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# Are acceptance and commitment therapy-based interventions effective for reducing burnout in direct-care staff? A systematic review and meta-analysis

Andy Reeve, Anna Tickle and Nima Moghaddam

## Abstract

**Purpose** – *Work-related stress amongst staff working in direct care roles in mental health and intellectual disability settings is associated with a range of problematic outcomes. There has been a proliferation of research into the use of acceptance and commitment therapy (ACT)-based interventions in this staff population. The purpose of this paper is to review the extant literature.*

**Design/methodology/approach** – *A systematic search of the literature was conducted, and seven studies identified which met the criteria for inclusion in the review, of which four were eligible for meta-analysis.*

**Findings** – *Results of the meta-analysis were most convincing for the effectiveness of ACT-interventions to reduce psychological distress within a subgroup of those with higher distress at baseline. There was no statistically significant effect for the amelioration of burnout, nor for an increase in psychological flexibility (a key ACT construct).*

**Research limitations/implications** – *Conceptual issues are considered including the purpose and treatment targets of ACT interventions, such as supporting valued living rather than diminishing stress per se. Methodological issues are discussed around the measurement of psychological flexibility.*

**Originality/value** – *This review makes recommendations for future research and for the implementation of ACT-interventions for work-related stress in these settings.*

**Keywords** *Burnout, Systematic review, Work-related stress, Acceptance and commitment therapy, Direct-care staff*

**Paper type** *Literature review*

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## Background

Work-related stress is known to be prevalent amongst staff providing direct care in mental health and intellectual disability (ID) settings. At its most problematic this is thought to have deleterious effects on the well-being of individual staff members, on organisations as a whole, and on the quality of client care delivery. One approach to ameliorating these effects is based on Acceptance and Commitment Therapy (ACT) – a contemporary cognitive-behavioural intervention model. There has been a recent proliferation of research examining the efficacy of ACT for managing work-related stress: The current review aimed to systematically review and meta-analyse this research evidence.

### *Work-related stress, burnout, and the effects on staff[1]*

In its most extreme form, work-related stress is conceptualised as constituting “burnout”: “a state of physical and emotional depletion” resulting from “prolonged exposure to stressful working environments” (Khamisa *et al.*, 2015).

Cross-sectional studies have found an association between burnout in mental health and ID staff and a broad variety of difficulties, including more frequent flu-like symptoms (Acker, 2010);

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depression, anxiety, poor sleep, and increased alcohol use (Peterson *et al.*, 2008); rejecting responses towards clients (Holmqvist and Jeanneau, 2006); and a milieu which facilitates the abuse of clients (White *et al.*, 2003). There are some context-specific environmental factors which are thought to contribute to elevated levels of burnout in mental health and ID staff working in inpatient and residential environments: where there is an increased risk of exposure to aggression and challenging behaviour (Hensel *et al.*, 2014; Jenkins *et al.*, 1997).

Given the harmful effects of burnout at the level of client, individual staff member, and organisationally, a variety of approaches have been trialled to ameliorate the consequences of burnout. The above-stated definition of “burnout” identifies both environmental conditions and individual responses as component processes; accordingly, interventions to reduce work stress and burnout tend to target either the organisational context or individual coping responses (Montgomery, 2014). A meta-analysis into the effectiveness of occupational stress interventions found greater effect-sizes for individual-level (cognitive-behavioural) interventions than for organisational-level interventions (Richardson and Rothstein, 2008). However, Ahola *et al.* (2017) conducted a meta-analysis into the effectiveness of individual-level psychological interventions for burnout and found that these did not significantly alleviate burnout symptoms. Finally, a recent systematic review of mindfulness and acceptance-based interventions (i.e. a subset of individual-level interventions) did find general support for the effect of these interventions on distress and burnout, in a mixed sample of student and qualified mental health professionals, although no meta-analysis was conducted (Rudaz *et al.*, 2017).

### *ACT-based interventions*

ACT is a third-wave cognitive-behavioural intervention, founded on the behavioural understanding of language posited by Relational Frame Theory (Luoma *et al.*, 2007). Recently there has been research interest into the use of ACT-based interventions for staff working on inpatient mental health and ID wards (McConachie *et al.*, 2014).

There are several important conceptual differences between ACT and “standard” cognitive-behavioural therapy (CBT). A typical CBT intervention may seek to change the content or frequency of troubling cognitions; whereas an ACT-based approach will seek to enhance a person’s ability to behave in ways which are compatible with their personally chosen values – in spite of any unpleasant cognitive or emotional experiences. The capacity to act in this way is termed “Psychological Flexibility”. The ACT model proposes that six processes contribute to increased Psychological Flexibility: Willingness/acceptance, cognitive defusion, self-as-context, present moment contact, values identification, and committed action. Theorised processes underlying Psychological Flexibility are sometimes grouped into three dyads, as expounded in Table I.

The application of ACT-based interventions for burnout has been trialled in a media organisation (Bond and Bunce, 2000); large governmental organisations (Flaxman and Bond, 2010); and for

**Table I** Explanation of the division of psychological flexibility into three dyads, and the corresponding six ACT processes

<i>Dyad-level</i>	<i>Process-level</i>	<i>Explanation</i>
<i>Psychological flexibility</i>		
Showing up	Acceptance	The willing and undefended experiencing of internal experiences, such as feelings, thoughts, and memories even if they are aversive
	Defusion	The making of psychological distance from one’s internal experiences and sense of self
Letting go	Self-as-context	The stance that one’s self transcends one’s internal experiences. Conceptualising internal events as not defining the essence of self-hood
	Present moment awareness	A moment-to-moment engagement with one’s internal and external worlds, promoting access to a broader range of potentially reinforcing opportunities
Doing what matters	Values identification	The identification of abstract hopes and ideals which can be used to guide a person’s decisions, promoting an individual to strive towards action which provides them with a sense of vitality
	Committed action	Making the decision to take real and tangible action towards one’s own values, or persist in such behaviour, irrespective of aversive internal experiences

teachers (Jeffcoat and Hayes, 2012), amongst others. These studies have yielded support for the use of ACT-interventions in reducing work-related stress – albeit in contexts different from that of interest in the present review – and concomitant psychological distress. This growing body of research has led to a narrative review of the usefulness of ACT-based interventions for burnout by Moran (2015).

Within the context of mental health and ID care settings, several cross-sectional studies have found an association between: the level of burnout or stress that a member of staff is experiencing; and their level of psychological flexibility (Noone and Hastings, 2011; Halsey, 2014; Kurz *et al.*, 2014; Veage *et al.*, 2014). Given that Psychological Flexibility is the treatment target of ACT, this is suggestive of the potential helpfulness of ACT for staff working with PWID and in mental health contexts. Indeed, there have been several intervention studies investigating the helpfulness of ACT-based interventions for staff in these settings, which culminated in a narrative review (Leoni *et al.*, 2016): concluding that the extant research is promising, albeit with further research yet required. Additionally, the use of ACT-based interventions in this context has been found to reduce other problems associated with burnout, such as by improving the quality of client-staff interactions (Castro *et al.*, 2016).

### ***Rationale and objectives for the current review***

The purpose of this review is to systematically identify and examine extant research on the effectiveness of ACT-based interventions to reduce staff burnout and psychological distress, in the context of working with PWID or people with mental health difficulties, in an inpatient or residential environment. The intention was to achieve this to a standard satisfying PRISMA criteria for reporting a systematic review (Moher *et al.*, 2009).

The need for a review restricted to this specific population is based on the particular challenges facing staff who work in these contexts (such as identified by Hensel *et al.*, 2014; Jenkins *et al.*, 1997) and the well-documented consequences of staff burnout and stress on patient care. The particular focus on reviewing evidence for ACT-based interventions is responsive to a recent wave of studies in this area: ACT offers a model that appears conceptually compatible with the challenges faced by this population (such as working in an environment with potential threat of client-perpetrated violence) and there is now sufficient empirical data to enable an informed review and meta-analysis of its effectiveness.

The review aims to answer the following specific questions:

1. Are ACT-based interventions helpful to alleviate burnout in this context?
2. Are ACT-based interventions helpful to reduce psychological distress in this context?
3. Do ACT-based interventions in this setting increase Psychological Flexibility?
4. What is the quality of currently available research pertaining to the above questions?

## **Method**

### ***Search strategy***

A systematic search was conducted across four databases: PsycINFO, Medline, Embase and CINAHL. These databases were chosen to provide broad and complementary coverage of relevant journal titles. The Ovid database engine was used to search the former three databases, and Ebscohost to search the latter. The final search was conducted on the 6 April 2018. No date limit was set. In order to optimise the search strategy, search terms were chosen according to three categories, as detailed in Table II, and the search conducted on both the title and abstract for each term. Where there was a choice between a broader and a more sensitive term (e.g. “stress” or “work-stress”, the more inclusive term was utilised). These search categories were expanded using synonyms and each database’s indexed subject-heading for each term-category. Full details of the search strategy for each database is shown in Figures A1 (for Ovid) and A2 (for Ebsco).

**Table II** Search term categories and rationale

Search category	Terms used	Notes
Population	Nurse, RMN, RN, MHN, RNMH, support worker, care worker, HCA, nursing assistant, nurse assistant, staff And ID, LD, learning disability, learning difficulty, intellectual disability, mental health, ward, inpatient, in-patient, psychiatr*	To specify the precise client group (people working in ID and mental health inpatient and residential), two categories of search terms were combined
Intervention	ACT, acceptance and commitment, acceptance and commitment, acceptance based, acceptance-based	
Comparison Outcome	n/a Burnout, stress, burn out, exhaustion, burn-out	For the purpose of inclusivity, no comparison condition was specified

After the initial search was conducted and duplicates removed, a screening process was undertaken. Screening involved reviewing the title and abstract of each paper. The remaining “of interest” papers were subject to hand-searching, consisting of reference list searching and reviewing forward citations using the “cited by” function of Google Scholar. The full article texts were accessed for the papers retained after screening or identified via subsequent hand-searching, and the selection criteria (see selection criteria below) were applied to these to provide a final pool of papers to be included in the review.

### Selection criteria

The inclusion and exclusion criteria are explicated in Table III. The type of study design used was not specified in the selection criteria in order to maximise the number of intervention studies selected, given the anticipated low number of studies. Although randomized controlled trials are often purported to be the most robust study design it is also acknowledged that other designs may be more appropriate in some scenarios (Barker *et al.*, 2016). For example, Zingg *et al.* (2016) suggest that including a broader range of study designs may allow access to data which are relevant to local contexts and cannot be accessed through a limited range of design types.

Also omitted from the selection criteria was any necessity for a process measure of Psychological Flexibility despite this concerning one of the questions this review intends to address. This decision was made to maintain sensitivity to trials which may have not measured this mediating variable and instead only focussed on outcome variables of interest.

No specification was made to include only studies published in peer-reviewed journals. Borenstein *et al.* (2009) provide a review of research which has found a publication bias in

**Table III** Selection criteria

	Rationale
<i>Inclusion criteria</i>	
English language only	Practical reasons of insufficient resources for translation
Intervention studies only	To be able to adequately answer question of usefulness of ACT-based interventions
Population to include direct care staff working with ID and mental health clients in inpatient or residential contexts	The population specific to the question, although given the mixed populations used in the literature (as discussed in the Background) this review does not exclude mixed populations due to risk of losing sensitivity
At least one outcome measure of work-related stress or burnout	To assess the usefulness of the intervention in this domain
At least one outcome measure of broader psychological distress	To assess the usefulness of the intervention in this domain
Nature of intervention must be ACT-based, defined as including each of the three dyadic processes	To ensure that the intervention demonstrates a high degree of fidelity to the ACT model
<i>Exclusion criterion</i>	
Focus on community work or one-to-one therapy settings	To avoid the focus on inpatient and residential settings being diluted by research into other settings

favour of studies with statistically significant findings, and that meta-analyses are more likely to include published studies. Including “grey literature” such as doctoral theses may be a more comprehensive and inclusive way to conduct a systematic search, and reduce the risk of bias.

### **Data extraction**

The following characteristics were collected from each study: name of ACT-based intervention, setting and number of participants, duration of intervention, study design, measure of burnout, measure of psychological flexibility (if any) and measure of distress (and well-being, if any).

### **Quality appraisal**

Prior to meta-analysis, each identified study was subjected to systematic quality appraisal. Commonly used critical appraisal tools have been critiqued as being variable in construction and their psychometric properties (Katrak *et al.*, 2004), and for having weak inter-rater reliability (Dixon-Woods *et al.*, 2007). Additionally, they are often designed for only one type of study design. An attempt at addressing some of these concerns has been made by Zingg *et al.* (2016), who developed an appraisal tool designed for multiple study designs using expert panel consensus, entitled Integrated quality Criteria for Review of Multiple Study designs (ICROMS).

The ICROMS tool uses a two-part decision matrix to establish if any given study should be included in the review. First, a number of criteria are mandatory for a study to be included in the review (these are marked with an asterisk in this paper). Second, a summed score of over 60 per cent of the available points is deemed necessary for inclusion. Points are awarded from zero to two, representing criterion not met; unable to ascertain if criterion met; and criterion met, respectively. The specific criteria vary according to study design (with some commonalities), and so two different sets of criteria were applied depending on study type.

The ICROMS tool was adapted in three ways prior to use in this review. Item 3F asks “are primary outcome measures reliable?”, with the “yes” criteria “Two or more raters with at least 90 per cent agreement (or kappa 0.8); OR Outcome variables are objective (e.g. quantity of handrub consumed; length of hospital stay)”. As all outcome measures in the assessed studies in this review used questionnaire outcomes, this item was adapted so that the “yes” criterion was satisfied if “outcome measures relevant to this review have satisfactory internal reliability (Cronbach’s  $\alpha > 0.7$ )”. Item 4b was omitted as, when applied to the pool of studies in this review, it duplicated item 4a. Finally, item 3a was made a non-mandatory inclusion criterion: as it pertains to the blinding of participants, which is usually impractical in the delivery of psychological interventions.

In addition to the ICROMS appraisal, data were extracted pertaining to: the detail provided regarding the setting from where participants were recruited; the level of behavioural challenge presented by clients that participants worked with; and the duration of follow-up. These were not rated using a numerical scoring system, but will be referred to in the discussion.

### **Data analysis**

A meta-analysis was conducted on any results for which there were multiple papers of the same study design. As advised in the *Cochrane Handbook for Systematic Reviews*, a standardized mean difference model was used to enable pooling of studies using different outcome scales to measure the same variable. A random effects model was used where the study data were heterogenous, in order to provide a suitably conservative estimate of pooled effect size (Higgins and Green, 2011).

Data analysis was conducted on all three variables in line with the aims of this review, the measures of: burnout, psychological distress and Psychological Flexibility. Where data were available at a follow-up time point, a separate analysis was conducted on this. In studies using

multiple measures for a single outcome variable of interest, selection favoured the measure that was most frequently used across included studies.

Prior to the calculation of pooled effects, funnel plots were generated and visually inspected for evidence of publication bias, as advised by Higgins and Green (2011). These graphs plot the effect size (standardized mean difference) along the x-axis, against the standard error on the y-axis. As larger error sizes would be expected to produce more extreme effect sizes, pooled data without evidence of publication bias would be expected to produce a roughly symmetrical “funnel” shape. Visual analysis is thought to be vulnerable to subjective error. Statistical tests for this characteristic can only be conducted if there are “a reasonable number of studies” (Borenstein *et al.*, 2009).

Following this, an analysis of heterogeneity was conducted. This was measured using  $I^2$  – a measure of the inconsistency of findings across meta-analysed studies (reflecting overlap of confidence intervals from these studies) – as suggested by Higgins *et al.* (2003). A raised level of heterogeneity was anticipated given the clinical and methodological diversity. An  $I^2$  score of > 75 per cent represents a risk of “considerable heterogeneity” (Higgins and Green, 2011).

To examine whether meta-analysis results were robust to inclusion of potentially discrepant studies/sources of heterogeneity, sensitivity analyses were planned and undertaken. Analyses were conducted to examine the impact of removing studies that: had effect estimates that did not overlap with the pooled estimate (non-overlap of 95% CIs); or had a primary interventional focus on phenomena other than burnout and distress (i.e. studies for which current variables of interest – burnout/distress – were only secondary outcome measures). This latter sensitivity analysis was only considered relevant for analyses examining burnout and distress outcomes – all ACT interventions would be expected to target Psychological Flexibility.

## Results

### *Search strategy outcome*

The search strategy was undertaken as planned, which resulted in a final total of seven papers to be included in the review. Figure 1 explicates the process of the search strategy using a PRISMA flow diagram. The full text for one paper (Bethay, 2010) could not be located through the standard procedures. An e-mail request was sent to the author, but no response was received, and so this paper was omitted from the review.

### *Study characteristics*

The characteristics of the seven papers identified for review are summarised in Table IV. For purposes of readability, studies included in the review will henceforth be referred to by the emboldened authors as shown in the first column of Table IV.

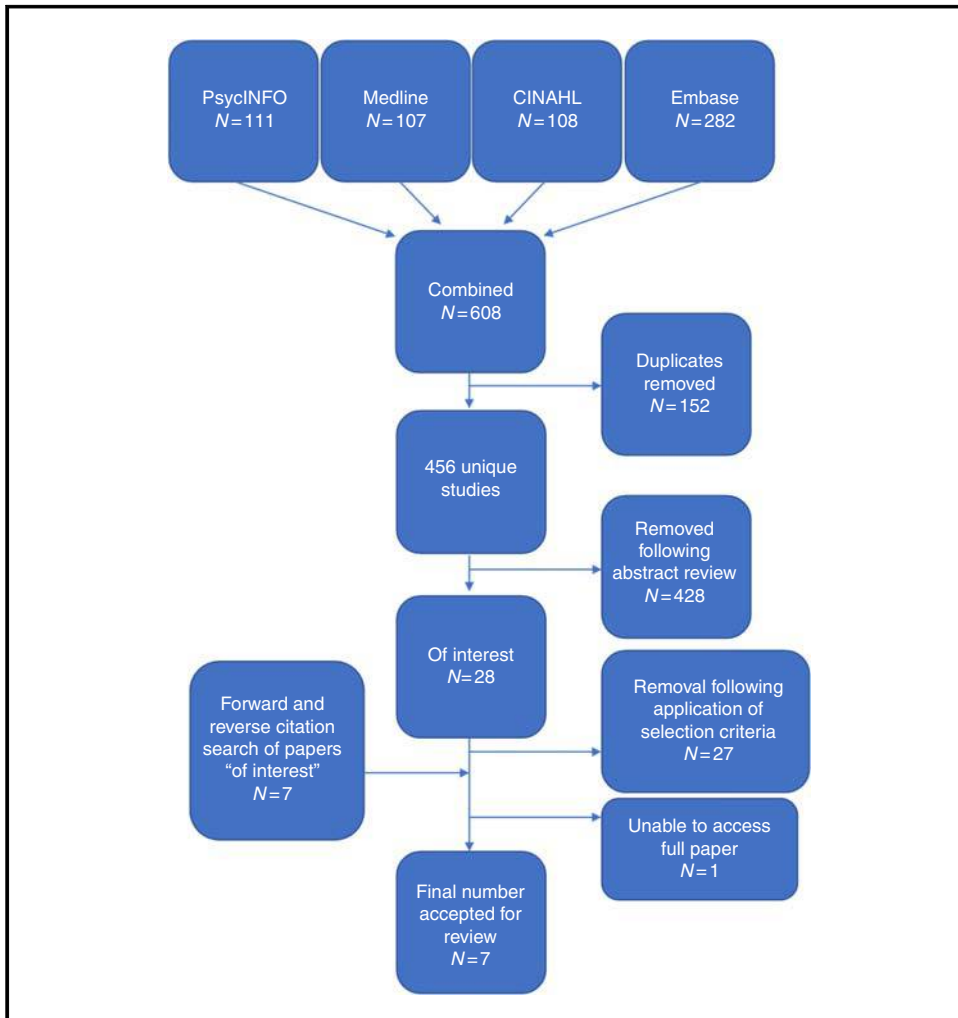
Five of the papers identified for review are RCTs, and of these all but one (Noone and Hastings, 2009) presented the means and standard deviations of both the intervention and control groups, which is the essential data required to pool the effect in a meta-analysis. This left four remaining papers eligible for meta-analysis based on sharing the same study design, and the availability of data to pool. No study had more than one control group and so there was no decision to be made regarding which control group to select for meta-analysis.

Of the four RCT papers meta-analysed, three included outcome data for a follow-up time-point and two included separate data for a subgroup of participants with high psychological distress scores at baseline. Both of these subgroups were analysed separately.

Meta-analysis was not conducted on the uncontrolled before-after paper (Noone and Hastings, 2010) nor the interrupted time-series paper (Smith and Gore, 2012) due to there being only single papers of each of these study designs.

Two of the identified studies (Noone and Hastings, 2009, 2010) partially shared the same cohort of participants. The inclusion of both studies within the review remains valid as neither study is eligible for meta-analysis for the reasons given above. This removes the risk of “double-counting” the data (Senn, 2009).

**Figure 1** PRISMA flow diagram of the search strategy outcome



Several studies were identified which were of some relevance to the topic but did not meet the selection criteria for answering the specific questions posed by this review. In the interests of transparency and exhaustivity, these are shown in Table V with an explanation for why they did not meet selection criteria. They will not be included in the review *per se*.

### Quality appraisal

The outcome of the quality appraisal is presented in Table VI for the RCT criteria, and Table VII for the uncontrolled before-after and the uncontrolled interrupted time-series criteria (the latter two study designs share the same criteria under the ICROMS instrument, and so are combined in one table for clarity). Every study scored a minimum of 1 for each mandatory criterion, except Noone and Hastings (2009) who did not reach the minimum standard for an adequately random component of sequence generation. The same study was also the only one which failed to reach the minimum score of 60 per cent as advised by Zingg *et al*. Therefore, this study was excluded from the meta-analysis.

### Assessment of bias

Funnel plots were generated to assess for evidence of publication bias or other types of bias. Figure 2 shows three funnel plots, for: psychological distress; psychological flexibility; and burnout at the post-intervention timepoint. Funnel plots are not displayed for a follow-up timepoint due to insufficient data points to make a meaningful assessment.



**Table IV** Study characteristics

Author(s)	Name and duration of intervention	Participant group and setting ( <i>n</i> = intervention completers; control group)	Study design and presence of follow-up data collection	Outcome measures used			Summary of findings
				Burnout measure	Psycho-logical flexibility (PF) measure	Psycho-logical distress measure	
Bethay <i>et al.</i> (2013), Wilson, Schnetzer, Nassar, and Bordieri	Acceptance and commitment training with instruction in applied behaviour analysis. Three 3-hour group sessions at weekly intervals	Staff having direct contact with PWID in large residential facility in USA ( <i>n</i> = 18; 16 control)	RCT, although not explicitly stated as such in the paper. Control group received instruction in applied behaviour analysis (ABA) whereas intervention group received ACT +ABA. Follow-up at 3 months	MBI, but this was reported as three subscales independently. <b>Emotional exhaustion subscale</b> used in meta-analysis	None	<b>GHQ-12</b>	Favourable effects of ACT intervention only present in subgroups with high distress at baseline and those who consistently applied the taught techniques
Clarke <i>et al.</i> (2015), Taylor, Lancasster, and Remington	ACT-based training intervention. 2-day training course	Staff having contact with personality disordered patients. 38% of intervention group worked in inpatient setting ( <i>n</i> = 57; <i>n</i> = 49 control)	RCT. Control group received psychoeducation on personality disorder. Follow-up at 6 months	Adapted MBI, taking the sum of two of the three subscales to form a burnout measure. <b>Emotional exhaustion subscale</b> used in meta-analysis	VLQ	<b>GHQ-28</b>	Primary aim was to reduce stigmatizing thoughts experienced by staff (for which both intervention and active control was effective). No change in level of distress in either condition
McConachie <i>et al.</i> (2014), McKenzie, Morris, and Walley	Acceptance and mindfulness workshop. 1 ½ day workshop	Direct care staff in ID services ( <i>n</i> = 53; 45 control)	RCT/Longitudinal mixed between-within subjects <sup>a</sup> . Follow-up at 6 weeks	<b>SSQ</b>	<b>AAQ-II, WBSI</b>	<b>GHQ-12, WEMWBS</b>	Significant reduction in distress in intervention group compared with control. Effect more pronounced in subgroup with higher baseline distress scores. Mixed support for PF as mediating variable
Noone and Hastings (2009)	PACT (Promotion of Acceptance in Carers and Teachers workshop). 1 ½ day workshop	ID support staff ( <i>n</i> = 14; 6 control)	RCT No follow-up	<b>SSQ</b>	None	<b>GHQ-12</b>	Support staff distress reduced significantly compared with control following intervention
Noone and Hastings (2010)	PACT (Promotion of Acceptance in Carers and Teachers workshop). 1 ½ day workshop	ID support staff ( <i>n</i> = 34), 20 participants added to the sample used by Noone and Hastings (2009)	Uncontrolled before-after. No follow-up	<b>SSQ</b>	None	<b>GHQ-12</b>	Support staff distress reduced significantly between pre- and post-intervention. Greater changes in subgroup with higher baseline distress
Schwetschenau (2008)	"ACT training". Two 3-hour sessions	69% of sample worked in US ID services but not all in direct-care roles ( <i>n</i> = 21; 24 control)	RCT. Waitlist control. No follow-up	Adapted MBI using only <b>emotional exhaustion subscale</b>	<b>AAQ-II, acceptance subscale of COPE</b>	<b>GHQ-12, DSI, PANAS (negative subscale only)</b>	Partial support for effectiveness of ACT to reduce psychological distress. PF marginally predictive of reduced distress in intervention group although it did not improve significantly amongst whole intervention group

(continued)

**Table IV**

Author(s)	Name and duration of intervention	Participant group and setting (n = intervention completers; control group)	Study design and presence of follow-up data collection	Outcome measures used			Summary of findings
				Burnout measure	Psychological flexibility (PF) measure	Psychological distress measure	
Smith and Gore (2012)	ACT training based on Noone and Hastings and PACT workshop. 1 ½ day workshop	ID support staff, various roles (n = 49)	Multiple interrupted time series. Follow-up at 3 months and 6 months	MBI, SSQ	AAQ, SSVQ	GHQ-12	Significant reduction in distress and burnout. No changes in PF following intervention

**Notes:** AAQ, acceptance and action questionnaire; DSI, daily stress inventory; GHQ, general health questionnaire; PANAS, positive and negative affect scale; SSQ, staff stressor questionnaire; SSVQ, support staff values questionnaire; VLQ, valued living questionnaire; WBSI, white bear suppression inventory; WEMWBS, warwick-edingburgh mental well-being scale; PF, psychological flexibility. <sup>a</sup>Where a mixed-methods study design was used, the quality appraisal criteria most relevant to the extracted data were applied. Note that only measures pertinent to this review's questions are extracted here. Outcome measures included in the meta-analysis are emboldened

**Table V** Studies of interest to the review but not meeting selection criteria

Author and title	Reason for non-inclusion in review
Acceptance and commitment therapy for the treatment of stress among social workers: a randomized controlled trial (Brinkborg <i>et al.</i> , 2011)	Context of social workers does not meet inclusion criteria of inpatient or residential setting staff
On the role of values clarification and committed actions in enhancing the engagement of direct care workers with clients with severe developmental disorders (Castro <i>et al.</i> , 2016)	No measure of staff burnout or distress. Study focussed on improving staff-client engagement rather than burnout reduction
Correlates and predictors of burnout and secondary traumatic stress in mental health professionals (Halsey, 2014)	Cross-sectional, non-intervention design
Mediating the relation between workplace stressors and distress in ID support staff: Comparison between the roles of psychological inflexibility and coping styles (Kurz <i>et al.</i> , 2014)	Cross-sectional, non-intervention design
Values and psychological acceptance as correlates of burnout in support staff working with adults with intellectual disabilities (Noone and Hastings, 2011)	Cross-sectional, non-intervention design
The effectiveness of an ACT informed intervention for managing stress and improving therapist qualities in clinical psychology trainees (Stafford-Brown and Pakenham, 2012)	Context of trainee clinical psychologists does not meet inclusion criteria of inpatient or residential setting staff
Value congruence, importance and success and in the workplace: Links with well-being and burnout amongst mental health practitioners (Veage <i>et al.</i> , 2014)	Cross-sectional, non-intervention design
Acceptance and commitment therapy (ACT) for clinically distressed health care workers: Waitlist-controlled evaluation of an ACT workshop in a routine practice setting (Waters <i>et al.</i> , 2017)	Context of "health care workers" is not specified, so does not meet inclusion criteria of direct care staff working with ID and mental health clients in inpatient or residential contexts

Visual inspection reveals satisfactory levels of symmetry in the outcomes of the psychological flexibility and burnout measures, however there is some apparent asymmetry in the funnel plot for psychological distress. Given the small number of data-points, it is not possible to draw firm conclusions about bias from this, and as such it is not a basis for eliminating studies. The uncertainty about a potential bias should be viewed as a weakness of the analysis and shall be addressed in the discussion. There was an insufficient number of studies to enable the use of statistical methods of assessing for bias (Borenstein *et al.*, 2009).

### Meta-analysis of burnout scores

The RevMan output for the meta-analysis of burnout scores is shown in Figure 3 (at post intervention) and in Figure 4 (at follow-up, varying from six weeks to six months).

**Table VI** Quality assessment using the ICROMS tool for randomised controlled trials

	1 A. Clear statement of the aims of the research*	2 A. Sequence generation*	2B. Allocation concealment*	3 A. Blinding	3E. Protection against detection bias: Blinded assessment of primary outcome measures	3 F. Reliable primary outcome measures	4 A. Follow up of subjects (protection against exclusion bias)	4 C. Incomplete outcome data addressed	5 A. Protection against detection bias: intervention unlikely to affect data collection	6 C. Analysis sufficiently rigorous/free from bias	7 A. Free of selective outcome reporting	7B. Limitations addressed	7 C. Conclusions clear and justified	7D. Free of other bias	7E. Ethics issues addressed	Total score out of 30, percentage
Beithay <i>et al.</i> (2013)	2	1	1	0	1	2	2	1	2	2	2	2	2	1	1	22
Clarke <i>et al.</i> (2015)	2	2	2	0	1	2	1	2	2	1	2	2	2	2	2	73
McConachie <i>et al.</i> (2014)	2	2	2	0	1	2	0	2	1	2	2	2	2	1	2	83
Noone and Hastings (2009)	2	0	1	0	1	2	0	1	2	2	0	2	2	0	2	77
Schweitschenau (2008)	2	1	1	0	1	2	2	2	2	2	0	2	2	2	0	50
																21
																70

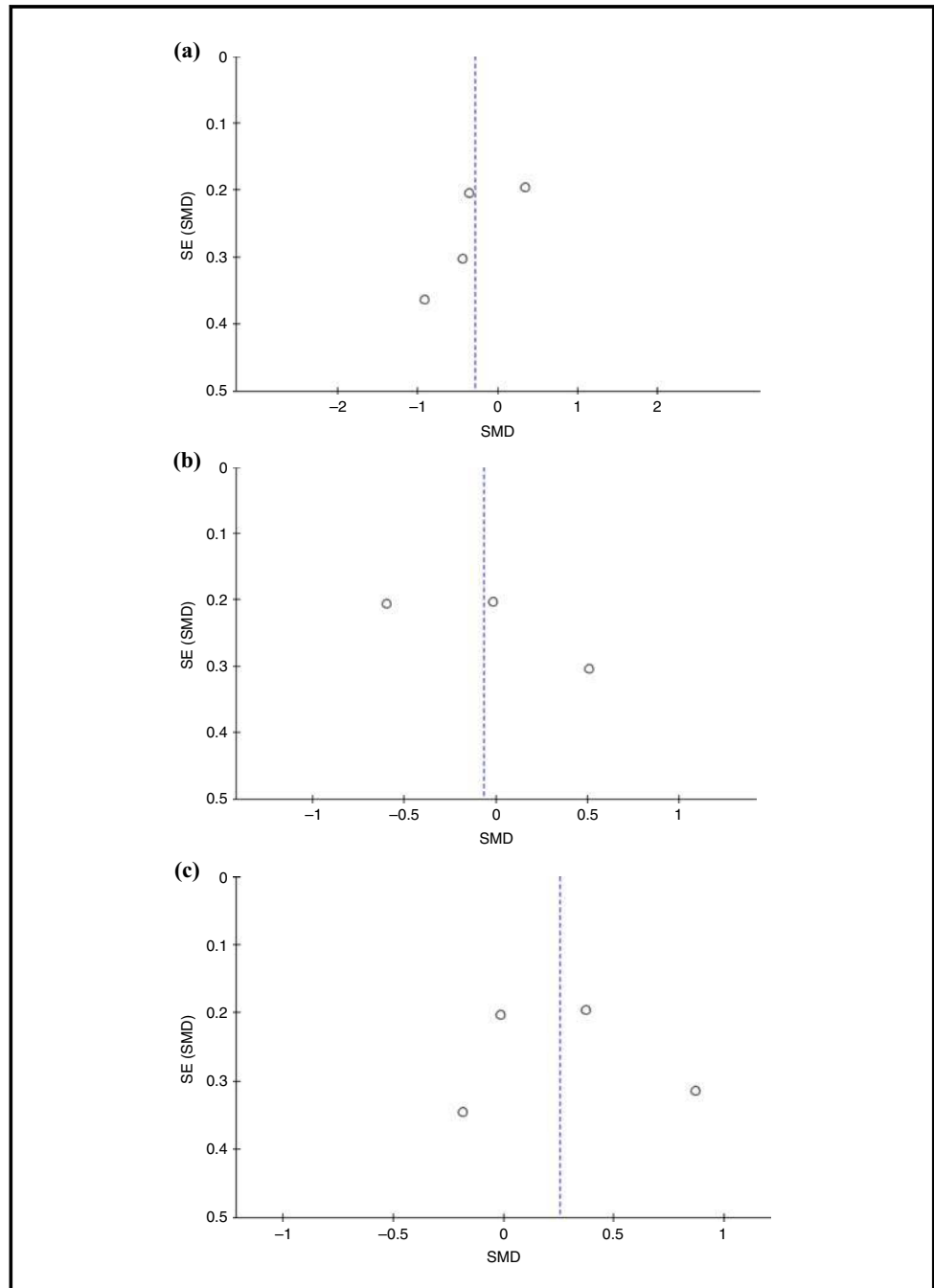
**Notes:** Zingg *et al.* (2016) stipulate two conditions to be met to achieve minimum quality standard: all mandatory criteria to be met (denoted by an asterisk here) and a minimum score of 60 per cent. Points are awarded from zero to two, representing criterion not met; unable to ascertain if criterion met; and criterion met, respectively

**Table VII** Quality assessment using the ICROMS tool for non-controlled before-after & non-controlled interrupted time-series

	1 A. Clear statement of the aims of the research?*	1 B. Rationale for number of pre- and post-intervention points or adequate baseline measurement*	1 C. Explanation for lack of control group	2 C. Justification for sample choice*	3 E. Protection against detection bias: Blinded assessment of primary outcome measures	3 F. Reliable primary outcome measures	4 C. Incomplete outcome data addressed	5 A. Protection against detection bias: intervention unlikely to affect data collection	5 D. Attempts to mitigate effects of no control*	6 C. Analysis sufficiently rigorous/free from bias	7 A. Free of selective outcome reporting	7 B. Limitations addressed	7 C. Conclusions clear and justified	7 D. Free of other bias addressed	7 E. Ethics issues addressed	Total score (percentage)
Noone and Hastings (2010)	2	2	0	2	1	2	1	1	0	2	2	2	2	2	0	21
Smith and Gore (2012)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30
																100

**Notes:** Zingg *et al.* (2016) stipulate two conditions to be met to achieve minimum quality standard: all mandatory criteria to be met (denoted by an asterisk here) and a minimum score of 60 per cent. Points are awarded from zero to two, representing criterion not met; unable to ascertain if criterion met; and criterion met, respectively

**Figure 2** Funnel plots for: (a) psychological distress (b) psychological flexibility and (c) burnout at the post-intervention timepoint

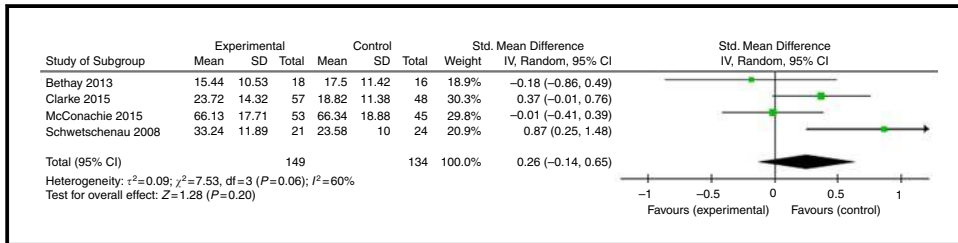


There was no significant pooled effect at either time point, although there was satisfactory homogeneity at both (post-intervention timepoint  $z = 1.28$ ,  $I^2 = 60$  per cent,  $p = 0.20$ ; at follow-up  $z = 0.31$ ,  $p = 0.75$ ,  $I^2 = 0$  per cent).

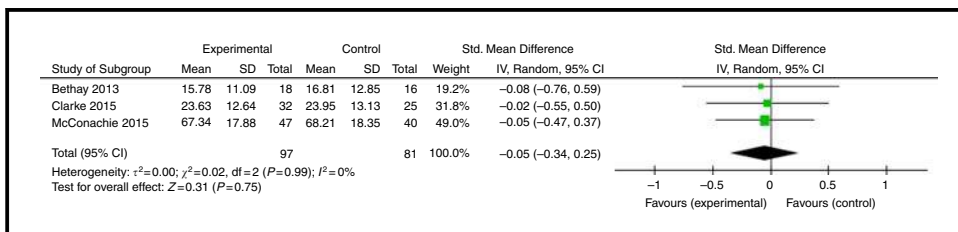
There are three aspects of the Clark study which make it dissimilar from the other studies included in this meta-analysis:

1. the primary purpose of the ACT-based intervention was to reduce staff stigma towards clients; burnout and psychological distress were secondary outcomes which were not directly addressed by the intervention;

**Figure 3** RevMan output for burnout scores at post-intervention



**Figure 4** RevMan output for burnout scores at follow-up



2. this study was the only study to have a distinct active treatment control group (Psychoeducation Training); other studies used passive or treatment component control groups; and
3. of the pooled studies, the Clark *et al.* study had the lowest proportion of participants working in a direct-care inpatient role (at 38 per cent of the intervention group).

Therefore incorporating the Clark *et al.* study reduces the uniformity of the pooled studies. On these grounds, a sensitivity analysis was conducted with the Clark *et al.* study removed.

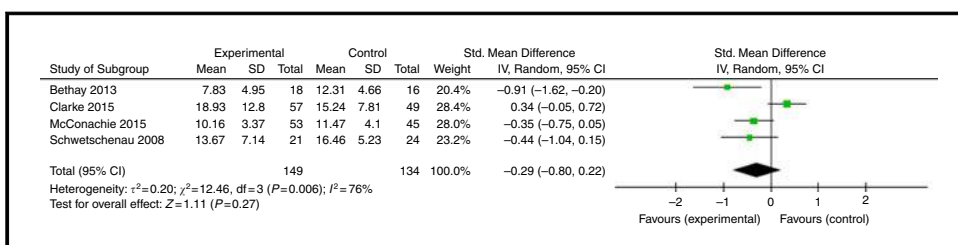
There was no significant pooled effect for burnout at either timepoint with the Clarke *et al.* scores omitted, although homogeneity was reached at both time points albeit marginally so at post-intervention ( $Z=0.72$ ,  $p=0.48$ ,  $I^2=71$  per cent at post-intervention;  $Z=0.32$ ,  $p=0.75$ ,  $I^2=0$  per cent at follow-up).

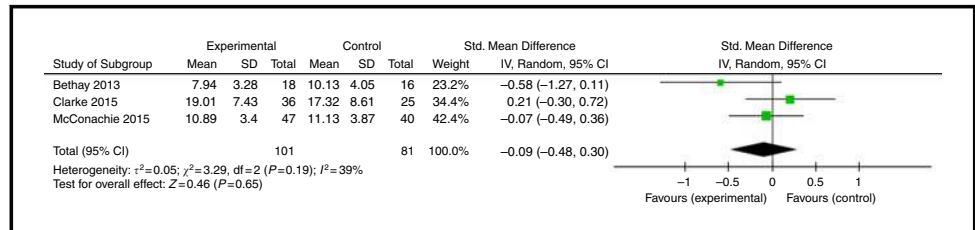
### Meta-analysis of psychological distress scores

The RevMan output for the meta-analysis of psychological distress scores is shown in Figure 5 (at post intervention) and in Figure 6 (at follow-up, varying between studies from six weeks to six months).

There was no significant pooled effect at either timepoint, and homogeneity was only met at the follow-up (at post-intervention timepoint  $z=1.11$ ,  $p=0.27$ ,  $I^2=76$  per cent; at follow-up

**Figure 5** RevMan output for psychological distress scores at post-intervention



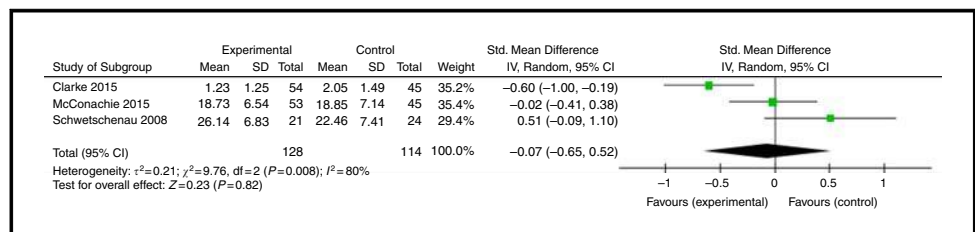
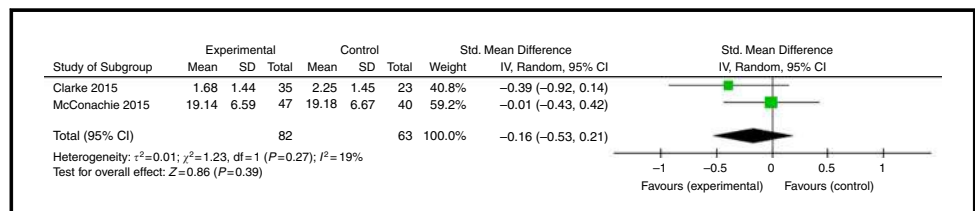
**Figure 6** RevMan output for psychological distress scores at follow-up

$z=0.46$ ,  $p=0.65$ ,  $I^2=65$  per cent). As in the analysis of Burnout scores, the Clarke *et al.* (2015) study intended to reduce staff-stigmatizing thoughts by using the ACT-based intervention. Again, it can be hypothesised that this may result in a reduced effect on Psychological Distress and so a sensitivity analysis was conducted by removing the Clark *et al.* study from the pool.

This sensitivity analysis demonstrated that – having removed estimates from Clarke *et al.* – there was a significant effect favouring ACT for reducing distress at post-intervention ( $z=3.08$ ,  $p=0.002$ ), but not at follow-up ( $z=1.01$ ,  $p=0.31$ ). With the Clarke *et al.* scores removed, homogeneity of studies was achieved in both cases (at post-intervention,  $I^2=0$  per cent; at follow-up  $I^2=37$  per cent).

#### Meta-analysis of psychological flexibility scores

The RevMan output for the meta-analysis of psychological well-being scores is shown in Figure 7 (at post intervention) and in Figure 8 (at follow-up, varying between studies from six weeks to six months). Unlike in the analyses of Psychological Distress, no sensitivity analysis removing the Clarke *et al.* data was appropriate here, as the Clarke *et al.* intervention, being an ACT-based intervention, should theoretically have targeted ACT-constructs such as psychological flexibility irrespective of the outcome targets of the intervention. There were no significant pooled effects, although homogeneity was satisfied in the follow-up scores (at post-treatment  $z=0.23$ ,  $p=0.82$ ,  $I^2=80$  per cent; at follow-up  $z=0.86$ ,  $p=0.39$ ,  $I^2=19$  per cent).

**Figure 7** RevMan output for psychological flexibility scores at post-intervention**Figure 8** RevMan output for psychological flexibility scores at follow-up

## Meta-analysis of high distress subgroups

Two of the studies identified for meta-analysis also provided data for a subgroup of participants with a high level of distress at baseline (Bethay *et al.*, 2013; McConachie *et al.*, 2014). Bethay *et al.* defined high distress as a GHQ-12 score of greater than or equal to 11, and McConachie *et al.* used a GHQ-12 score of greater than 11. Bethay *et al.* provided medians and the range of scores rather than means and standard deviations. Although it is common practice in meta-analyses use the median and a fraction of the variance in lieu of the mean and standard deviation, there is no evidence that they can be used interchangeably (Hozo *et al.*, 2005). Hozo *et al.* provide a formula to estimate the mean from the median and the upper and lower values of the range. This transformation was applied to the data provided by Bethay (see Appendix A3 for the calculation of this). Figures 9 and 10 are the RevMan output analyses for the higher-distress subgroups for psychological well-being, at post-intervention and follow-up, respectively. As Bethay *et al.* did not include a measure of psychological flexibility, no analysis was possible in this subgroup for this variable.

There was a significant pooled effect at both of these time points within this subgroup of participants ( $Z = 2.64$ ,  $p = 0.008$ ,  $I^2 = 0$  per cent at post-intervention;  $Z = 2.41$ ,  $p = 0.02$ ,  $I^2 = 0$  per cent at follow-up). Homogeneity was evident in both cases.

Meta-analyses were also conducted for the effect on burnout in the high-distress subgroup, as shown in Figures 11 and 12 for post-intervention and at follow-up, respectively.

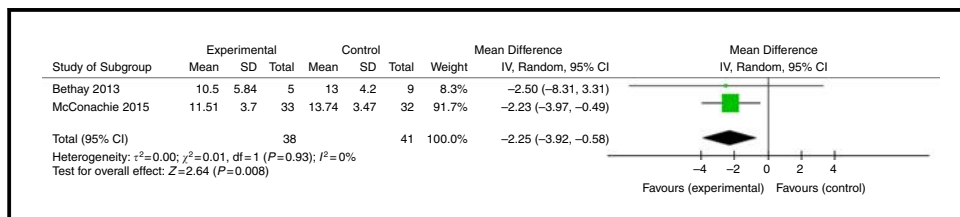
There was no significant pooled effect for the measures of burnout at either time point, although homogeneity was established at both ( $Z = 0.15$ ,  $p = 0.88$ ,  $I^2 = 0$  per cent at post-intervention;  $Z = 0.27$ ,  $p = 0.79$ ,  $I^2 = 0$  per cent at follow-up).

## Discussion

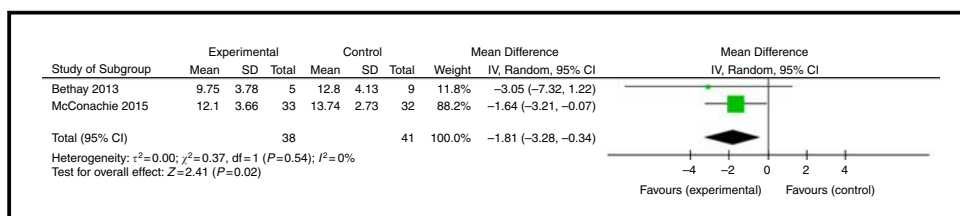
### Are ACT-based interventions helpful to alleviate burnout in this context?

The meta-analysis found no pooled effect for ACT interventions reducing burnout relative to control. This picture remained the same within the high distress subgroup meta-analysis. Amongst the papers not eligible for meta-analysis, one found no significant amelioration in

**Figure 9** RevMan output for psychological distress scores at post-intervention for the high-distress subgroups

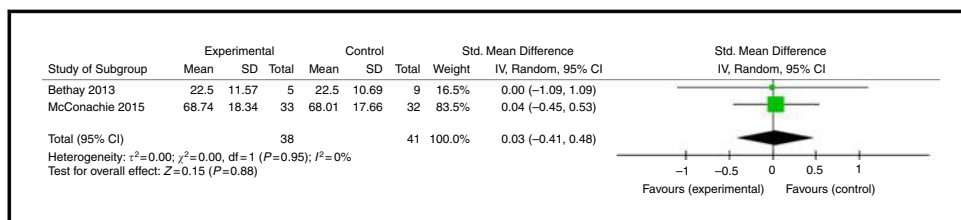


**Figure 10** RevMan output for psychological distress scores at follow-up for the high-distress subgroups

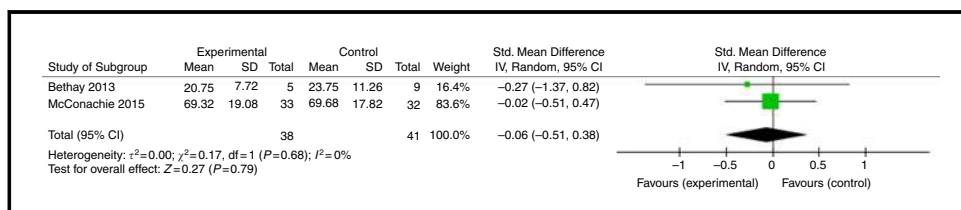




**Figure 11** RevMan output for burnout scores at post-intervention for the high-distress subgroups



**Figure 12** RevMan output for burnout scores at follow-up for the high-distress subgroups



burnout (Noone and Hastings, 2010) whereas the other did find a statistically significant improvement in burnout (Smith and Gore, 2012) following their ACT-interventions.

For the purpose of meta-analysis, the “emotional exhaustion” subscale of the Maslach Burnout Inventory (Maslach *et al.*, 1996) was used for three of the four studies within that analysis. The Staff Stressor Questionnaire (Hatton *et al.*, 1999) – a measure of staff work-stress specifically designed for ID settings – was used by the remaining study in the meta-analysis (McConachie *et al.*, 2014).

Given that only one subscale of the MBI was used in the meta-analysis, it is possible that this may have provided a measure of only a partial element of the larger construct of “burnout”. Of the four studies in the review to use the MBI, two omitted at least one subscale (Clarke *et al.*, 2015; Schwetschenau, 2008). It is not clear in these studies why burnout was conceptualised in such a way as to warrant being measured using only part of the MBI.

That no strong effect on burnout was observed is not necessarily contradictory to the underlying theory of the ACT model – which aims to “grow the person” rather than “shrink the problem” (Hart, 2015). However, in the absence of indicators of growth – meaningful changes in areas of functioning that may be adversely affected by burnout or work-related stress – there is little evidence to support the utility of ACT in managing burnout. Such indicators were not an *a priori* focus of this review, but were also not a focus of the primary studies reviewed herein: to properly evaluate the utility of the ACT model in this context, there is a need for closer mapping of measurement to theory.

#### *Are ACT-based interventions helpful to reduce psychological distress in this context?*

Under certain conditions (namely the sensitivity analysis at post-intervention with Clarke *et al.*, 2015 removed, and also within the high-distress subgroup analysis at both time-points), the meta-analysis demonstrated a statistically significant pooled effect favouring ACT (over control) for reducing psychological distress. This is congruent with the individual findings of the two studies in the review which were not eligible for the meta-analysis (Noone and Hastings, 2010; Smith and Gore, 2012) which also found an amelioration of psychological distress following intervention. Furthermore, in the case of Noone and Hastings (2010) they found a relationship between elevated baseline psychological distress and greater improvement following intervention (albeit for mean scores – on further analysis of individual participant-level data, Noone and Hastings (2010) found that whilst the GHQ scores improved for 22 participants, they deteriorated

for 10 participants). These findings are supported by a study of the effectiveness of ACT for work-related stress in social workers, where the greatest improvement in psychological distress was found in a subgroup with high-distress at baseline (Brinkborg *et al.*, 2011). Pooled findings in the present study should be seen as tentative given that this outcome measure demonstrated the greatest risk of publication bias demonstrated by the funnel plots, described above.

The sensitivity analysis which found a significant pooled effect without Clarke *et al.*'s (2015) study raises a question as to the specificity of effect of ACT-based interventions. The primary purpose of Clarke *et al.*'s intervention was to reduce the stigmatizing attitudes of staff working with people diagnosed with a personality disorder, with the measures of psychological distress and burnout being secondary in their study aims. As described in the Results, the Clark *et al.* study appeared to be an outlier, based on the minimal overlap with the confidence intervals of other studies, and the lack of any overlap with Bethay *et al.* (2013). That Clark *et al.* was the outlier, rather than Bethay *et al.*, is suggested by the strong overlap which Bethay *et al.* showed with both other studies (McConachie *et al.*, 2014; Schwetschenau, 2008). Furthermore, the effect-estimate from Clarke *et al.* was in a direction opposing effect-estimates from all other studies in the analysis. This difference seems most likely attributable to the differential aim/focus of intervention in Clarke *et al.* Implementation of ACT in other domains has highlighted the importance of focussing ACT processes on specific phenomena of interest. For example, within the field of chronic pain, "acceptance of pain" has been identified as a focal construct that can be usefully measured and targeted as distinct from "general acceptance" (McCracken and Zhao-O'Brien, 2010).

### ***Do ACT-based interventions in this setting increase psychological flexibility?***

The meta-analysis did not find an increase in Psychological Flexibility in the pooled intervention data, relative to control. Of the two studies not included in the meta-analysis, only one used a measure of Psychological Flexibility – Smith and Gore (2012) – and also found no increase in this variable. This is inconsistent with the theoretical understanding of the ACT-model given the improvements demonstrated in psychological distress (even if only under specific conditions). It is also discordant with research into the use of ACT-interventions for work-related stress in other contexts, which has found Psychological Flexibility to be a mediating variable for the amelioration of psychological distress (Flaxman and Bond, 2010).

One potential explanation for no change being detected is the near ubiquitous use (within reviewed studies) of the Acceptance and Action Questionnaire-II (AAQ-II) (Bond *et al.*, 2011). A recent investigation into the construct validity of the AAQ-II found that it does not discriminate adequately between the outcome of psychological distress and the process of Psychological Flexibility (Wolgast, 2014). Of the studies in the meta-analysis of Psychological Flexibility, only Clarke *et al.* (2015) did not use the AAQ-II, instead using the Valued Living Questionnaire (VLQ). Interestingly, Clarke *et al.* was the only study to detect an ACT-favouring effect for Psychological Flexibility. If the AAQ-II is indeed seen as lacking content validity as suggested by Wolgast, this could account for the lack of detected change in Psychological Flexibility in the present studies, and account for the exception of Clarke *et al.* detecting an improvement in Psychological Flexibility. Against this, most of the supportive research for mediating effects of Psychological Flexibility has similarly relied on the AAQ-II (Hooper and Larsson, 2015; Ruiz, 2010), and – given its sole focus on valued living – the VLQ is limited in scope/potential to comprehensively gauge Psychological Flexibility. The limited data available preclude meaningful discussion about the relative importance of sub-processes of Psychological Flexibility (e.g. values vs acceptance) in this context.

Overall, the reviewed studies did not support the theoretical understanding that the mediating variable of ACT-interventions is Psychological Flexibility. However, the reasons for this lack of support may be methodological.

### ***What is the quality of currently available research***

Seven studies were included in the review, of which six were assessed as being of adequate quality using the ICROMS tool (Zingg *et al.*, 2016). Even among the four RCT studies which were included in the meta-analysis, there remained a range of methodological issues. A number

of studies had statistically significant differences between the control and experimental groups at baseline (e.g. Schwetschenau, 2008) in favour of the control group. This is likely to make it more difficult to detect significant effects of the intervention, as a greater change in outcome scores will be required. The degree of control of the controlled trials was at times questionable, for instance Noone and Hastings (2009) used six participants as the control group who later underwent the intervention, and so did not act as controls for the full duration of the intervention period.

The use of a follow-up data-point was not in routine use within the papers reviewed. Four of the studies did use outcome measures at follow-up, at an interval which varied between six weeks and six months. Similarly, process measures to ascertain the role of Psychological Flexibility were not universally used: Three of the four studies did not use any measure of Psychological Flexibility. Given that this is a key construct within the ACT model, this appears to be a serious omission when hoping to understand why any such intervention may or may not have been effective.

None of the studies included in the review set an inclusion criterion for participants to be experiencing burnout or psychological distress. This is in contrast with the broader research on psychological interventions for burnout in non-care delivery settings. In a recent systematic review of the effectiveness of psychological interventions for burnout, an inclusion criterion was set requiring each participant to be “experiencing burnout” at the commencement of the study (Ahola *et al.*, 2017). The absence of such a criterion in the studies reviewed here may contribute to a ceiling effect as to how much potential there is to benefit from any interventions. This view is supported by the improved success of ACT-based interventions in the subgroup meta-analysis, which will be discussed in more detail below.

The level of behavioural-challenge faced by staff was only explicated by two of the reviewed papers (Noone and Hastings, 2009; Smith and Gore, 2012). This is discordant with research which has found that this has a major influence on the level of anxiety and job satisfaction of staff working in ID residential units (Jenkins *et al.*, 1997). It is a weakness that the present literature has not so far investigated the relationship between the level of behavioural-challenge faced by staff and their responsiveness to different interventions for burnout or psychological distress.

Overall the quality of the research was moderate. The funnel plot produced for psychological distress was indicative of a potential publication bias for studies finding a favourable outcome for the alleviation of psychological distress; however, with the small number of studies included in the meta-analysis, it is difficult to draw concrete conclusions regarding the existence of such a bias.

### *Generalisability of conclusions*

There are several factors which affect how generalisable the conclusions of this review are.

The nature of the ACT-based intervention was broadly similar across all seven papers, consisting of a group face-to-face intervention lasting between 1½ and 3 days. Although the existence of such a likeness between the interventions does add to the robustness of conducting a meta-analysis, it limits potential to draw generalisable conclusions regarding the usefulness of ACT-interventions more broadly. There were difficulties conducting the search for the review due to divergent terminology pertaining to staff roles. The term “direct-care worker” has been utilised in this review, but the specific roles and settings which this describes may well vary between research studies. This in turn may affect the nature of the stressors that different staff groups are likely to face. When such divergent studies are pooled, this creates a less homogenous data set with a consequent reduction in expected observed pooled effect sizes (Higgins and Green, 2011), yet where a pooled effect is found this will be of interest to a broader range of settings.

### *Implications for practice and future research*

Given the results of the meta-analysis and the supporting evidence from other studies in the review, tentative support can be given in favour of using brief ACT-based group

interventions to reduce psychological distress of staff working in direct-care settings. The processes through which such interventions may reduce staff distress are unclear – as available evidence does not demonstrate effects on ACT-specific process measures (gauging Psychological Flexibility). Such interventions will likely be more helpful for those with greater levels of psychological distress, and are unlikely to be found helpful by those with unproblematic levels of psychological distress. Such interventions should not be expected to reduce burnout.

In conducting the review several gaps in the literature have become apparent, and further research to investigate these will permit more robust conclusions to be drawn in the future.

Given the similarity in the format and delivery of the interventions included in this review, investigations into alternative methods of delivering ACT interventions in this setting would be of pragmatic value for potential applied implementation. Future studies may trial individualised ACT interventions, or those delivered with a greater duration of contact time.

Furthermore, future research should incorporate methodologies which help to illuminate why some participants demonstrate improvements, yet others do not. As some studies found an improvement in some participants' outcome scores yet a deterioration in other participants' scores (i.e. Noone and Hastings, 2010), the use of study designs which follow individual participants may shed light on the factors underlying this. This issue is likely to benefit from single-case time series designs.

A further area for investigation in future research is to develop a greater understanding of the specific aims and treatment targets of ACT-based interventions. The inclusion of a burnout measure in every study included in the review, yet the lack of support for any clear effect of an ACT-intervention on this variable, is symptomatic of the lack of a clear conceptualization as to what treatment targets and benefits an ACT-intervention should hope to achieve. Enhancing conceptual clarity within the literature is likely to benefit the design of both interventions and of the research which investigates them.

Future research would benefit from the inclusion of a broader range of outcome measures to supplement measures of psychological distress and burnout. Measurement of variables such as job satisfaction, attitudes towards clients, and the effect on the quality of client interactions may be of interest. Additionally, the use of alternative measures of Psychological Flexibility will enhance the understanding of the role of this as a mediating variable, the evidence for which so far is uncertain. A move away from the dominance of the AAQ-II may provide clarity, especially given that there are new alternative metrics available such as the CompACT (Francis *et al.*, 2016).

## Note

1. The term "staff" will be used throughout the review to refer to people providing direct care in mental health and intellectual disability settings.

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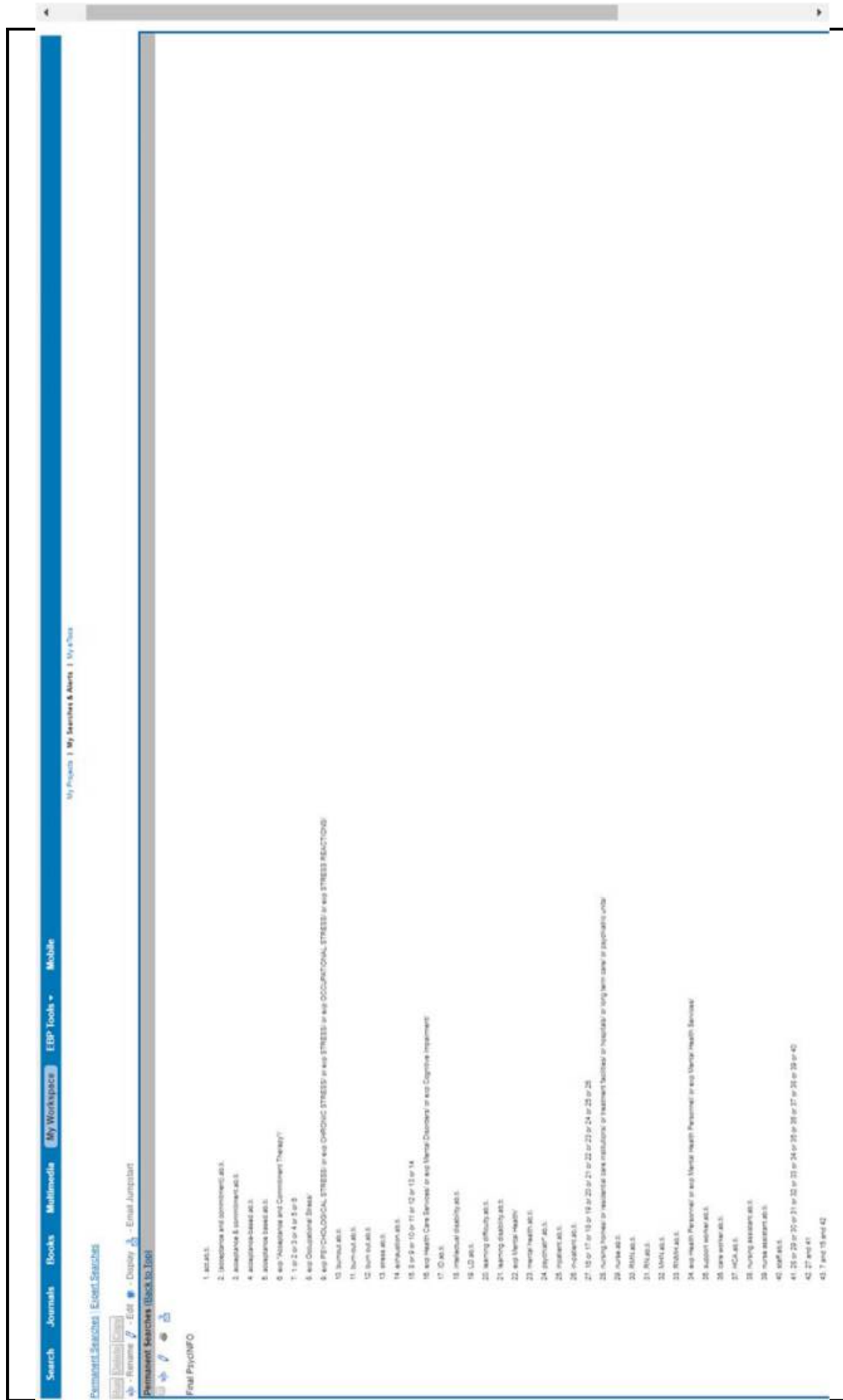
### Further reading

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Figure A1 Screenshot capture of Ovid search strategy





## Appendix 2

**Figure A2** Screenshot capture of Ebsco search strategy

Search History/Alerts			
<a href="#">Print Search History</a>   <a href="#">Retrieve Searches</a>   <a href="#">Retrieve Alerts</a>   <a href="#">Save Searches / Alerts</a>			
<input type="checkbox"/> Select / deselect all		<input type="button" value="Search with AND"/>	<input type="button" value="Search with OR"/>
		<input type="button" value="Delete Searches"/>	<input type="button" value="Refresh Search Results"/>
Search ID#	Search Terms	Search Options	Actions
<input type="checkbox"/> S5	<input type="checkbox"/> (AB ( nurse or RMN or RN or MHN or RNMH or support worker or care worker or HCA or nursing assistant or nurse assistant or staff ) OR TI ( nurse or RMN or RN or MHN or RNMH or support worker or care worker or HCA or nursing assistant or nurse assistant or staff )) AND (S1 AND S2 AND S3 AND S4)	Search modes - Boolean/Phrase	<input type="button" value="Rerun"/>   <input type="button" value="View Details"/>   <input type="button" value="Edit"/>
<input type="checkbox"/> S4	<input type="checkbox"/> AB ( nurse or RMN or RN or MHN or RNMH or support worker or care worker or HCA or nursing assistant or nurse assistant or staff ) OR TI ( nurse or RMN or RN or MHN or RNMH or support worker or care worker or HCA or nursing assistant or nurse assistant or staff )	Expanders - Apply equivalent subjects; Apply related words Search modes - Boolean/Phrase	<input type="button" value="Rerun"/>   <input type="button" value="View Details"/>   <input type="button" value="Edit"/>
<input type="checkbox"/> S3	<input type="checkbox"/> AB ( TI id or Id or learning disability or learning difficulty or intellectual disability or mental health or ward or inpatient or in-patient or psychiat* ) OR TI ( TI id or Id or learning disability or learning difficulty or intellectual disability or mental health or ward or inpatient or in-patient or psychiat* )	Expanders - Apply equivalent subjects; Apply related words Search modes - Boolean/Phrase	<input type="button" value="Rerun"/>   <input type="button" value="View Details"/>   <input type="button" value="Edit"/>
<input type="checkbox"/> S2	<input type="checkbox"/> AB ( burnout or stress or burn out or exhaustion or burn-out ) OR TI ( burnout or stress or burn out or exhaustion or burn-out )	Expanders - Apply equivalent subjects; Apply related words Search modes - Boolean/Phrase	<input type="button" value="Rerun"/>   <input type="button" value="View Details"/>   <input type="button" value="Edit"/>
<input type="checkbox"/> S1	<input type="checkbox"/> AB ( act or (acceptance and commitment) or acceptance & commitment or acceptance based or acceptance-based ) OR TI ( act or (acceptance and commitment) or acceptance & commitment or acceptance based or acceptance-based )	Expanders - Apply equivalent subjects; Apply related words Search modes - Boolean/Phrase	<input type="button" value="Rerun"/>   <input type="button" value="View Details"/>   <input type="button" value="Edit"/>

### Appendix 3. Method of estimating means and standard deviations for Bethay *et al.* (2013)

Bethay *et al.* (2013) provided only the median and range scores. Hozo *et al.* (2005) suggest the following equation for estimating the mean from the median where  $n \leq 15$ :

$$\text{Mean} \approx \frac{a+2m+b}{4},$$

where  $a$  is the low end of the range;  $b$  the high end of the range;  $m$  the median.

Hozo *et al.* (2005) suggest the following equation for estimating the variance from the range when  $n \leq 15$ :

$$\text{Variance} \approx \frac{1}{12} \left( \frac{(a-2m+b)^2}{4} + (b-a)^2 \right),$$

where  $a$  is the low end of the range;  $b$  the high end of the range;  $m$  the median.

As the standard deviation was required for the meta-analysis (rather than the variance), the formula was modified by taking the square root of the above formula to obtain the standard deviation:

$$\text{Standard deviation} \approx \sqrt{\frac{1}{12} \left( \frac{(a-2m+b)^2}{4} + (b-a)^2 \right)}.$$

The median and range scores for the high distress subgroup were extracted from Bethay *et al.* (2013). From these, the mean and standard deviation was estimated using the above formulae. These were then inputted into RevMan in the usual way, as described in the method.

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