	16.6(1)
Year 10	-2.43	0.27	-6.81	1.95		
Year 12	9.74	0.10	-1.99	21.46		

<u>Plot of main effects</u>	Participant	Control		<i>Plot</i>
Group	Steady	Decrease	51	16.1
Male	Increase	Decrease	52	16.2
Female	Increase	Increase	53	16.3
Year 7	Decrease	Decrease	54	16.4
Year 10	Increase	Decrease	55	16.5
Year 12	Steady	Steady	56	16.6

There was a marginally significant main effect of group on immediate well-being ($F(1,85)=3.40$, $p=.07$, $\eta^2=.04$)(44), and significant interactions between group and gender ($F(1,85)=3.91$, $p=.05$, $\eta^2=.44$)(45), and group and year ($F(1,85)=3.50$, $p=.03$, $\eta^2=.08$) (46). Participants scored significantly higher than the control group (47). Participant female well-being was significantly higher than controls (48) and participant males (49). Year 7 participants scored marginally significantly higher than controls (50). Participants' well-being was maintained, whereas controls decreased. The decrease appears to be within males (52), not females (53). Changes were consistent within years 7 and 12, but not 10.

Non-parametric sustained well-being data prevented ANOVA. Non-parametric tests were conducted to ascertain group effects on immediate and sustained well-being.

Table 10: Well-being non-parametric analysis

Friedman's test	χ^2	Df	p	<i>Ref</i>	<i>Appendix</i>
Immediate control	2.17	1	.14	57	16.7
Immediate participant	4.41	1	.04	58	
Sustained control	1.58	2	.45	59	16.8
Sustained participant	4.11	2	.13	60	
Mean scores	Time 1	Time 2	Time 3		
Control	49.77	48.20	49.36	61	16.7
Participant	49.06	50.45	49.41	62	16.8

The difference in participants' immediate well-being was significant ($\chi^2(1)= 4.41$, $p=.04$) (58), unlike controls' ($\chi^2(1)= 2.17$, $p=.14$) (57). However, sustained changes were non-significant for both groups (59 & 60). Participants' immediate well-being

increased (62), and controls' reduced (61). In the sustained period, participants' well-being increased marginally from origin (62), whereas controls' diminished marginally (61).

Overall, participating in the course led to significant improvements in immediate and sustained mindfulness and ego-resilience, and maintenance of participants' immediate well-being whilst controls' declined. Group had significant effects on immediate resilience and well-being, and sustained mindfulness and resilience. Females' resilience remained steady, whereas males' tended to decline. Females' well-being was more stable than that of males. There is a mixed pattern of relative increases and decreases within participant and control groups on mindfulness, resilience and well-being scores, but an overall pattern of increases in participants' scores when compared to those of controls.

Qualitative Results

The percentage of positive and neutral/negative responses to key interview questions by participants is outlined in Table 11 (Appendix 17 for analysis by student). 67% of responses were positive. There were differences by year, which reflects the quantitative results.

Table 11: Summary of responses to core interview questions

Year	7		10		12		Total	
Answer	+ive	-Ive	+ive	-ive	+ive	-ive	+ive	-ive
Percentage	78%	22%	55%	45%	96%	4%	67%	33%

The reported quotes are primarily positive, and enable understanding of the researcher's analytic interpretations; teacher and parent quotes are marked (T) and (P). There were over-arching effects on awareness and self-regulation, and on psychological factors (Table 12) across participants (Appendix 18). An analysis of the elements within each sub-theme is contained in Appendix 9, and Appendix 19 contains

a full set of 116 quotes which constitute sub-theme “controlling attention” within “Self-regulation”.

Table 12: Summary of major and sub-themes derived from the narrative

Major theme	Sub-themes				
Awareness	Recognising and accepting present moment inner states - emotions, thought and physical sensations				
Self-regulation	Regulation of thoughts	Emotional reactivity	Regulating behaviour	Controlling attention	Deploying Mindfulness
Psychological effects	Self-Efficacy	Self-confidence	Goal setting	Relatedness	Motivation-benefits, enjoyment

Awareness

Students reported being more aware of the present moment

“I’m more able to feel in the present moment than just keep wandering and imagining things in the past, so inside now I understand where I am, what I’m doing and who I’m with, and it’s helpful.” (**Molly**)

Awareness and acceptance of emotional states increased, and **Julia** recognised that “now I’ve done mindfulness, I understand more about how I’m feeling and why I’m feeling that way”, and **Anna** said mindfulness “helped me to accept things instead of pushing them away”.

Students also reported greater acceptance of others:

“I don’t really criticise people as much.... some people are the same and some people are different, so after mindfulness I understand why people are different, and you have to accept that you can’t change that”(Molly).

Self-regulation

Regulation of thoughts

Students reported greater clarity of thought, described by **Alistair** as “I can think more clearly and more rationally”. **Chris** noticed Improved task-parsing, and the effect of deliberately regulating thoughts is described by **James**:

“It just helps me to gather up my thoughts, and sort of restart.... I can keep my mind focused, just getting work done, and find the answer to the problems I face.”

Molly noticed a change, but acknowledged that she has not experienced a complete attitudinal-shift, saying “I’ve started to think positively more... I do still think negatively, but not as much as before”.

Changes in the effect of decision making were noticed by **Felix**, who said

“I’ve respected my own choices better. I’ve known how to make choices better, and I make better choices - better for me, for now and for my future”.

Emotional reactivity

Noah recognised that he now has a practical skill to regulate his reactions: “when I think about calming down, I’ve actually had some lessons on how to do it, so I can do it”. Students explained that they still experience anger and annoyance, but respond to it differently - “I’m better at dealing with things that annoy me” (**Sam**) and “when I feel angry, it doesn’t annoy me as much” (**Lucy**). Some use mindfulness exercises specifically: “when I’m angry or upset, I use mindfulness to calm me down” (**Esther**).

Regulating behaviour

Students noticed greater regulation of their behaviour as a consequence of responding instead of reacting. **James** says “I think more before I act, instead of making irrational decisions straight away”, whereas **Jane** responds differently to provocation, saying “before, I’d get angry straight away and start shouting, but now I don’t - I think about what I’m going to say, I just make my point”, which **Jude** says “helps me to get a better

outcome than before". **Stacey** noticed that teasing had diminished "because I'm not reacting to it anymore - they do call me names, it's just I chose to ignore it".

Harry experienced greater self-regulation in class, saying

"I try to think about what's best for me and not what would be best for everyone else to see.... I am one of those people who mess around, but once we started this, I just started to get down and do all the stuff that was said for us..... I liked what I got out of it, like the stuff that helped me, helped me through it. The breathing exercises and stuff, I really enjoyed those..... I do think about things a lot more now..... I only started doing it after mindfulness, so I think that it is the mindfulness that's been helping me.... it's helped me to stop doing all that stupid stuff I do."

When asked how that was for him, he answered "I like it!"

Externalised effects were noticed by fellow students and teachers in the classroom.

Martin(T) reported "really clear improvements" in behaviour, and individual change: "one student would blow up very quickly, and that is no longer the case.... that aspect of going from nought to ninety has gone as the person's gained more control".

This had effects on classroom dynamics; **Helena** said "I think that our class actually got quite a lot more well-behaved as a result of it". **Martin(T)** validated this, saying

"Some pupils do seem to be much more calm and better at getting to work straight away from the start" which "means that at the start of class you don't have the incident that's going to blow up and derail the beginning of the class, which is a massive effect."

Anna recognised this "helps a lot - other people aren't being distracting, and it helps you not distract other people if everyone's doing what they're meant to be doing".

The effect of this for **Adrian** was that "you can hear what the teacher's saying, so you can understand the answers". **Dom** offered an interesting insight into disruption: "I was struggling in chemistry and I couldn't do it, so I was chatting about other things to fill the time".

Observing her son's changed attitude to school, **Jennifer(P)** reported that

"There has been a change and it has been the last six weeks of the last term last year (the period of the course), and certainly now. I think he's trying, he's certainly trying, and I don't think he particularly tried before.... he's not playing at being at school anymore, he *is* at school."

Controlling attention

Benefits to aspects of education were widely reported; **Felix** is "more engaged in the lessons". **Molly** noticed that "I didn't pay attention that much, but now I get focused on what the person's telling me", and **Yolande(T)** recognised that "they are very good at listening now, whereas before, I might have to say things several times".

Harry acknowledges the allure of distraction, and said

"There have been times when I wanted to be distracted, but I've controlled myself to carry on doing what I've been doing. So it's helped me personally, to want to more in the lessons, because I used to not be able to complete all my work. Now, I try to do like the best I can, achieve the most that I possibly can..." and "when there's a task to be done, I'm more focused on it than I would have been."

Students were more able to direct their attention, **Alastair** said "you can think "Right, this is what I'm doing now"", the consequence of which for **Marcus** was "I get work done a lot faster and to a better standard".

Jennifer(P) was realistic about being unable to observe her son's inner processes, saying "I don't think I'd be able to comment on the concentration level. I certainly know he's got a better grasp of things. He's paying more attention. He's got a better understanding.... he's taking it in, he's absorbing more".

There were benefits to homework, exams and revision; **James** said "it made revision a lot easier if I just took the time to focus". Memory improved, as **Jude** reported "I've

found it easier to remember things, and that it's actually going in, because I can focus on it for longer and better". However, **Marie** did not notice a change, explaining "I don't think I ever had bad concentration in the first place".

Deploying mindfulness

The reported tactical deployment of mindfulness techniques as and when they are needed is encapsulated by:

"I don't think about it when I'm just getting on with it, but when I'm in a muddle, I'm just "Ah, try this!"... it seems like the best way to do it, cos there's no point in doing it if you don't need to do it.... I'm sure there is a reason to do it all time." (**Dom**)

Whilst unable to restrain an initial reaction, **Robbie** reported that he used mindfulness techniques to calm himself, explaining "once my brother was annoying me so much, I hit him, and I got told to go to my room, so I did it in there, and after about five minutes I calmed down". This employment of mindfulness exercises had noticeable calming effects, **Rachel(P)** said that "mindfulness has been very helpful to her. Well, she gets agitated, she goes and hides for a bit and then comes back, and she's much calmer, much more focused".

The techniques' utility is described by **Lucy**:

"I can use mindfulness to reduce stress. I don't have any other practical skill I can use."

Students report using mindfulness techniques to overcome occasional and chronic sleep problems; this is described by **Alastair** as:

"I used to have pretty bad insomnia; I didn't used to be able to sleep much at all, but I'm not too bad now.... the beditation practice, that's the thing that helps me; it's part of my routine now"

the effects of which is “I’m awake for once! That's another thing that’s contributed towards the clearer mind, ability to work and manage things better.... I'm more awake and I can think about it more.”

Psychological effects

Self-efficacy

Students reported greater self-efficacy; **Julia** said “it’s making me feel more self-competent”, and **Jane** that

“I feel now I can reach my goals of what I want to do in the future, whereas before I was “Oh I don’t know if I can do that”.... now, I feel like I can.”

This was externally noticeable; **Jennifer(P)** recognised a change her son’s attitude, saying: “he didn’t do as well as he expected in his exams, but he had the right reaction - it wasn’t “Oh well, fuck it”, it was “Oh God, I thought I'd have done better than that.” He’s gone back to school very positive and homework is being done”.

Self-confidence

Changes in self-confidence were reported by many students; **Jude** said “I feel more secure in myself and more confident about my views” allowing her “just say what I really want”. This was observable, and she said that her Mum had commented “that I seemed just more confident and walking taller”. **Zach** said the effect of being able to “control myself” was that he feels “more grown up”, although **Olivia** had not noticed a change, explaining “I was confident already”. **Connor** reported increased resilience as being able to “bounce back easier” from difficult situations.

There were effects in school:

“it’s helped me be calmer in class and less anxious, so being more confident and speak out... the teacher will explain it - if you get it wrong, you find out how to do it right.” (**Adrian**).

The effect of enhanced academic performance was that “my confidence is better; it’s

just quite nice to know I'm improving really" (**Marcus**). Positive feedback from teachers in an improved school report boosted **Molly's** confidence: "the teachers see that I'm doing things differently now - I feel happy about that".

Goal setting

Differences in goal-setting arose across age groups. Year 7 students did not report changes, whereas Year 10 students became more goal-orientated. **Libby** said "before I didn't really care, but now I do care what I do in the future". **Elizabeth** recognised "before, I used to not want to try anything new, but now I'm more open to the future, or not as closed-minded". **Jennifer(P)** noticed a change in her son's goals, reporting that "it was "I'm not staying on" but now, it's "I need better grades to get into sixth form"".

Year 12 students reported reappraising their goals to fit with authentic interests and abilities; this is encapsulated by **Dom**, who reported changing his ambition from medicine:

"It's allowed me to think more clearly about the future, as in reassess what my options actually are.... I'd rather do something that doesn't pay as well, but that I enjoy and is interesting and I don't really have to struggle with.... I don't want to wake up in the morning and think "Oh God, I really don't want to do it"."

Relatedness

Students reported improved relationships, both through improved communication:

"I've been getting on better with people, which is quite nice, and not annoying as many people with what I say" (**Dom**)

and increased self-regulation in inflammatory situations (**Harry, Anna**). **Stacey** reported greater harmony at home, saying

"I used to argue with my Mum a lot. Since I've done the mindfulness, we haven't had an argument."

Lucy described a fundamental shift in beliefs about others, saying “I’ve realised that you can trust other people. I had fear of certain people; now I know that everyone is the same”.

Motivation

Recognising benefits motivated students to engage in the course, and it took time for benefits to manifest: “at first, I thought it was a bit boring, but then I found that, as I got to do it more, it was helping me at home and at school”(Jane). **Harry** agreed, saying “it has made a big change in my life”.

A number of students in the conscripted cohort said that they would have preferred to have a choice about doing the course. **Martin(T)** said “I think those who were open and receptive were able to, and I think within that class it was more the minority of people that found that they didn’t get something from it, and some of those who said that they didn’t actual did!”

Specific physical benefits were reported, **Felix** reported:

“I feel healthier..... I think that it’s healthy mind, healthy body. I’m probably in better shape than I’ve been ever in my life, which is pretty good. My skin cleared up immediately, just whilst doing the mindfulness lessons; I’m sure it was connected, and I’ve just been more willing to look after myself.”

Students described feeling happier, which is encapsulated by **Chris**:

“I really think I am happy..... I’m really enjoying my life at the moment in a way I haven’t done previously“

Jude reported “it’s made me calmer and happier”, and **Ben** said that his friends have “noticed I’ve been calmer, and more playful, and yeah, more happy”. **Jennifer(P)** noticed that her son is “enjoying what he’s doing more”.

Enjoyment

Summing up the overall effects of the course, **Alistair** said:

“I thought it was really good; it was good fun, it was very interesting,

something new. It was really relaxing - I think it's made a considerable difference. I do it as much as I can it's not strenuous, it's not work, but it's something that considerably benefits your work."

James agreed "it was very enjoyable. It was definitely different as well"; and **Felix** "would like to do more". **William's** experience confounded his expectations

"I thought it was going to be.... before I was thinking "Eugh, we've got to do some mindfulness, ching chong ching chong, blah blah blah" stuff like that... but I thought it was actually really good!"

Discussion

Participating in the .b course was associated with significant effects on mindfulness, ego-resilience and well-being, unlike the shorter pilot programme (Huppert & Johnson, 2010), and there were differences between year groups and genders. Comparison to the control group increased the reliability of outcomes, as the effects of maturation and in-school events can be assumed to be reasonably consistent within year groups, although there was no control of individualised events.

The increases in mindfulness and resilience post-course suggest that this is an incremental process, as described by Hanh (1991), and one which continues as students integrate mindful attitudes and practices into their daily lives. Although the effect size of these changes is nominal, this is an important finding as no previous studies have assessed sustained effects for adolescents. The oldest group of participating students (Year 12) experienced a significant improvement in ego-resilience, whereas younger students did not. What distinguishes this group is that they volunteered to take the .b course. Within SDT (Deci & Ryan, 2000), this volitional participation may have affected their motivation to engage in the programme, and to practice at home. Choosing to take part concurs with Fennell and Teasdale's (1987) plausibility effect, and the voluntary group was more consistent in reporting benefits than the conscript groups, which may reflect autonomy.

The effects of .b on well-being are interesting because the participants' scores remained steady over the course period, whilst controls' reduced. This generated a significant effect on well-being that would not otherwise have been detected, and suggests that the participating students may have been able to maintain their well-being during events which contributed to their peers' deterioration. This increased resilience to life events is a characteristic of cultivating mindfulness (Kuyken et al, 2010).

The larger increases in resilience and well-being for females suggests that girls have at least as great a potential as boys to benefit from the programme, although the possible influence of non-equal gender distributions in the Year 10 and 12 participant groups cannot be quantified. Interestingly, male participant mindfulness and ego-resilience decreased in comparison to controls during the course; this may be the manifestation of increased inner-state awareness, and the deterioration did not persist in the longer period. The participant and control groups' pre-course scores were not significantly different, which suggests that there was similar potential for improvements in both groups, and that schools' selection of conscript classes did not mediate the outcomes.

The interviews provided a broad, deep basis from which to understand experiential effects underpinning quantitative changes. Sustained and immediate themes were consistent; some participants reported habituation of mindfulness practice, responses and attitudes, whilst others had ceased to practice.

Whilst self-awareness and self-regulation are explicit in the course content, the students' feedback about the effects of .b was evidently grounded in their internal experience, not in a theoretical framework. Teachers, parents and students provided a valuable multi-dimensional portrayal of externally noticeable effects, which increases the veracity of the research findings. However, it is important to acknowledge that not all students reported engagement in the course or beneficial changes.

The accounts of increases in the principle components of mindful awareness, which are awareness of present moment thoughts, emotions and physical sensations (Kabat-

Zinn, 1982), confirms the significant increase in mindfulness scores. Acceptance of these states is fundamental to mindfulness (Kabat-Zinn, 1990). Students experienced the benefits of not pushing away unpleasant thought and emotions, which is argued to be important to the effectiveness of adult clinical programmes (Kuyken et al, 2010). Concordant with increased acceptance is the reported greater ability to accept situations over which they had no control.

Acceptance of situations and acknowledging one's ability, or lack thereof, to influence outcomes supports appropriate action (Bandura, 1977). Appropriate action was supported by widely-reported increases in self-regulation of thought, emotion, behaviour and attention.

The potential of increased attention-regulation is manifest in those who reported increased motivation, productivity and accuracy of school work. Problem-solving capability, and the ability to parse overwhelming problems or workloads into do-able tasks, improved, suggesting improved executive function (Flook et al, 2010). This change created a sense of control (Shapiro et al, 2006), which potentially reduced amotivation (Stipek, 1988). Being able to deliberately focus on sequential elements of tasks was helpful to homework, revision and exams. Evidence of improvements in students' ability to learn and recall information indicates improvements in working memory, established by Jha et al (2007). Coupled with this was an increased ability to deliberately resist the hijacking of attention by distractions, and to maintain attention on the task in hand, as per Napoli et al (2005) and Schonert-Reichl et al (2007, 2010). Experiencing these improvements was motivational for students, and benefitted self-determination (Deci & Ryan, 2008). The reported positive feedback from teachers may have reinforced intrinsic improvements in self-efficacy (Bandura, 1977). Changes in the classroom dynamic and self-confidence improved students' ability and willingness to ask teachers for help, which is important to successful learning.

Students' deliberate employment of mindfulness techniques to exert control over inner states, and quell worrisome thoughts, is a judicious approach to managing stress and potentially improves self-efficacy as mastery of one's own state increases (Bandura, 1977). This not only allowed them to more resilient to their inner states, but

to external stressors too. Greater self-determination (Deci & Ryan, 2000) is evident in increases in authentic decision-making, and greater synchronicity between personal choice and behaviour. An important benefit derived from the ability to purposefully control attention was the ability to overcome occasional and chronic insomnia, agreeing with Wall (2005). Improved sleep increased clarity of thought, established by Broderick and Metz (2009), and daily functioning for previously fatigued students, enhancing their ability to be academically effective.

A sense of effectiveness and control was promoted by lower emotional reactivity to difficult situations, and being able to deliberately calm oneself using mindfulness techniques (Shapiro et al, 2006). Students were more accepting of their appropriate anger, as described by Kabat-Zinn (1990). This produced noticeable trait changes in responses to anger, engendering a sense of capability to manage self and situations. Deliberately considering possible actions in given contexts was widely reported by the students, and an increased ability to purposefully control one's propensity to engage in conflict, cause disruption and annoy others was evident. This offers insight into the internal processes and motivations which underpin externally noticeable behavioural change, and may be important in behavioural-modification contexts beyond the classroom environment in which this study occurred. Not only does this volitional behaviour promote self-determination (Deci & Ryan, 2000), its effects on the ability to manage one's own behaviour produced noticeable positive effects on students' behaviour in class, as in Schonert-Reichel et al's studies (2007, 2010).

Greater self-regulation, and decreasing thoughtlessness (i.e mindlessness), created improvements in social relationships, established by Beauchemin et al (2008). This may reflect increases in trait mindfulness characteristics (Miners, 2008), and improved relatedness is concordant with increasing self-determination (Deci & Ryan, 2000).

The elements of self-regulation of attention, thought, emotion and behaviour are not individuated processes - they are co-dependent, and the manifest changes are the result of changes in an individual's ability to be more mindfully aware of their inner states, and deliberately deciding how to respond to them. A minority of students reported major changes in their behaviour, which were corroborated by others. As

Huppert and Johnson (2010) and Flook et al (2010) suggest, students who had lower initial self-regulation than their peers may have had greater potential to benefit. Indeed, the statement which explains that one student chatted in class because he was struggling to understand the material is one which offers insight into the behavioural effects of experiencing low competence in class. Another was able to regulate his classroom behaviour both in the face of temptation and his beliefs about others' expectations of him, and instead do what was best for himself. This potentially transformative shift was intrinsically generated, rather than externally imposed. It reflects Peters et al's (2011) finding about the inverse relationship between trait mindfulness and impulsivity, as do reported reductions in reactivity to anger (inner state) and to provocations from others (external stressors). Whilst this volitional, autonomous change is key to increased self-determination (Deci & Ryan, 2000), the imposition of mindfulness training on three of the four groups may have reduced their potential for improvement, making the reported attitudinal shifts reported by some conscripted students particularly noteworthy.

The general effect of less disruption and greater attention in class increased students' ability to work (per Schonert-Reichl, 2007 & 2010), which was welcomed by teachers and students. Importantly, teachers reported increases in the effectiveness of teaching to a more attentive, less disrupted class. Lack of reaction to disruptive behaviour was suggested to be a factor in others' reduced levels of inappropriate behaviour. It may be that a lack of rewarding response to disruptive behaviour, and a consequent reduction in its utility, may promote behaviour modification (Kocsis et al, 2009) and reduce motivation to behave in this way (Deci & Ryan, 2000). Whilst it is not possible to separate the effects of increased internal regulation from that of reduced external reward, teachers reported that students who asserted that they had not gained any benefit from the .b course were noticeably less disruptive.

Whilst a small number of students practiced on a regular basis during and after the course, the majority did not practice outside of the classroom. Rather than establishing consistent mindfulness, students tended to deploy mindfulness techniques and attitudes when challenging situations arose. This did not appear to happen every time a difficulty arises, although some students had habituated a

mindful response to sleep problems, moments of stress, worry and confusion. Some students continued to use the techniques post-course, whilst others reported a diminution then cessation without the support of regular classes. This suggests that on-going support may encourage practice-maintenance, but lack of on-going motivation may be associated with lack of perceived need. Although the sustainability of MBSR outcomes over three years is described by Miller et al (1995) the patients in these programmes, who were suffering from deleterious levels of stress, may have greater motivation to practice in order to maintain therapeutic improvements than those not suffering in this manner. The students in this study did not have clinical diagnoses, and so it is significant that some students experienced sufficient benefits to motivate them to practice post-course and/or to utilise mindfulness techniques to purposefully regulate impulse, mood, thoughts or attention, and to generate sustained effects which exceeded immediate effects.

The evidence suggests that motivation to be mindful, and to practice, was recognising benefits for self in daily life and enjoyment of the course (per Mendelson et al, 2010), which confounded some students' expectations. Liking a course, and its effects, is argued by Fennel and Teasdale (1987) to positively mediate outcomes.

The psychological benefits of the course were diverse. Increased self-confidence in personal and school contexts supported students in over-coming pre-existing problems in asking for help from teachers, tackling difficult tasks, meeting new people and expressing opinions. Students expressed greater belief in their own ability to be effective, established to be a characteristic outcome of mindfulness training by Grossman et al (2003) and critical to self-efficacy (Bandura, 1977). Self-efficacy is associated with the implementation of behavioural intentions into actions (Stretcher et al, 1986), and likeliness to attempt to master tasks, rather than avoid them (Bandura, 1977). The changes in attitudes to learning, and immediate and projected effects on educational and personal achievements, may be underpinned by increased self-efficacy.

Bogels et al (2008) established difference in goal setting amongst ADHD students, and this effect is replicated with these typical students. The differences by year groups

reflect the different imminent and long-term opportunities available to them. Year 7 students did not appear to be goal orientated, and were primarily concerned with overcoming the immediate challenges of adaption to secondary school, and managing relationships with family and friends. Year 10 students became more focused on attaining higher education and career opportunities, and whilst they were more open to opportunities, goals tended to be non-specific. Year 12 students, who are more likely to have already orientated their educational choices towards specific goals, either felt more confident about achieving their pre-existing goals, or reappraised their goals in line with authentic abilities and interests. Recognition that a meaningful, enjoyable career was more important to them than material gain at the cost of unhappiness was reflective of the increases in autonomy identified by Deci and Ryan (2000) as an element of increased self-determination.

An overall effect reported by many students was increased general relaxation and calm (Campion & Rocco, 2009; Broderick & Metz, 2009), which is different from the ability to deliberately calm oneself when stressful situations occurred. This greater general calm may reflect a reduction in anxiety, characteristic of mindfulness training in children (Beauchemin et al, 2008)) and adults (Grossman et al, 2003). Increases in general happiness were reported by some students, and reduction in negative cognition was identified by Broderick and Metz (2009) as an effect of mindfulness training. Trait mindfulness is positively correlated with positive emotion and negatively with anxiety in adolescence (Miners, 2008), and an increase in general happiness and calmness may be the manifestation of increases in trait mindfulness. This is interesting, as those students who “deploy” mindfulness skills as a management skill may only affect their temporary (state) levels of mindfulness, and the effectiveness of practicing mindfulness prior to tasks may reflect the “state not trait” effects established by May et al (2011). This may explain the apparent differences between the small, albeit significant, effect on mindfulness scores and the diverse and notable effects reported in interviews. Further investigation of this state/trait change presents an interesting research opportunity. Comparing the effects of .b, which teaches theory and practice, to “technique only” and “theory only” versions, would identify theory-effects and practice-effects on students’ scores and experiences. Nonetheless,

students' reported that engaging in the exercises resulted in daily life benefits, increased attention, awareness and regulation which suggests that practice mediates these effects.

Critique of the study

It is important to acknowledge that the researcher is embedded in both mindfulness research and practice, and was motivated to undertake this study as a result of her own experiences and belief that cultivating mindfulness in adolescence could have wide-ranging benefits. She observed, assisted on and participated in School 1's teaching programme, spending 9 hours with this school's students prior to interviewing them, and attended the first three classes at School 2. Whilst this may have had an effect on the interviews, negative and neutral outcomes were reported by these cohorts, although some students may have responded in accordance with participant bias. The predominantly positive response by students at School 3, where there had been minimal contact with the researcher, offers some assurance that a balanced approach was maintained. The researcher strove to maintain impartiality, and to put aside her own experiences, knowledge and beliefs whilst gathering and analysing the data, but acknowledges her positive bias towards mindfulness.

Although one teacher taught all the courses, inherent differences between the classes and school environments may have reduced the homogeneity of course delivery. However, the .b programme allows teachers to adjust the course in response to classroom dynamics, and some variance was acceptable in this applied multi-centre cognitive study.

Conclusions

In conclusion, this controlled longitudinal study demonstrates that .b training was associated with significant improvements in mindfulness and ego-resilience, and greater stability of well-being for adolescents in typical secondary schools. The interviews allowed exploration of the diverse effects of cultivating mindfulness, and revealed experiential effects on self-awareness and self-regulation. Awareness and

regulation of inner states created observable changes in behaviour and improvements in academic productivity and performance.

There were direct effects on psychological well-being and self-reported confidence, competence and effectiveness, which are key components of self-efficacy (Bandura, 1977). Self-efficacy mediates the translation of intention into practice, which may underpin reported increases in motivation and goal-setting. The goal-adjustment behaviour is a reflection of greater authenticity which, along with improved social relationships and increased volitional control of decision-making and behaviour, reflects increased self-determination.

Trait and state mindfulness appeared to differ between students. The deployment of mindful attitudes and techniques as situation-specific tools is not the explicit intention of the .b programme, but the evidence suggests that this is how many students perceived and utilised mindfulness. This would manifest as state mindfulness, and may explain the disparity between the small effect size on mindfulness scores and the sometimes profound experiential benefits. The short practice time in .b may not be sufficient to trigger the neurological, and potentially trait-determinant, changes detected in adult studies. Although some students reported practicing at home and post-course, this was the exception, which moderates the potential for neurological change.

In summary, this study demonstrates that, in common with other MBI's, .b is associated with immediate improvements in adolescents' functioning and well-being, and establishes that these effects continue to develop post-course. It offers explanations of what underpins b's diverse effects, and identifies the cognitive shifts which create volitional, intrinsically-derived behavioural changes in class. Important in educational contexts is the effects of this on "teachability".

Overall, this study establishes that the .b programme is viable and effective in mixed-gender secondary schools across different year groups, and has the potential to benefit adolescents in ways which reflect their diverse pre-existing strengths and challenges.

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