



## Article

# A smart-phone intervention to address mental health stigma in the construction industry: A two-arm randomised controlled trial

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## ABSTRACT

**Background:** High levels of self-stigma are associated with a range of adverse mental health, treatment, and functional outcomes. This prospective study examined the effects of an electronic mental health stigma reduction intervention on self-stigma (self-blame, shame, and help-seeking inhibition) among male construction workers in Australia.

**Method:** Male construction workers (N = 682) were randomly assigned to receive either the intervention condition or the wait list control over a six-week period. Self-stigma was assessed using the Self-Stigma of Depression Scale at post-intervention. We conducted linear regression to assess the effectiveness of the intervention on self-stigma, adjusting for relevant covariates.

**Results:** Self-stigma was relatively low in the sample. The intervention had no significant effect on self-stigma, after adjusting for confounders. There were reductions in stigma in both the intervention and control groups at 6-week follow-up. Process evaluation indicated that participants generally enjoyed the program and felt that it was beneficial to their mental health.

**Conclusions:** These observations underscore the need for further research to elucidate understanding of the experience of self-stigma among employed males.

## 1. Introduction

Self-stigma (also called internalised stigma) is commonly described as a process occurring at an individual level (Livingston and Boyd, 2010). In the context of mental health, this may occur if individuals with mental illness endorse stereotypes about themselves, anticipate possible negative social repercussions (e.g., social rejection) and believe that they are devalued members of society (Livingston and Boyd, 2010). In other words, when a person with mental health problems internalizes stigmatizing societal messages about mental illness (Lucksted et al., 2011). This differs from stigma experienced from others (public stigma) which occurs when an individual or group endorses stereotypes about a stigmatised group (Corrigan, Kerr & Knudsen, 2005). There are several aspects involved in the process of stigma, including feelings of alienation, social withdrawal, and perceived discrimination (e.g., person's beliefs about the negative and stigmatising views that other people hold) from others (Brohan, Gauci, Sartorius & Thornicroft, 2011; Corrigan and Shapiro, 2010).

Research suggests that having high levels of self-stigma can be associated with a range of psychosocial factors, such as poorer self-esteem, hopelessness, reduced self-efficacy, decreased quality of life, and weakened social support/integration (Livingston and Boyd, 2010). Self-stigma has been associated with greater severity of mental health symptoms among people with psychiatric disorders (Livingston and Boyd, 2010; Büchter and Messer, 2017). In addition to being related to poorer mental health outcomes, self-stigma can lead to suboptimal employment outcomes (Rüsch et al., 2014), and loss of previously held or desired identities (e.g., employee, parent, partner), resulting in personal devaluation (Brohan, Gauci, Sartorius & Thornicroft, 2011; Yanos, Roe, Markus & Lysaker, 2008). Conformity to traditional masculine norms is particularly implicated in greater self-stigma against depression (Latalova et al., 2014) and appears to be associated with reluctance to seek help among men (Topkaya, 2014).

Addressing self-stigma may bring about positive outcomes for affected individuals. At the individual level, these outcomes may include improved coping skills, self-worth, and knowledge about stigma and its

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ill-effects (Büchter and Messer, 2017; Livingston and Boyd, 2010). There may also be social (e.g., greater social networks and social support) and treatment-related benefits (e.g., more help-seeking behaviours and treatment adherence), as well as positive outcomes in other life domains (e.g., employment, education) (Livingston and Boyd, 2010). The potential positive effects of reducing stigma has seen growing interest in stigma-focused interventions (Livingston and Boyd, 2010). However, results of trials in this area appear to be equivocal (Büchter and Messer, 2017). To some extent, this may reflect the methodological flaws of these interventions, which frequently lack core components of a randomised controlled trial design (e.g., allocation concealment, blinding of outcome assessors) (Büchter and Messer, 2017). It is also necessary to note that past studies addressing self-stigma have been largely conducted among people with a clinical diagnosis of mental illness (Alvidrez, Snowden, Rao & Boccellari, 2009; Fung, Tsang & Cheung, 2011; McCay et al., 2007; Yanos, Roe, West, Smith & Lysaker, 2012). Therefore, the generalisability of such studies to the general population may be limited.

The current prospective study expands on previous research by focusing on a non-clinical sample of male construction workers. The current study aims to assess whether an intervention designed to reduce stigma against mental health problems was associated with lower self-stigma. The anti-stigma intervention evaluated in this study was part of the Contact+Connect program, a randomised controlled trial comparing a six-week package of electronic brief contact interventions to wait list control condition. We hypothesised that individuals who received the intervention would report lower self-stigma compared with those in the control group at post-intervention. We also report process evaluation of the trial based on program monitoring and feedback provided by participants.

## 2. Methods

### 2.1. Participants

The program was implemented and managed by Incolink, a social enterprise in the commercial building, construction and civil allied industries. This organisation administers redundancy and provides support to members of the construction industry in Victoria, Australia. The Contact+Connect program was originally targeted towards unemployed persons in the construction industry, but there was strong interest in the program among those who were employed. Thus, the study protocol was altered to allow employed people in the industry to participate in the study. Participants were predominantly recruited via SMS messages to Incolink members using an online communications platform ('Whispir'<sup>TM</sup>), as well as through social media and word of mouth at union meetings and training courses.

Eligible individuals were males in the construction industry accessing services from Incolink between 30 May 2016 and 4 April 2017. Males who owned a smartphone with internet connectivity and adequate data download capacity were invited to participate. Individuals who would like to participate in the program were then screened by Incolink staff to exclude those with inadequate English language skills (a primary language other than English) and those who were under 18 years old.

Fig. 1 shows that of the individuals who were considered eligible to participate (e.g., males in the construction industry who self-selected into the study), 74% returned a baseline survey and were allocated to either the intervention group or wait-list control group. Further, 70% of those who received a baseline survey also returned a survey at the conclusion of the intervention period. The total sample size fell below our expectation, but was still adequate to observe results for depression stigma based on our original power calculations (Milner, Witt, Burnside, Wilson & LaMontagne, 2015).

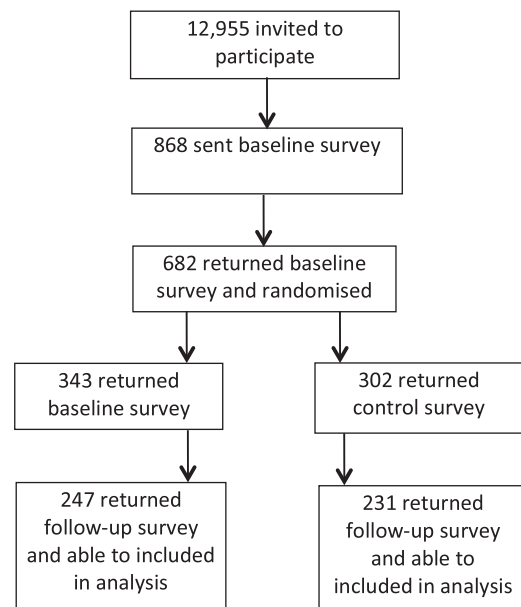


Fig. 1. Flow of participants into the study.

### 2.2. Design and procedure

Written informed consent was sought from all eligible participants. Those persons who agreed to be involved filled out an electronic consent form, which was available to participants at all times. Participants were able to withdraw at any time. Those who gave consent were randomly allocated to one of the two groups, the intervention group or wait-list control group, by an off-site statistician using a computerised randomisation software implemented through Stata 13. Participants and outcome assessors were blind to treatment allocation.

Following randomisation, a staff member at Incolink provided the participants allocated to the intervention group with access to the Contact+Connect program. The content of the Contact+Connect program itself (containing an anti-stigma component) has been detailed elsewhere (Milner et al., 2015). Briefly, the program was delivered to participants' smart phones via rich text messages with embedded hyperlinks to microsites and other digital resources such as videos and digital wallet cards. These additional resources provided information on stigma, mental health, information on help seeking, and links to sources of help, whilst also encouraging the establishment and maintenance of long-term contact with others. The program was delivered using Whispir<sup>TM</sup> enterprise edition, an automated and programmable SMS message and communication management system. In addition to allowing multiple types of communication at once, this software enabled assessors to track participants' engagement with various materials.

Participants in the intervention group were delivered one message per week for a total of six weeks. Participants in the control group were provided the intervention materials in full at the conclusion of the project. Participants' stigma as an outcome measure was assessed at baseline (i.e., prior to randomisation) and post-intervention (i.e., six weeks). Participants were also asked at a second follow up point (i.e., 12 weeks) several process questions assessing engagement with the program and recommendation of the program to others.

### 2.3. Outcome measures

The primary outcomes of the study were the three subscales of The Self-Stigma of Depression Scale (SSDS), all of which measure different aspects of the self-stigmatising attitudes (Barney, Griffiths, Christensen & Jorm, 2010). Self-stigmatising attitudes were assessed using the Self-

Stigma of Depression Scale (SSDS) (Barney et al., 2010) which consisted of an adapted subscales on self-blame, shame, and help-seeking. The self-blame subscale was comprised of three items: “I would think I should be able to cope with things”; “I would think I should be able to ‘pull myself together’”; and “I would think I should be stronger.” The shame subscale is comprised of four items: “I would feel ashamed”; “I would feel embarrassed”; “I would feel inferior to other people”; and “I would feel disappointed in myself”. The help-seeking subscale is comprised of four items: “I would feel embarrassed about seeking professional help for depression”; “I would feel embarrassed if others knew I was seeking professional help for depression”; “I would see myself as weak if I took antidepressants”; and “I wouldn’t want people to know that I wasn’t coping”.

Items within each self-stigma subscale were summed with higher scores representing greater stigma. This resulted in scores ranging from 4 to 16 for the help-seeking subscale (mean = 9.89, s.d. = 2.75) and the shame subscale (mean of 9.51, standard deviation of 2.93), and ranging from 3 to 12 for the self-blame subscale (mean = 7.58, s.d. = 1.73). There was good reliability coefficient for help-seeking (0.85) and shame (0.89), but a fair reliability coefficient for the self-blame subscale (0.66). The SSDS has demonstrated been validated in a sample of 1312 community members (randomly selected via the electoral roll). Follow up was conducted with 151 of these people. This validation found that higher self-stigma was associated with a lower likelihood to seek help from professional sources, and greater perceptions of social distance (Barney et al., 2010). This research also found that positive associations between self-stigma, depressive symptoms and self-esteem (Barney et al., 2010).

Secondary outcomes included suicidal ideation, communication about suicide, and suicide attempts SBQ-R; (Osman et al., 2001). Both primary and secondary outcomes were assessed at baseline (prior to randomisation) and post-intervention (6 weeks after commencing the program).

2.4. Confounders

Possible confounders were adjusted in the analysis. They were age (18–29, 30–39, 40–49, 50–59, ≥ 60), relationship status (married/de facto, never married, divorced/separated, widowed), and employment status (employed, unemployed).

2.5. Analytic approach

Balance of baseline variables was assessed using Percent Standardised Differences between the treatment and control groups. Following this, we calculated unadjusted estimates for each of stigma outcome using linear regression. We then obtained covariate-adjusted estimates by regressing baseline measurements of the intervention group and covariates on overall outcomes using linear regression. In both unadjusted and adjusted analyses, the effect of the Contact + Connect package was assessed by including an interaction between time (0 = baseline, 1 = post-intervention) and intervention status (0 = control, 1 = intervention) on the outcome. Marginal means were calculated post-estimation.

2.6. Ethics, consent and permissions

The study was approved by Deakin University Human Research Committee (approval number 2015-194). The trial was prospectively registered with the Australian and New Zealand Clinical Trial Registry (ACTRN12615000792527). Following randomisation, allocation and implementation, participants were contacted by staff at Incolink if they reported they had been thinking, communicated about suicide or had attempted suicide in the baseline survey. These people were offered the services of a psychologist at Incolink for no cost. It should also be noted that we updated some aspects of the trial and these changes were

Table 1  
Baseline distribution of outcome (self-stigma) and covariates.

	Intervention (n = 247)	Control (n = 231)	Std. Diff %
<b>Age group %</b>			
18–29	9.8	11.4	-0.052
30–39	22.1	25.8	-0.087
40–49	29.5	31.8	-0.049
50–59	29.1	22.9	0.142
≥60	9.4	8.1	0.049
<b>Help-seeking inhibition (mean)</b>	10.00	10.11	-0.036
<b>Shame (mean)</b>	7.61	7.75	-0.04
<b>Self-blame (mean)</b>	9.72	9.70	-0.042
<b>Relationship status %</b>			
Married/De facto	68.7	69.6	-0.02
Never married	17.2	16.3	0.023
Divorced/Separated	13.3	12.3	0.029
Widowed	0.9	1.8	-0.08
<b>Employment status %</b>			
Employed	23.8	24.5	-0.016
Unemployed	76.2	75.5	0.016

Notes: Help-seeking inhibition and shame scale runs from 4 to 16; self-blame runs from 3 to 12. Higher scores equal greater stigma.

reported to both the Australian and New Zealand Clinical Trial Registry and university ethics committee. Participants were offered small financial incentives for taking part in the study (\$20 gift voucher).

3. Results

3.1. Intervention effects on help-seeking inhibition, shame, and self-blame

Table 1 shows no baseline imbalance between the intervention and control groups.

There was no effect of the intervention on stigma by the six-week post-intervention period (Table 2). The adjusted results (i.e., adjusting for all confounders) pertaining to the interaction between intervention and time was -0.03 for help-seeking (95% CI -0.74, 0.68), -0.19 for shame (95% CI -0.96, 0.58), and -0.06 for self-blame (95% CI -0.50, 0.39).

Table 2  
The effects of Contact+Connect on suicide ideation, unadjusted results, adjusted for covariates and adjusted using a propensity score.

	Mean Difference	95% CI	p value	Mean difference (95% CI): Time 0 vs 1, Control	Mean difference (95% CI): Time 0 vs 1, Intervention
<b>Help-seeking inhibition</b>					
Unadjusted analysis	0.03	(-0.66, 0.73)	0.917	-0.35 (-0.85, 0.15)	-0.31 (-0.82, 0.20)
Adjusted analysis	-0.03	(-0.74, 0.68)	0.931	-0.34 (-0.86, 0.18)	-0.37 (-0.90, 0.16)
<b>Shame</b>					
Unadjusted analysis	0.01	(-0.74, 0.76)	0.977	-0.32 (-0.86, 0.22)	-0.30 (-0.85, 0.24)
Adjusted analysis	-0.19	(-0.96, 0.58)	0.625	-0.27 (-0.83, 0.28)	-0.46 (-1.02, 0.09)
<b>Self-blame</b>					
Unadjusted analysis	0.01	(-0.43, 0.43)	0.997	-0.15 (-0.45, 0.15)	-0.15 (-0.46, 0.17)
Adjusted analysis	-0.06	(-0.50, 0.39)	0.800	-0.16 (-0.48, 0.15)	-0.22 (-0.54, 0.10)

Notes 95% CI = confidence intervals at 95% significance; p value = p value set at 95%. Adjusted for: age (18–29, 30–39, 40–49, 50–59, ≥60), and relationship status (married/de facto, never married, divorced/separated, widowed), and employment status (employed, unemployed).

However, at the six-week post-intervention assessment, there was a non-significant reduction in help-seeking inhibition (adjusted mean difference [aMD] -0.34, 95% CI -0.86, 0.18), for shame (aMD -0.27, 95% CI -0.83, 0.28), and -self-blame (aMD -0.16, 95% CI -0.48, 0.15) in the control group. Pre-post effects were slightly greater in the intervention group compared with the control group, with a -0.37 reduction in help-seeking inhibition (95% CI -0.90, 0.16), a -0.46 reduction in the shame (95% CI -1.02, 0.09), and a -0.22 reduction in the self-blame scale (95% CI -0.54, 0.10).

### 3.2. Participant engagement

Participants completed a participant engagement survey at the conclusion of the Contact+Connect program at a second follow up point (12 weeks). Of the 117 surveys returned, 20% of respondents spoke with a mental health professional since completing program and 34% had professional counselling. In addition, since completing the Contact+Connect program, 42% of respondents had assisted someone who was experiencing a mental health issue, with the majority referring them to a mental health professional and the remaining majority advising them to contact an Incolink counsellor or refer to online resources. Most encouraging is that 81% of respondents reported that they would have enrolled and participated in the Contact+Connect program regardless of the financial incentives involved.

Of the 117 participants who completed a follow-up survey, 70% enjoyed participating in the program, with mental health information and video content attracting the most engagement (19% and 28%). In addition, 56% of respondents reported the Contact+Connect program was beneficial to their mental health and 73% stated they would recommend the program to others.

## 4. Discussion

The present findings indicate that the electronic Contact+Connect stigma reduction program was not effective in reducing self-blame, shame, and help-seeking inhibition among a participating sample of male construction workers in Victoria, Australia. Our failure to find statistically significant results may reflect methodological problems, including a lack of statistical power and substantial drop out. Our results may also highlight complexities in the experience of addressing self-stigma. In saying this, our process evaluation suggested that a majority of participants reported felt the study had been beneficial to their mental health.

Despite not reaching statistical significance, there was some suggestion that participants randomised to the intervention group experienced a reduction in self-blame, shame, and help-seeking inhibition. We would note there was a slightly greater decrease in self-stigma among those in intervention group compared to the control group. However, the control group also reported a reduction in self-stigma over the six-week intervention period. Considering these results, it we are unable to rule out the possibility that those in the control group did not experience the intervention. This may have occurred if construction workers in the intervention group shared the program content with participants in the control group. This issue of contamination is a recognised problem in psychosocial interventions where trial researchers are unable to control where, when, and with whom the participant undertook the program. The fact the participants were not able to be blinded is also likely to have affected results.

As mentioned above, it is also necessary to consider complexities associated with the conceptualisation and measurement of self-stigma. Leading researchers in the area suggest that the experience of self-stigma is a process (Corrigan and Rao, 2012), the first stage of which is perceived devaluation and discrimination, which may then lead to diminished self-esteem and self-efficacy. This assumes that self-stigma operates in a linear manner. We are unsure whether this was the case in our study, although we would note that reported stigma was relatively

low among construction workers (particularly the shame subscale). It is also important to note that models of self-stigma have been developed for people with mental illness rather than the general population; thus, models of self-stigma may not generalise to our sample. It may be that construction workers experience stigma in a fundamentally different way than clinical samples of people with depression. In saying this, it is likely that some of the participants in this study did experience mental health problems, given that mental health problems are common in the working as well as unemployed populations that the overall prevalence of mental health problems in the population. Further, not all people appear to suffer from the ill-effects of self-stigma (Corrigan and Rao, 2012). In fact, some people with mental health problems may react against the process of self-stigma. This suggests that self-stigma is not inevitable and may be context and person specific.

We chose three subscales of the SSDS to measure self-stigma (self-blame, shame, and help-seeking inhibition). However, we are aware of several other scales, all of which highlight different aspects of the phenomena. For example, Link (1987) developed the Perceived Devaluation-Discrimination Questionnaire (PDDQ) which assesses whether people are aware of or can otherwise recognise the stereotypes of mental illness (Corrigan et al., 2012). This has been criticised as not being able to represent the breadth of self-stigma experience, which also includes acceptance and internalisation (Corrigan et al., 2012). The 40 item Self-Stigma of Mental Illness Scale (SSMIS), created by Corrigan (Corrigan et al., 2012), includes four main domains, reflecting the process model of stigma, as explained above. These stages are: 1) awareness (e.g., “I think the public believes most persons with mental illness are dangerous.”); 2) agreement (“I think most persons with mental illness are dangerous.”); 3) application (“Because I have a mental illness, I am dangerous.”), and; 4) harm to self-esteem (“I currently respect myself less because I am dangerous.”) (Corrigan et al., 2012). The Internalized Stigma of Mental Illness (ISMI) scale picks up other aspects of the phenomenon including alienation, stereotype endorsement, perceived discrimination, social withdrawal and stigma resistance (Boyd Ritsher, Otilingam & Grajales et al., 2003). Thus, it may be that our study may not have detected pertinent aspects of what is a complex process. For example, it may be that perceived stigma and stereotype endorsement may be particularly important to investigate, given that these are critical parts of several past scales. It is also important to acknowledge that stigma and discrimination from others may be associated with greater harm than internalised self-stigma, as suggested in a number of recent studies (Berger and Saranyai, 2015; Fuller-Rowell Doan & Eccles, 2012). At the same time, there is consistent evidence that people with mental health problems are often excluded from education and employment, and are less likely to have supportive relationships and social connections (Livingston and Boyd, 2010). This suggests that the experience of stigma (whether from internal or external forces) is likely to affect health both directly and indirectly. We would also note that the SSDS has only been validated in one study to date (Barney et al., 2010) and there is need to assess the performance of the scale prospectively and with independent samples.

There were a number of other limitations in the current study worth mentioning. First of all, we did experience considerable drop out in the present study (attrition rate was 30% from those who commenced the program, i.e., submitted the baseline survey to those who went on to complete it, i.e., submitted the follow up survey). This not only reduced the power for detecting a significant result, but was particularly apparent in the second follow up survey at 12 weeks, where we only received 106 responses. Given the high risk of selection bias as a result, we decided not to report the responses to the 12-week follow-up survey. The ability to attract and retain participants such as those eligible for Contact+Connect has been noted as a problem in health research (Bonevski et al., 2014) and digital interventions more specifically (Witt et al., 2017). Some of factors that are likely to have contributed to drop out include the fact that the intervention was delivered to a participants' mobile phone and thus may have been forgotten when

considered alongside the range of other work and non-work related commitments occurring in participants' day. Although not a methodological limitation, it would have been useful to have data on a participants' mental health and help-seeking behaviours following participation in this trial, in order to assess some of the correlates of stigma. It would have also been useful to have data on other possible confounders, such as education. This was not included in the survey due to space constraints.

In saying this, the process evaluation we conducted with 117 participants suggested that the majority (70%) enjoyed the program. Promisingly, participants also reported that Contact+Connect improved their mental health and about 40% had said they had referred a person who they were worried about to professional help. About one in five participants sought help themselves from a health professional following the program. While we acknowledge this represents a subsection of participants, this suggests that (at the least) the stigma program was acceptable to participants.

## 5. Conclusion

This study suggests that the electronic anti-stigma program Contact + Connect did not have a beneficial effect on aspects of self-stigma such as self-blame, shame and help-seeking inhibition. This highlights the need for a better understanding of the experience of self-stigma in the general population, as well as a careful alignment between measurement tools and the specific aspects of stigma under study. At the same time, there needs to be greater scrutiny into the mechanisms through which stigma can be addressed. We anticipate this work would enable the development of effective and targeted anti-stigma interventions.

## Acknowledgment

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## Declarations Ethics approval and consent to participate

This project received ethics approval from Deakin University Human Research Committee (approval number 2015-194). Consent for publication

Not applicable. Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to confidentiality and ethics but are available from the corresponding author on reasonable request. Funding

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The authors declare that they have no competing interests. Author contributions

AM, KW designed the intervention and study with assistance from ADL, PL, ZA and TC helped analyse the data. All authors contributed to the interpretation of results, commented on drafts and approved the final manuscript.

## Trial registration

This trial was prospectively registered on the Australian and New Zealand Clinical Trials Registry [12615000792527].

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