Workplace mental health training for managers and its effect on sick leave in employees: a cluster randomised controlled trial

Josie S Milligan-Saville, Leona Tan, Aimée Gayed, Caryl Barnes, Ira Madan, Mark Dobson, Richard A Bryant, Helen Christensen, Arnstein Mykletun, Samuel B Harvey

Summary

Background **Mental illness is one of the most rapidly increasing causes of long-term sickness absence, despite improved rates of detection and development of more effective interventions. However, mental health training for managers might help improve occupational outcomes for people with mental health problems. We aimed to investigate the effect of mental health training on managers' knowledge, attitudes, confidence, and behaviour towards employees with mental health problems, and its effect on employee sickness absence.**

Methods **We did a cluster randomised controlled trial of manager mental health training within a large Australian fire and rescue service, with a 6-month follow-up. Managers (clusters) at the level of duty commander or equivalent were randomly assigned (1:1) using an online random sequence generator to either a 4-h face-to-face RESPECT mental health training programme or a deferred training control group. Researchers, managers, and employees were not masked to the outcome of randomisation. Firefighters and station officers supervised by each manager were included in the study via their anonymised sickness absence records. The primary outcome measure was change in sickness absence among those supervised by each of the managers. We analysed rates of work-related sick leave and standard sick leave seperately, with rate being defined as sickness absence hours divided by the sum of hours of sickness absence and hours of attendance. This trial was registered with the Australian New Zealand Clinical Trials Registry (ACTRN12613001156774).**

Findings **128 managers were recruited between Feb 18, 2014, and May 17, 2014. 46 (71%) of 65 managers allocated to the intervention group received the intervention, and 42 (67%) of 63 managers allocated to the control group were entered in the deferred training group. Managers and their employees were followed up and reassessed at 6 months after randomisation. 25 managers (1233 employees) in the intervention group and 19 managers (733 employees) in the control group provided data for the primary analysis. During the 6-month follow-up, the mean rate of work-related sick leave decreased by 0·28 percentage points (pp) from a pre-training mean of 1·56% (SE 0·23) in the intervention group and increased by 0·28 pp from 0·95% (0·20) in the control group (p=0·049), corresponding to a reduction of 6·45 h per employee per 6 months. The mean percentage of standard sick leave increased by 0·48 pp from 4·97% (0·22) in the intervention group and by 0·31 pp from 5·27% (0·21) in the control group (p=0·169).**

Interpretation **A 4-h manager mental health training programme could lead to a significant reduction in work-related sickness absence, with an associated return on investment of £9.98 for each pound spent on such training. Further research is needed to confirm these findings and test their applicability in other work settings.**

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Introduction

Mental illness is one of the most rapidly growing causes of long-term sickness absence across developed countries.[1,2] Evidence suggests that this increase is not due to a change in the underlying prevalence of mental ill health among the working age population,[3] but is related to changes in the way society and workplaces perceive mental illness and its effect on work capacity.[2,4] Around half of individuals with a diagnosis of mental illness have moderate or severe occupational impairment, leading to social exclusion, poor self-esteem, and financial hardship.[5,6] Standard, symptom-based treatments in isolation have inadequate effects on occupational outcomes,[7] leading many individuals to conclude that work outcomes for people with mental illness can be improved only by increased involvement of workplaces in support, management, and rehabilitation plans.[8,9]

Managers in the workplace have a key role in determining the occupational outcomes of workers who become unwell.[10,11] Managers hold an understanding of workplace issues, are aware of the duties required of the job, and have the authority to implement adjustments to working conditions.[12] Managers can use their knowledge and ability to prevent long-term disability, but are also in a position to do harm with inappropriate responses or inaction.[13] Observational studies[12,14] showed that early and regular contact from managers during a sickness absence episode was associated with a more rapid return to work

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School of Psychiatry, University of New South Wales, Randwick, NSW, Australia (J S Milligan-Saville BPsych, L Tan MPsych, A Gayed MCrim, Prof A Mykletun PhD, Prof S B Harvey PhD); **Black Dog Institute, Randwick, NSW, Australia** (C Barnes MD, Prof H Christensen PhD, Prof S B Harvey); **Occupational Health Department, The Education Centre, Guy's and St Thomas' NHS Trust, London, UK** (I Madan MD); **Division of Health and Social Care Research, King's College London, London, UK** (I Madan); **Fire and Rescue NSW, Public Safety Office, Sydney, NSW, Australia** (M Dobson BArts); **School of Psychology, University of New South Wales, Sydney, NSW, Australia** (Prof R A Bryant DSc); **School of Medicine, University of New South Wales, Randwick, NSW, Australia** (Prof H Christensen); **Norwegian Institute of Public Health, Bergen, Norway** (Prof A Mykletun); **Centre for Research and Education in Forensic Psychiatry and Psychology, Haukeland University Hospital, Bergen, Norway** (Prof A Mykletun); **Department of Community Medicine, University of Tromsø, Tromsø, Norway** (Prof A Mykletun); **and Nordland Hospital Trust, Bodø, Norway** (Prof A Mykletun)

Correspondence to:
Prof Samuel B Harvey, School of Psychiatry, University of New South Wales, Randwick, NSW 2031, Australia
s.harvey@unsw.edu.au

Research in context

Evidence before this study

Mental illness continues to be one of the most rapidly growing causes of long-term sickness absence and labour market exclusion across developed countries, despite improved rates of detection and development of increasingly effective interventions. Observational studies have suggested that mental health training for managers might help improve occupational outcomes for employees with mental health problems. However, randomised controlled trials of manager mental health training on objective occupational and public health outcomes are scarce. For the purposes of an, as yet unpublished, but related meta-analysis, we searched PubMed, MEDLINE, PsycINFO, Embase, and the Cochrane database, with no language restrictions, from inception until July 21, 2016, with search terms including "manager*", "intervention", "mental health", and "controlled trial". This search identified eight controlled trials of manager mental health training, only one of which assessed an objective outcome. No randomised controlled trials of manager mental health training were identified that showed a significant reduction in employees' sickness absence.

Added value of this study

Our findings show that, over the 6-month follow-up period, 4-h face-to-face RESPECT mental health training for managers in a large Australian fire and rescue service significantly reduced rates of work-related sick leave among employees, but not standard sick leave, in the generalised estimating equation model, and reduced the odds of employees taking standard sick leave in a post hoc zero-inflated negative binomial model. At the 6-month follow-up, managers who received RESPECT training reported improved confidence in communicating with their employees and an increased likelihood of having contacted an employee suffering from mental illness or stress. Cost-benefit analysis based on the generalised estimating equation model suggests a return on investment of £9·98 for each pound spent on such training.

Implications of all the available evidence

This cluster randomised controlled trial shows, for the first time to our knowledge, that simple mental health training for managers in the workplace can generate meaningful public health and individual benefits. These findings provide an economic argument in favour of organisations providing managers with mental health training. Further studies are needed to test similar interventions in other workplace settings.

for employees. However, many managers feel reluctant or underskilled to contact an employee who is on sick leave or showing signs of ill health, especially if the illness concerned is a mental disorder, as they might fear contact could cause harm or lead to complaints.[15]

To address this issue, several organisations are implementing training for managers to promote their understanding of mental health problems among workers. Evidence suggests that managers value such initiatives and feel more confident in discussing mental health matters after receiving training.[16,17] Some research evidence exists to suggest employees of managers who have received mental health training might have reduced levels of psychological distress and greater wellbeing.[16–19] However, to date, the key question of whether manager mental health training reduces the occupational impact of mental disorders and reduces sickness absence has remained unanswered. One pilot study[20] has assessed the effect of online manager mental health training on the sickness absence of employees, but no significant effect on this objective occupational outcome was found. Without a robust evidence base it is difficult for the mental health community to argue that employers need to provide this type of training for their managers.

In this study, we aimed to investigate manager mental health training via a randomised controlled trial (RCT) within one of the world's largest urban fire and rescue services. As a high-risk workforce with a clear managerial hierarchy,[21] an emergency service organisation provides an ideal setting for evaluation of manager mental health interventions. To our knowledge, this study is the first RCT to directly test the effect of manager mental health training on managers' behaviour and employees' sickness absence.

For the **study protocol** see http://www.wmh.unsw.edu.au/projects/new-mental-health-training-fire-rescue-nsw-managers

Methods

Study design and participants

We did a cluster RCT within Fire and Rescue New South Wales (FRNSW), Sydney, NSW, Australia. FRNSW is the seventh largest urban fire service in the world, and responds to fire, rescue, and hazardous material emergencies across metropolitan Sydney and surrounding regional areas.

For the purposes of this study, we defined managers (clusters) as being at the level of duty commander (DC) or equivalent. These individuals are uniformed on-shift managers who are responsible for several different fire stations, and tend to have primary responsibility for sickness absence management or dealing with staff who are unwell. We aimed to include all employed managers at the level of DC or equivalent. We included data for the firefighters and station officers supervised by each of the consenting managers via their sickness absence records. FRNSW removed the names of all firefighters and station officers before providing our research team with these administrative data. All managers gave written informed consent. DCs who did not provide informed consent were excluded from the study. The study protocol was

approved by the Human Research Ethics Committee of the University of New South Wales (HC12562).

Randomisation and masking

A research assistant from an independent research team based at the University of New South Wales randomised (1:1) all eligible managers to receive mental health training immediately or to receive the same training after a 6-month delay, by use of an online random sequence generator. The employees whose manager received the training immediately were classified as being in the intervention group, and the employees whose manager received the training after a 6-month delay were classified as being in the control group. Because of logistical reasons relating to the organisational planning of training, participants were randomised before consent and baseline information were obtained (ie, all 128 managers in FRNSW were randomly allocated). Researchers and managers were not masked to the outcome of randomisation, but it is unlikely employees were aware of the research project or the condition to which their manager was allocated.

Procedures

Managers in the intervention group received the RESPECT Manager Training Programme, which combined mental health knowledge and communication training. The training consisted of three main topics: key features and effects of common mental health issues in the workplace; roles and responsibilities of senior officers in terms of employee mental health; and development of effective skills for discussing mental health matters with staff. The face-to-face training was designed to be interactive and was delivered in a single 4-h session at a training facility operated by the fire and rescue service. Seven small groups of managers (ranging in size from 7–15 people) received the training in seven separate sessions. These sessions occurred across a 2-month period, with the first taking place on Feb 18, 2014, and the last on April 29, 2014. The intervention was provided by either a clinical psychologist or a consultant psychiatrist, with experience in mental health-related educational programmes for workplace settings. In the 8 weeks after completion of training, managers in the intervention group received a single phone call from an employee assistance programme representative specialising in manager assistance to answer any outstanding questions.

The first phase of training focused on the symptoms of depression, anxiety, post-traumatic stress, and alcohol misuse, and how these conditions can be recognised in the workplace. During the second phase of training, helpful responses towards a subordinate with an identified mental health problem were contrasted with poor management practices. Positive communication techniques were then implemented in group discussions. An important component of the third phase of training was learning how to implement the RESPECT principles outlined below when contacting a worker who might be suffering from mental health problems. The RESPECT principles are as follows: Regular contact is essential; the Earlier the better; Supportive and empathetic communication; Practical help, not psychotherapy; Encourage help-seeking; Consider return to work options; Tell them the door is always open and arrange next contact (appendix).

See Online for appendix

For the **online random sequence generator** see http://www.random.org/sequences/

Managers in the control group were emailed a link to an online version of the baseline questionnaire by a researcher from our research team approximately 2 weeks after the first training session. They could complete the baseline questionnaire across a 2-month period, between March 11, 2014, and May 17, 2014. Managers in the control group continued to be offered as much contact with the standard employee assistance programme manager support as needed. Within FRNSW, employee assistance programme specialist advisers are available for managers to contact anytime via phone. These advisers can provide assistance across a broad range of management issues, including the sickness absence of employees.

The pre-intervention period was set as the 6 months before Feb 18, 2014 (the date on which the first group of managers undertook training) for all participants. The follow-up was set as 6 months from the dates of the seven training sessions (between Feb 18, 2014, and April 29, 2014) for managers in the intervention group, which is when they also completed their baseline assessments. These seven post-intervention dates were also assigned to subgroups of control managers, which were approximately equal in number to those who received training on these dates. This strategy was used to minimise potential seasonal differences in sickness absence between the groups, resulting from any differences in when the baseline assessments were completed. We assessed managers' knowledge, attitudes, confidence, and communication behaviours at baseline, immediately after training, and at the 6-month follow-up assessment via a combination of paper and online questionnaires. Mental health knowledge was assessed with a series of true-or-false questions about mental disorders. We assessed stigmatising attitudes towards mental illness using a modified version of previously published measures of personal stigma towards depression, anxiety, and post-traumatic stress disorder;[22–24] a higher score showed greater non-stigmatising attitudes. Managers' knowledge of their role in dealing with employees on sickness absence was assessed by a questionnaire based on the core competencies outlined in published guidance on managers' role in supporting return to work after ill health.[14] Confidence in communicating with employees on sickness absence was assessed by presenting managers with various situations and asking them to indicate their level of confidence on a five-point scale. We converted all responses on the knowledge, attitude, and confidence

scales to percentages. We assessed self-reported communication behaviours with employees on sickness absence using a modified version of previously published supervisor interviews.[12] Managers were asked to think of the most recent case in which an employee was on long-term sickness absence (ie, ≥96 consecutive hours or eight consecutive shifts) because of mental illness, and whether they initiated contact with the employee. Other questions about the managers' communication behaviours towards staff on sickness absence for reasons of stress or physical illness were asked, but are not reported in this paper as they form the basis of an as yet unpublished cross-sectional survey.

We also did a cost-benefit analysis considering the costs and savings from the perspective of the employer. Costs considered included the payment of facilitators to deliver the training, the travel and salary costs of managers attending the training, and the payment of employee assistance programme staff making the phone call after training. The cost or saving of any change in sickness absence rate over the 6-month follow-up was calculated based on the average hourly wage of a firefighter in New South Wales (AUD$35·77, equivalent to £22·00 per h).

Outcomes

The primary outcome was the change in rate of sickness absence from the 6 months before the intervention, compared with the 6 months after the intervention. We assessed sickness absence records of the firefighters and station officers supervised by each of the managers for the 6 months before and after the intervention by use of administrative data provided by FRNSW. Administrative sickness absence records were available only for employees working for managers who had consented to be involved in the study. Firefighters and station officers who changed groups during the period of interest were excluded. Two types of sickness absence were recorded in this administrative data: work-related sick leave and standard sick leave. Work-related sick leave, which relates to Australia's Workers' Compensation scheme, is taken when an employee sustains an injury at work or suffers an illness due to work. Standard sick leave is used when an employee is ill or injured in a manner that is not related to their work. Importantly, the role of the manager and the remuneration of employees are identical for both types of leave. The original study protocol approved by the university ethics committee stated that the primary outcome measure was intended to be the change in the number of hours of sickness absence. However, because some participants were not working full time, we redefined the primary outcome to assess the change in the rate of each type of sickness absence (ie, hours of sickness absence divided by the sum of hours of sickness absence and hours of attendance). This measure, which represents a slight deviation from our published protocol but was selected a priori, is one of the most common methods used to assess sickness absence in occupational medicine literature.

Secondary outcomes were change in managers' knowledge, attitudes, confidence, and communication behaviours.

Statistical analysis

The original study protocol included a power calculation based on the total number of hours of sickness absence. As noted, to allow for part-time workers, the primary outcome was modified to change in sickness absence before the analysis. As the intervention was delivered at the level of managers, but the primary outcome was change in sickness absence among employees, the potential clustering of sickness absence needed to be accounted for in the power calculations. Based on a mean 45 staff members per manager and an intragroup correlation of 0·05, recruiting 3600 employees (via 80 managers) would allow adequate power (0·8) to detect an effect size of 0·2 in terms of change in sickness absence, with an α value of 0·05.

We calculated differences between the intervention and control groups using *t* tests for normally distributed continuous variables, Wilcoxon rank sum tests for non-normally distributed continuous variables, and χ^2 tests for categorical variables. For our a-priori primary outcome measure, the change from pre-training sickness absence rate was computed for each group. In non-randomised studies, which have the potential to be affected by pre-existing group differences, analysis of change from baseline has been found to be less biased than analysis of post-intervention scores, when adjusted for pre-intervention scores.[25] Whether the same observation holds true for RCTs is not clear. However, given our small number of clusters and the potential for large variation in sickness absence, we decided a priori that change in sickness absence would be the primary outcome measure. Differences in the change in absences between the intervention and control groups were then assessed using linear regression with generalised estimating equations and robust SEs to adjust for clustering at the manager level. Absolute change in sickness absence was used as the dependent variable, with intervention group or control group used as the independent variable. Individual employees were level one in the data structure and managers were level two.

A series of zero-inflated models were also created using the number of hours of work-related sick leave and standard sick leave in the post-training period as the outcome measures. Because these models were not part of the original registered protocol, we will refer to these as post-hoc analyses. We analysed our post-hoc outcome measure—number of hours of sickness absence in the post-training period—as count data using random-effects zero-inflated Poisson and negative binomial distributions. We used an offset term to adjust for the

differing numbers of hours of attendance plus sickness absence in the post-training period. The zero-inflated models were constructed using SAS with coding described elsewhere.[26,27]

For the secondary outcomes, a change from baseline score for each measure was computed and differences between the intervention group and control group were assessed using *t* tests. Differences between the intervention and control groups in communication behaviours with employees were assessed using χ^2 tests.

Data were analysed using STATA 12.1 for the a-priori analyses, and SAS version 9.4 for the post-hoc analyses. The trial was prospectively registered with the Australian New Zealand Clinical Trials Registry (ACTRN12613001156774).

Role of the funding source

This project was supported by funding from NSW Health and Employers Mutual Ltd, a regulated workers compensation insurer that provides workers' compensation claims management for various government agencies, including FRNSW. The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Managers were recruited for the study between Feb 18, 2014, and May 17, 2014 and the 6-month follow-up occurred between Aug 18, 2014, and Nov 17, 2014 (figure). All currently employed managers at the level of DC or equivalent who were assessed for eligibility (n=128) were eligible for inclusion in the study, and were randomly assigned to either the intervention group (n=65) or control group (n=63). 46 (71%) of 65 managers in the intervention group received the training (19 declined to participate in the study) and completed baseline questionnaires, and 42 (67%) of 63 managers in the control group completed the baseline questionnaire (ten declined to participate in the study, and 11 mistakenly attended the wrong training after receiving an email from FRNSW mistakenly instructing them to do so). 44 (50%) of 88 participating managers (in the intervention group and the control group) completed the 6-month follow-up questionnaire. Three managers (one from the intervention group and two from the control group) withdrew consent. Sickness absence records of 2298 fire fighters were obtained; however, following exclusion of those who moved team during the study (n=117), data from 2181 employees (95%) remained. Because some individuals did not work for FRNSW in both the pre-intervention and post-intervention periods, they dropped out of the analysis, leaving data from 1966 employees. Each participant in the control group managed a mean 45 employees, and in the intervention group each participant managed 44 employees. The

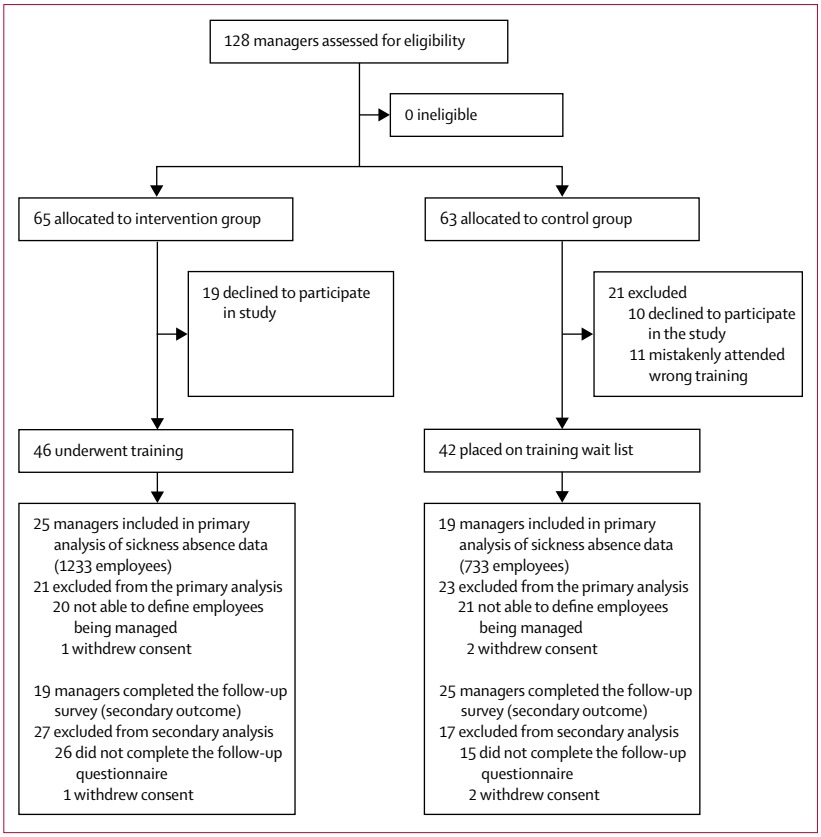

***Figure*: Trial profile**

11 managers from the control group who mistakenly attended the first RESPECT training session were excluded from the study, meaning no data was available for them or their subordinates. Furthermore, employees' sickness absence data were not available for 41 (48%) of 85 managers who consented to participate, because it was not possible to define which employees they managed.

Managers in the intervention group and the control group seemed similar in terms of the demographic characteristics examined (table 1; appendix), as did rates of work-related and standard sick leave of employees supervised by the managers in the 6 months before the intervention.

Table 2 shows rates of both types of sickness absence in the 6 months before the intervention and during the 6-month follow-up period. Standard sick leave increased in the control group, probably because the follow-up period occurred during the winter months. Over the same period, the increase in standard sick leave in the intervention group was similar and did not differ between groups. However, work-related sick leave decreased in the intervention group and increased in the control group, and this group difference was significant (table 2). The intragroup correlations for standard ($r<0\cdot0001$) and work-related ($r=0\cdot0013$) sick leave were negligible.

Results of the post-hoc analyses are supplied in the appendix. The zero-inflated negative binomial model showed that the intervention significantly reduced the odds of an employee taking any standard sick leave, with employees in the intervention group having 0·34 lower odds of taking standard sick leave than those in the control group (odds ratio 0·66, 95% CI 0·48–0·93, p=0·02). However, among employees who did take standard sick leave, number or incidence of standard sick leave hours did not differ between the intervention and control groups (incidence rate ratio 1·19, 95% CI 0·94–1·48, p=0·14). Unlike the a-priori analysis, the zero-inflated negative binomial model for work-related sick leave was not significant. The Akaike information criteria and the Bayesian information criteria values suggested that the zero-inflated negative binomial models were substantially better fitting for sick leave data than were the zero-inflated Poisson models. Therefore, we have not reported the results of the zero-inflated Poisson models, although it should be noted that they produced the same overall findings as the zero-inflated negative binomial models.

	Intervention group (n=45)	Control group (n=40)
Age, years	49·3 (5·4)	49·1 (5·6)
Number of staff	74 (50–150)	58 (16–145)
Sex	..	..
Male	45 (100%)	40 (100%)
Female	0	0
Length of employment at Fire and Rescue NSW	..	..
>10–15 years	1 (2%)	0
>15 years	44 (98%)	40 (100%)
Length of employment as an inspector or above	..	..
<1 year	4 (9%)	4 (10%)
1–5 years	10 (22%)	14 (35%)
>5–10 years	22 (49%)	16 (40%)
>10–15 years	4 (9%)	3 (8%)
>15 years	2 (4%)	2 (5%)
NA	3 (7%)	1 (3%)
Previous mental health training	..	..
Yes	5 (11%)	4 (10%)
No	40 (89%)	36 (90%)

Data are mean (SD), median (IQR), or n (%). NA=did not provide this information, as we included managers who were inspectors or equivalent, but this question only referred to inspectors specifically.

***Table 1*: Baseline characteristics of managers**

After receiving training, managers in the intervention group had significantly higher levels of mental health knowledge (mean difference 13·5 percentage points [pp], 95% CI 8·47 to 18·5, p<0·0001) than they did before training (appendix). Although there was no significant change in non-stigmatising attitudes towards mental illness (–0·09, –2·07 to 1·88, p=0·93), managers in the intervention group had significantly higher levels of knowledge of the manager's role (5·17, 2·99 to 7·35, p<0·0001) and confidence in communicating with employees (8·82, 4·32 to 13·3, p=0·01) regarding mental illness after receiving training.

At the 6-month follow-up, intervention and control groups did not differ in scores for mental health knowledge (–7·66 pp, 95% CI –19·17 to 3·84, p=0·18), non-stigmatising attitudes towards mental illness (–0·34, –5·27 to 4·59, p=0·89), and knowledge of manager's role regarding sickness absence (–1·71, –7·48 to 4·05, p=0·55). However, the mean improvement in baseline confidence when communicating with employees regarding mental illness and sickness absence remained, and was significantly greater in the intervention (11·6 pp) group than it was in the control (0·5 pp) group (difference –11·1, –19·4 to –2·82, p=0·01).

At baseline, 38 (76%) of 50 managers had initiated contact with the most recent employee on long-term sickness absence due to mental illness or stress. At the 6-month follow-up, all ten (100%) managers in the intervention group who indicated that they had an employee on long-term sickness absence due to mental illness or stress reported having initiated early contact with them, compared with eight (67%) of 12 managers in the control group (p=0·044).

The total cost of delivering the training was AUD$1017·13, equivalent to £625·55, per manager.

	Intervention			Control			Unstandardised β coefficient	Effect size* (hours of sickness absence per employee over 6 months)	p value
	Pre-training, mean (SE)	Post-training, mean (SE)	Absolute percentage point change (relative to baseline)	Pre-training, mean (SE)	Post-training, mean (SE)	Absolute percentage point change (relative to baseline)			
Work-related sick leave	1·56% (0·23)	1·28% (0·23)	–0·28 (–18%)	0·95% (0·20)	1·23% (0·28)	0·28 (29%)	–0·580	–6·45	0·049
Standard sick leave	4·97% (0·22)	5·45% (0·25)	0·48 (10%)	5·27% (0·21)	5·58% (0·30)	0·31 (6%)	0·169	1·89	0·73

The rate of each type of sick leave is defined as the number of hours of sickness absence presented as a percentage of the total hours of rostered or planned attendance. *Effect sizes were calculated by multiplying the unstandardised β coefficient by the number of hours of expected attendance for a full-time employee to reveal the estimated reduction in the number of hours of sickness absence per employee in the intervention group compared with the control group.

***Table 2*: Employees' rates of work-related and standard sick leave before and after intervention**

Using the β coefficients listed in table 2 from the a-priori analysis and the average hourly wage of a fire fighter in NSW (AUD$35·77, equivalent to £22·00 per h), the cost of work-related sickness absence was AUD$10 151·53 (£6243·60) per manager less in the intervention group compared with the control group. This cost reduction equates to a return on investment of £9·98 for every pound spent on manager mental health training.

Discussion

Our results show the potential public health and economic benefits of a brief workplace mental health intervention. We showed that a 4-h manager mental health training programme can have a significant effect on managers' confidence and behaviour in dealing with mental health matters among their staff over a 6-month follow-up period. We also showed a significant effect of the intervention on sickness absence using a range of statistical models, with substantial return on investment estimates. As different models produced various conclusions regarding a possible differential effect on work-related sick leave as opposed to standard sick leave, it is difficult to reach firm conclusions on the true effect on different types of employee sickness absence from this single trial.

To date, efforts to improve occupational outcomes for those with mental illness have focused on modification of the care and rehabilitation provided by mental health services.[1] Although these efforts are undoubtedly important,[8] our results suggest that simple interventions within the workplace could make a difference to patient outcomes. The body of research on workplace mental health interventions has often ignored measures of work-related functioning, such as absenteeism, presenteeism, and job performance, instead focusing solely on symptom reduction.[9] Similarly, previous studies of mental health training programmes for managers[17,28] have tended to focus on outcomes such as reduction of employees' mental health symptoms. To our knowledge, only one previous study[20] has examined the effect of manager mental health training on objective occupational outcomes. Online mental health education led to minor improvements in employees' psychological wellbeing; however, the human resources data obtained showed no significant effect on sickness absence.[20] The much larger size of our study, the face-to-face interactive nature of our training, and our ability to examine work-related absence and standard sickness absence separately might all account for the significant effect on sickness absence.

The differing results of the a-priori generalised estimating equations modelling of sickness absence data and the zero-inflated negative binomial modelling make it difficult to know whether manager mental health training has more of an effect on standard sickness absence or work-related sickness absence. The intervention might reduce the odds of employees taking standard sickness absence in the first instance, as the results of the post-hoc zero-inflated negative binomial modelling suggest. Most episodes of standard sickness absence are of short duration and due to minor physical illnesses or infections,[29] but are also influenced by non-illness factors, such as coping behaviours.[30] As a result, RESPECT manager training might be unlikely to reduce the length of these brief episodes of standard sickness absence, but could influence the number of absences initiated. Alternatively, or perhaps additionally, the intervention might be effective at reducing the overall amount of work-related sickness absence, as suggested by the generalised estimating equations models. It is possible that any episode of illness that is directly related to the occupational environment should be more amenable to change by an intervention aimed at key workplace factors, such as manager support.

The exact mechanisms underlying the reduction in sick leave of employees whose manager underwent mental health training in the present study remain unclear. Managers' increased confidence and greater likelihood of communicating with employees on or at risk of sickness absence might have played an important mediating role. Early and frequent contact from managers once an employee has begun an episode of sickness absence is associated with a faster time to full return to work.[12] However, the results of the post-hoc zero-inflated negative binomial modelling suggest that the intervention might also have a preventive effect, reducing the odds of employees initiating episodes of standard sick leave. Although there were some immediate improvements in mental health knowledge and understanding of the manager's role in sickness absence, these differences were not sustained at 6-month follow-up, suggesting that changes in these knowledge-based measures might be less important in influencing behavioural change than the more lasting improvements in confidence.

The main strength of this study is its clustered randomised controlled design and use of an objective occupational measure—administrative sickness absence data—as the primary outcome. However, the different statistical approaches used produced differing results, with our a-priori generalised estimating equations model showing a significant reduction in work-related sick leave for the intervention group, whereas the zero-inflated negative binomial model showed a significant reduction in the odds of employees taking standard sick leave in the intervention group. There are strengths and limitations to each of these analytical approaches. Our a-priori primary outcome measure for the generalised estimating equations model analysis—change in sickness absence rate—was not normally distributed. Although use of a change score allowed for an equal distribution either side of the mean, the large numbers of individuals with little or no change in their sickness absence led to some deviation from a true Gaussian distribution. Although this violation of the assumption

of normality limits the interpretation of data from a generalised estimating equations model, such models have been shown usually to be robust to these assumption violations, provided the sample size is sufficiently large.[31] Because of this assumption violation, we did post-hoc testing with zero-inflated models using negative binomial regression to account for the disproportionate number of employees with minimal changes in sickness absence. The zero-inflated negative binomial model showed a significant reduction in the odds of taking standard sick leave in the intervention group, but not work-related sick leave, which casts some doubt on the strength of our original finding. We are not able to make a definitive statement about which model is the most appropriate, although we note there is often debate surrounding the reanalysis of data, with different analytical methods sometimes producing different findings.[32]

The study has other important limitations. The completion rate for the 6-month follow-up questionnaire was lower than ideal (44 [50%] of 88), although this level of drop-out is typical of prospective studies carried out in young, male-dominated workforces.[33] The similar drop-out rates in both the intervention and control groups suggests significant bias is unlikely, and thus loss to follow-up is most likely to underestimate the true effect of the intervention. Additional reassurance in this regard is provided by post-hoc analyses, which revealed no significant differences in demographic characteristics between managers who did or did not complete the follow-up questionnaire (data not shown). Unfortunately, the administrative database used does not register the reasons for an employee's sickness absence, and so it is unknown whether there was a differential effect of the intervention on sickness absence due to mental health problems compared with other reasons. However, mental health problems tend to be one of the commonest reasons for work-related sick leave, particularly in firefighters.[21,34,35] Additionally, stated reasons for sickness absence might not reflect the true underlying causes, with official diagnoses often underestimating the role of mental illness.[36] Furthermore, 11 managers from the control group were excluded from the study after receiving an email from FRNSW mistakenly telling them to attend the first RESPECT training session. This error created the potential for bias between the groups and compromised both the randomisation process and plans for an intention-to-treat analysis.

Five other limitations related to the design of this study require mentioning. First, for logistical reasons relating to the organisational planning of training, we were required to randomise at the level of managers before obtaining consent and baseline information. Therefore, a full intention-to-treat analysis was not possible. Second, we did not collect demographic information from the employees, therefore, it is possible that pre-existing group differences in managerial style or employees' health contributed to the results, although the randomisation process should ensure an even distribution of both known and unknown confounders. Third, the training programme, including the follow-up phone call, was provided as an integrated intervention, meaning it is not possible to know which components were essential. Fourth, as expected there was a seasonal influence on the amount of sickness absence taken, with increased amounts of sick leave in the winter months. Use of change in sickness absence as our primary outcome and the fact that both groups were followed over the same seasons should have reduced any potential bias from this. Finally, staff at FRNSW, like other emergency services organisations, operate within a well defined hierarchical structure, in which managers work in close quarters with their subordinates. Mental health is an issue that is frequently discussed in both formal and informal settings among emergency workers because of their routine exposure to critical incidents. The uniqueness of the study's workplace environment might limit the generalisability of the results to other occupational groups.

In this study, we have shown, for the first time to our knowledge, that a modest investment in mental health training for workplace managers might have measurable benefits. In addition to creating lasting changes in managers' confidence regarding discussing mental health, manager mental health training had a significant effect on the amount of sickness absence in the two statistical models analysed, although whether the intervention effect is via a reduction in the commencement of standard sick leave, a reduction in overall rates of work-related leave, or a combination of the two remains unclear. The economic effect of this simple intervention was large, with a return of investment of £9·98 for every pound spent on manager mental health training, based on the results of the a-priori analysis. The potential financial benefit for the employer could allow for an economic argument in favour of organisations providing this mental health training for managers, with employees and society hopefully gaining meaningful public mental health benefits.

Contributors

SBH and MD had the original idea for the study and, with CB and IM, designed the intervention and trial. JSM-S, LT, and AG acquired the data. SBH, AM, and JSM-S did the statistical analysis. JSM-S, AG, and SBH drafted the manuscript, which was revised for additional interpretation by all authors. SBH is guarantor.

Declaration of interests

CB, HC, and SBH are employed by the Black Dog Institute, which provides mental health training to workplaces. MD is employed by Fire and Rescue NSW. All other authors declare no competing interests.

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