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Development, implementation and evaluation of an innovative intervention to promote employee mental health and reduce mental illness stigma at work

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München, den 23.10.2017 Sabine Hanisch

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Abbreviations

PTSD Posttraumatic Stress Disorder

EAP Employee Assistance Program

RCT Randomized Controlled Trial

MHFA Mental Health First Aid

TRiM Trauma Risk Management

CIT Crisis Intervention Training

LMHP Leadership Training in Mental Health Promotion

LMU Ludwig-Maximilians-University Munich

MAKS Mental Health Knowledge Schedule

MHCM Mental Health Continuum model

MHP mental health promotion

MLM Multilevel models

OMS-WA Opening Minds Survey on Workplace Attitudes

Publication list

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1 Introduction

1.1 Mental illness stigma and associated consequences

Most people experiencing mental health problems do not seek help even though effective treatments are available. Globally, up to 70% of affected individuals are estimated to not receive any healthcare treatment [1]. Since mental health problems are relatively common among the general population (1 in 4), this estimation is rather disturbing [2]. Lack of knowledge of the symptoms of mental illness and how to access treatment, prejudicial attitudes, and anticipated or real acts of discrimination against people who have mental health problems are factors which were shown to contribute to the treatment gap [3-5]. Taken together, these factors defined as 'stigma' [1], have far-reaching consequences for people experiencing mental health problems.

Among the general population, the level of accurate knowledge about mental disorders has been reported to be fairly low [6].In the UK, for example, the majority of respondents to a population survey (63%) believed that less than 10% of the population would be likely to experience a mental illness at some time in their lives [7]. In contrast, research shows the benefits of improving mental health literacy with regards to people's ability to recognize signs of mental illness, and their willingness to seek help and accept treatment [8].

Negative attitudes or prejudice refer to negative thoughts and emotions, such as anxiety or disgust, a majority group holds against a minority group [1]. Beliefs of the general population about mental illness were repeatedly found to revolve around incompetence, dangerousness, a desire for social distance, and expectations of poor prognosis [9].

Discrimination forms the behavioral dimension of stigma and refers to any acts to the disadvantage of people who are stigmatized [10]. Research reported that about half of the general public (47%) would dislike or not be willing to work closely with people diagnosed with depression, while further 30% would avoid social interaction with them [11].

Public stigma as described above often leads to a form of 'self-stigma' (internalization of stigmatizing attitudes), reducing self-esteem and self-efficacy in people with mental health problems even more [12]. Affected individuals often perceive the consequences of being stigmatized due to their mental illness as worse than the actual mental illness due to its adverse impact on all aspects of life [13]. Perhaps most destructive about mental illness stigma is the major barrier it poses for affected individuals to seek help and access treatment [14, 15].

1.2 The impact of stigma on employee help-seeking at work

While there is a vast amount of research on mental illness stigma among the general public, little is known about its prevalence and consequences at the workplace. Emerging research, however, reports that mental illness stigma is likely to contribute similarly to low rates of usage of healthcare services at work [16]. For example, Walton [18] found that employees worried about their managers' perception of them if they were aware of their use of an Employee Assistance Program (EAP). Related to employees' reluctance to seek support was the very prominent fear that others finding out about their usage of mental health support services would negatively affect their career [19]. Thus, while being relatively under-researched, mental illness stigma and the fear of it seem to be at least equally if not more prominent in the workplace as it is in the general public, especially in the current economic climate [17]. This leads to employees substantially delay the help-seeking process, sometimes to the point of long-term sickness absence, when their symptoms severely interfere with daily functioning [20]. Therefore, stigma not only hinders access to treatment after the onset of mental illness, but equally disrupts prevention efforts during early stages of an illness [21].

1.3 Economic impact of mental illness at work

When mental illnesses go unrecognized and untreated, this has tangible economic consequences for businesses globally. The full work impact of mental illness in terms of sickness absence, presenteeism (lost at-work productivity), and turnover is estimated to cost organizations £26 billion a year in the UK alone [22]. In recent years, generally, the trend of sick days lost due to mental illnesses has been growing in high-income countries [23].

Adequate support, on the other hand, can improve employee wellbeing and job performance and is crucial given that 1 in 4 employees will be affected at some point in their lives [1]. Consequently, the workplace is increasingly being recognized as an important target to promote mental health, and to prevent and treat mental illness [24].

1.4 Current state of research and practice

Progressively more organizations have implemented EAPs, which typically support employees with personal or work-related problems and provide assessment, counseling, and referral services [25]. Additionally, programs to alleviate stress (e.g. relaxation techniques) are often offered [26].

However, current practices of workplace mental health promotion are far from perfect and are likely to benefit from addressing the following limitations. First, interventions aiming to promote employee mental health should focus more on the organizational level (working conditions) rather than mainly on the employee level (e.g. stress management) [27,28], since the social environment, hence the working culture, as well as the level of social support are strongly related to employee mental health [29]. Second, more emphasis should be placed on the impact of 'healthy leadership' in organizations [30,31]. Due to their special role and close contact with employees, managers are in an ideal position to recognize signs of deteriorating mental health and to provide support early to employees. Unfortunately, leaders often feel ill-equipped to support individuals with mental health problems adequately which highlights a need for specific training [32]. Third, currently neglected, efforts in workplace mental health promotion would benefit from addressing mental illness stigma specifically since it was shown to drastically undermine employee help-seeking (as shown in low utilization rates of EAPs) [25,33,34,35,36,37].

To conclude, there is still room for improvement concerning current practices in mental health promotion if organizations want to succeed at supporting employee mental health early and effectively [38]. In order to achieve acceptance, use, and thus, effectiveness of mental health interventions (e.g. EAPs), raising awareness, destigmatizing mental illness, and creating a supportive organizational culture seem to be key [39].

To address the limitations of current practices and research on stigma reduction programs in the workplace, this doctoral thesis includes a) a systematic review on the effectiveness of workplace anti-stigma interventions, and b) the development and pilot evaluation of an innovative workplace anti-stigma intervention.

2 Research questions and objectives

The general objective of this doctoral thesis is to gain an in-depth understanding of current workplace anti-stigma interventions and their effectiveness and provide recommendations for future research as well as workplace practice.

Study 1 – The effectiveness of interventions aiming to reduce mental illness stigma at the workplace: a systematic literature review

To our knowledge, there are no systematic reviews focusing on the effectiveness of workplace anti-stigma interventions. Similar systematic efforts so far, investigated stigma reduction programs among the general public [40-45]. While we did find two reviews of current workplace anti-stigma programs, they were rather conceptual and non-systematic in nature and did not focus on program evaluations.

Research questions

- Are anti-stigma interventions currently being used in the workplace and if so, what type of interventions are used?
- Are they effective in changing employees' knowledge, attitudes and behavior towards people with mental health problems?
- Do those interventions lead to an increased usage of psychological support services at work (e.g. EAPs)? Are those interventions capable of changing help-seeking behavior?
- Is the quality of program evaluation studies high enough to be able to draw conclusions about program effectiveness?

Objectives

While insight to current workplace anti-stigma interventions is widely lacking, such investigations could a) inform important stakeholders such as Human Resources or Health Management personnel about their effectiveness b) provide guidance for the development and implementation of effective future interventions, and c) inform about potential benefits (e.g. inferred impact on utilization rates of healthcare services/EAP and on employee mental health) and thereby strengthen the incentive for organizations to invest in stigma reduction efforts.

Therefore, this study aims to provide a first systematic review on the effectiveness of workplace stigma reduction programs by examining changes in: (1) knowledge of mental health and illness, of treatment and of signs of mental disorders, (2) attitudes towards people with mental illness, and (3) supportive behavior among colleagues (e.g. reduced discriminatory or increased affirmative behavior). Our outcome measures are based on the conceptual framework of stigma by Thornicroft [1] as described earlier. In contrast to the majority of existing evaluation studies, we were particularly interested in changes in the behavioral dimension of stigma and potential impacts of stigma reduction programs, such as increased help-seeking [3,43,47].

Study 2 – Development and evaluation of a digital game-based intervention for managers to promote employee mental health and reduce mental illness stigma at work: a quasi-experimental study of program effectiveness

In the past decade, interest in interventions targeting mental illness stigma in the workplace rather than the general public was growing [44,46]. The conduction of the systematic review described above [37] led to two major insights: a) it provided systematic evidence on the effectiveness of workplace stigma reduction programs in terms of a positive impact on employees' knowledge, attitudes, and supportive behavior toward people with mental health problems, and b) several limitations of current research and practices were identified. First, most research was conducted with public sector organizations. Second, only 50% of included studies targeted all 3 dimensions of stigma, which is crucial in achieving ultimate behavioral change. Third, a lack of sufficient follow-up measures was identified which undermines the evidence on the sustainability of any observed changes post intervention. And last, all except 2 of 16 included interventions were delivered face-to-face, which therefore, were very limited in reach.

In contrast, digital interventions could potentially provide a more effective alternative to changing employee behavior and the working culture in organizations [48]. Advantages of digital compared to face-to-face interventions include a greater reach, reduced barriers to access, increased participant engagement and adherence to treatment, and flexible and self-paced learning, as well as being more cost effective [49]. While that seems promising, so far, research on the application and effectiveness of digital interventions in the context of health promotion is still scarce, especially so with regards to workplace mental health [50-54].

Research questions

- Are digital interventions (such as our 'Leadership Training in Mental Health Promotion') effective in changing managers' knowledge of mental health, attitudes, and supportive behavior towards employees with mental illness?
- Are training outcomes sustained over (some) time?

Objectives

This study aimed to address some of the limitations of current practices in mental health promotion and of research on stigma reduction as outlined in Study 1. 2 objectives were followed: (1) to develop a digital game-based intervention to train leaders of a private sector organization to effectively manage employee mental health by addressing all 3 dimensions of stigma, and (2) to evaluate the training program in terms of its effectiveness and mid-term sustainability in a pilot study.

Specifically, we hypothesized that our digital game-based intervention, called Leadership Training in Mental Health Promotion (LMHP), would lead to (1) improved mental health knowledge, (2) increased positive attitudes toward colleagues with mental health problems, (3) increased self-efficacy to deal with mental health situations at work, and (4) improved intentions to promote employee mental health at work in managers undertaking the training.

3 Summary of objectives of the doctoral thesis

The general objective of this doctoral thesis is to gain an in-depth understanding of current workplace stigma reduction programs and their effectiveness and provide recommendations for future research and workplace mental health promotion practice.

The objectives of the 2 included studies are:

1. To provide a first systematic review on the effectiveness of workplace stigma reduction programs
2. To develop a workplace anti-stigma intervention that addresses limitations found in the systematic literature review as well as limitations in current workplace mental health practice
3. To examine whether a digital game-based intervention can be an effective tool to reduce mental illness stigma at work and for training managers to promote employee mental health
4. To evaluate the intervention in a pilot study in terms of its effectiveness and a) whether effectiveness is associated with certain characteristics such as participant age or level of education, and b) whether training outcomes are sustained over time.
5. To inform important stakeholders about the effectiveness of current workplace anti-stigma interventions and their potential benefits

In the following, this doctoral thesis reports on both studies separately and how those addressed the research questions and objectives mentioned above. It then ends with a summary of the results of both studies and a discussion from a broader, more general perspective.

4 Publication I: The effectiveness of interventions targeting the stigma of mental illness at the workplace: a systematic review

Published article:

Hanisch, S. E., Twomey, C. D, Szeto, A. C. H., Birner, U. W., Nowak, D., Sabariego, C. (2016). The effectiveness of interventions addressing mental illness stigma at work: a systematic literature review. *BMC Psychiatry* 16 (1).

4.1 Objective and specific aims

This review aims to provide a first systematic review on the effectiveness of workplace anti-stigma interventions by examining changes in: (1) knowledge of mental disorders and their treatment and recognition of signs/symptoms of mental illness, (2) attitudes towards people with mental-health problems, and (3) supportive behavior among colleagues (e.g. reduced discriminatory or increased affirmative behavior, help seeking, etc.). We chose to adhere to this conceptualization because, in contrast to the majority of evaluation studies, we wanted to place particular emphasis on measuring behavioral outcomes of stigma-reduction programs and help-seeking [3,43,47].

4.2 Methods

A systematic literature review on the effectiveness of workplace anti-stigma interventions was carried out after methods of the analysis and inclusion criteria had been specified in a protocol.

Eligibility criteria (see *Additional file 1*)

Study designs of interest: Randomized controlled trials and quasi-experimental studies were included, while longitudinal studies, cohort studies, primary prevention studies, phase-I and II studies, ecologic studies, case reports, case series, cross-sectional studies, and qualitative and economic evaluations were excluded from the analysis. This is because, in contrast to previous descriptive reviews on anti-stigma interventions, this review aimed to focus exclusively on evaluating the effectiveness of workplace anti-stigma programs and, thus, only included experimental studies which provided quantitative evidence.

Study participants: Participants aged 18-65 in the working population were considered. Studies that targeted mental healthcare providers were excluded from this review because this occupational group already has extensive knowledge of and contact with people with mental-health problems. Preliminary evidence suggests that this group might be fundamentally

different in their responses to anti-stigma interventions than people working outside of healthcare [55]. Studies targeting self-stigma in clinical patients were also excluded.

Types of interventions: All types of interventions targeting stigma against mental illness at the workplace were considered for the current review. Studies were included if they met the following criteria: (1) included an intervention that targeted at least one dimension of stigma as an outcome (any variables related to either knowledge and/or attitude and/or behavior were considered), (2) included an evaluation of the intervention, and (3) the evaluation was quantitative. This meant that programs which targeted any dimension of stigma were included, even though they couldn't necessarily be considered anti-stigma programs per se.

Studies were excluded if they met the following criteria: (1) self-stigma in clinical patients was targeted, (2) did not include an evaluation of the intervention, or (3) presented only qualitative evaluation data.

Information sources

Medline and PsycINFO were searched for peer-reviewed articles related to workplace anti-stigma interventions carried out between 2004 and 2014. This time span was considered exhaustive enough to include the most recent efforts, as well as those started ten years ago. Only papers in the English, German, Spanish, or Portuguese languages could be read and were selected. References in relevant articles were also screened for publications that might be acceptable for inclusion. An additional Google Scholar search was made to identify relevant grey literature, which is either unpublished or not published in peer-reviewed journals. Experts at the Mental Health Commission of Canada were also consulted for the potential inclusion of unpublished articles. The last search was run on July 1, 2014.

Search Strategy (see *Additional file 1*)

The search strategy was reviewed independently by subject experts/librarians at the University of Calgary. The following terms were used to search all trial registers and databases: stigma-related terms AND mental health-related terms AND workplace-related terms AND program evaluation-related terms. Limitations were applied with regards to restrictions in type of study design and type of participants as described above, as well as to studies on stigma related to physical health conditions or interventions aiming to reduce drug use (e.g. smoking cessation) unless they provided a quantitative measure on stigma related to drug use and didn't target healthcare providers.

Stigma-related terms: stigma*, labeling, prejudice, social acceptance or social approval, social discrimination, social perception, stereotyped attitudes, shame, discrimination or disability discrimination, judgment, fairness, health services accessibility, treatment barriers.

Mental health-related terms: mental disorders, psychiatric patients, psychiatric symptoms, recovery disorders, relapse disorders, work-related illnesses, mental health, well-being.

Workplace-related terms: occupations, employment history, occupational adjustment, occupational tenure, personnel, professional personnel, working women, employment status, employability, reemployment, supported employment, occupational health, industrial and organizational psychology, working conditions, unemployment, personnel termination, downsizing, workplace*, quality of work life, occupational stress, organizational climate.

Program evaluation-related terms: mental illness (attitudes toward), mental health program evaluation or mental health programs, community mental health training or mental health in-service training or in-service training or professional development, program development, program evaluation, health promotion, health education or health knowledge or health literacy or social marketing or client education, structured clinical interview or interviews or psycho-diagnostic interview or interviewers or interviewing or qualitative research or questioning or narratives or life review or narrative therapy or storytelling or health attitudes or attitudes or disabled (attitudes toward) or employee attitudes or employer attitudes or health personnel attitudes, or occupational attitudes or public opinion or work (attitude toward) or attitude measurement or attitude measures, campaign or initiative or aware or program or train or intervene or workshop or seminar or curriculum or booster session or strategy or implement or course or symposium or coach or mentor or blitz or policy or policies or guideline or recommendation or standard, questionnaires or mail surveys or surveys or telephone surveys.

Study selection

An eligibility assessment of abstracts and full-text papers was performed in a standardized manner by the lead author (SH), and 20% of total citations were double checked independently by a second reviewer (CT). Disagreements between reviewers were followed up by double checks and resolved by discussion.

Data extraction

Data on study design, sample characteristics, and findings were extracted by two reviewers (SH, CT) independently (CT double extracted 31% of total full-text inclusions).

The following information was extracted from each included study: (1) objectives, (2) general information (study design, country of origin, number and duration of follow-ups), (3) study population (age, sample size, percentage of female participants, target population), (4) workplace (workplace name, workplace sector, workplace type, job, (5) type of intervention (duration, frequency, target in terms of primary- and secondary- outcome measures, and whether the intervention addressed general mental health or a specific mental illness), and (6) intervention effectiveness (in terms of a change in outcome measures with effect sizes where reported). No further variables were added to those already pre-specified in the protocol after the review had begun.

Study quality

For all included studies (including grey literature), methodological quality was assessed using a checklist for randomized controlled trials and quasi-experiments [56]. This checklist involved an assessment of four kinds of systematic errors (detection, selection, attrition, and information bias) among a rating scale of low, moderate, or high risk. Two authors (SH, CT) independently rated all studies according to those criteria and resolved discrepancies through discussion. If no agreement could be reached, a third author was consulted.

Data analyses

A narrative synthesis following the guideline proposed by Popay et al. [57] was undertaken since a meta-analysis of results was not possible due to substantial differences in methodology and outcome data across studies. This involved addressing four main elements of narrative synthesis: a) developing a theory of how the intervention works, why, and for whom, b) developing a preliminary synthesis of findings of included studies, c) exploring relationships within and between studies, and d) assessing the robustness of the synthesis. Extracted information was summarized using the tabular form of the Cochrane review's 'Characteristics of Included Studies' table (participants, interventions, outcomes, notes) with the inclusion of additional information (country of origin, duration of the intervention, target, assessment time points, control group, study design, and the context in which the intervention was delivered).

4.3 Results

Study selection

The study selection process was carried out according to the PRISMA guidelines on reporting items for systematic reviews [58]. Appropriate studies were identified in Medline and PsycINFO (yielded 758 citations), while 36 additional citations were identified searching Google Scholar, consulting experts of the Mental Health Commission of Canada, and by checking the references of relevant papers. 773 studies remained after duplicates were removed. 711 were excluded since they clearly did not meet the criteria after abstract review. After reviewing the full text of the remaining 62 citations, 46 studies were excluded for specific reasons which are listed in the flow chart (see *Figure 1*). 16 studies were eventually included in the review.

Study characteristics (see *Additional file 2*)

Study designs

Of the 16 included studies, five were RCTs, and 11 were quasi-experimental studies. Seven studies included a control group. All studies were published in English.

Settings and populations

The included studies involved 3854 participants. The majority of studies targeted the public sector (12), only two the private sector, and no information on the type of workplace was given for another two. Regarding study populations, most studies examined interventions for managers or supervisors, as well as first responders, such as police officers. Two studies [59,60] examined interventions in employees routinely working with people with mental-health problems (e.g. housing agencies). Six studies were conducted in Europe, five in the US or Canada, four in Australia, and one in Asia.

Interventions

Eight studies assessed the impact of Mental Health First Aid (MHFA) training or a modified version of the program on one or more dimensions of stigma. While MHFA is primarily seen to be a mental-health literacy program, they do measure stigma and were therefore included [46]. The remaining eight studies included heterogeneous interventions, such as role play, online training, psycho-education, workshops, Trauma Risk Management (TRiM), and Crisis Intervention Training (CIT) in first responders. Half of the studies targeted

all three dimensions of stigma (i.e. knowledge, attitudes, behavior), while the other half specifically targeted attitudes or behavior. The duration of the interventions varied between a minimum of one hour up to a maximum of two days.

Outcomes

Primary

In all studies the primary outcome was a change in at least one dimension of stigma, namely knowledge and/or attitude and/or behavior. While studies differed with regards to the operationalization of variables for knowledge, attitude, and behavior outcomes, data collection and instruments used to assess change over time were fairly similar across studies.

Secondary

Secondary outcomes included change in participants' overall mental health [61,62]. One study examined readiness to provide actual help to people with mental disorders as the primary outcome while analyzing knowledge, attitudes, and self-confidence in helping a person with a mental disorder as secondary outcomes [63]. One study assessed the cost-effectiveness of the intervention [64].

Study quality

In general, all studies included were considered at high risk for detection bias, as at least one dimension of stigma was measured by self-reports (which is, however, fairly standard and about the only feasible way to measure attitudes). With regards to selection, attrition, and information bias, the majority of studies were at high risk of bias due to selective reporting, lack of allocation concealment, lack of participant blinding, and incomplete outcome data. While five studies received an overall rating of low risk for bias, no study had only low risk of bias ratings for the type of bias described above.

Effectiveness of anti-stigma interventions

See *Table 1* for a summary of results of the included studies with regards to intervention effectiveness (for reported effect sizes, please refer to *Additional File 3*).

Knowledge: 11 studies targeted 'knowledge', including a) the identification of mental-health problems and b) knowledge about effective treatments.

Ten anti-stigma interventions were shown to be effective in increasing mental-health knowledge with one exception. In this study, MHFA training did not result in improved mental-health literacy in the intervention as opposed to the control group [61]. However, since recognition of a mental disorder in a vignette task was already fairly high in the pre-test, this left limited room for improvement post intervention. Six studies with high risk of bias had a positive impact on mental-health literacy [65,66,59,67-69]. Nevertheless, the impact of their evidence is weaker given the absence of a control group, the lack of randomization procedures, and a high risk of selection bias (e.g. participation in the intervention was voluntary). These findings are supported by other studies of moderate-to-high quality, which confirms a significant positive effect of workplace anti-stigma interventions on employees' mental-health knowledge [63, 70-72].

Attitudes: 14 studies measured stigmatizing attitudes or openness towards people or coworkers with mental illness, often using social-distance scales. One study examined specific attitudes related to perceived dangerousness, unpredictability, and recovery of mentally-ill individuals [59]. Another study differentiated between first- and third-person viewpoints with regards to stigma [60].

Although the effectiveness of interventions on changing attitudes was mixed, nine studies did report improvements in participants' stigmatizing attitudes. Next to the MHFA training, the other types of anti-stigma interventions, such as TRiM, CIT, online training, and workshops, were effective in reducing stigmatizing attitudes towards people with mental-health problems. Of the six studies with low-to-moderate risk for bias, four reported a significant positive effect on participants' attitudes [61,62,71,72], while two did not note any significant changes [63,70]. However, while Svensson, Hansson [63] found no overall significant change in attitudes, their analyses of specific items on their stigma scales did reveal positive improvements (e.g. items related to personal stigma, as well as becoming a neighbor of a person with depression). With regards to more specific attitudinal changes, Knifton et al. [59] found particular improvement in relation to unpredictability and recovery, but not for dangerousness.

Behavior: 11 studies targeted 'behavior'. Behavior was operationalized in a heterogeneous manner across studies, including both true behavioral measures and proxies. In general, behavioral change was related to increased affirmative behavior, as well as to reductions in discriminatory behavior.

All types of anti-stigma interventions in 11 studies (three rated as of high quality) consistently had a significant positive impact on employees' supportive behavior [59,61,63,64,65,66,68,69,72,73] with the exception of one study [70], which reported a marginally significant effect. More specifically, this involved, for example, perceived confidence and self-efficacy in identifying and dealing with a person with a mental illness, as well as the likelihood of advising people to seek professional help and readiness to provide help in mental-health situations. One study involving police officers examined directly measured behaviors, such as the use of force [64].

In one study, role play was used to achieve behavioral change. Although not intended, the intervention also had a positive effect of mental-health knowledge [64]. Similarly, Moffitt et al. [71] observed a change in behavior achieved by an intervention that targeted knowledge and attitude only.

Secondary outcomes: Two studies of moderate to high quality examined participant mental health as a secondary outcome and reported a positive impact of the anti-stigma intervention [61,62]. The study including a cost-effectiveness analysis found its anti-stigma intervention (i.e. role play) to be cost-effective [64].

Sustainability of change

11 studies did not include any follow-up measurements beyond the initial two time points (pre-post). This limits the conclusions that can be drawn relating to the effectiveness of anti-stigma interventions over the long term. Five studies conducted a post-intervention follow-up of up to two years [62,63,70,72,74]. All these studies report that the changes achieved in either people's knowledge and/or attitudes and/or behavior post-intervention were, in part, sustained over time. For example, Svensson, Hansson [63] found a significant improvement in knowledge and confidence to provide help, but not in attitudes, and this pattern remained unchanged at a two-year follow-up.

4.4 Discussion

To our knowledge, this is the first systematic review to examine the effectiveness of interventions targeting stigma towards mental illness at the workplace. The majority of the included studies were published since 2010, reflecting a growing interest in evaluations of stigma-reduction programs at the workplace. Our review illustrates that workplace anti-stigma interventions may be effective in changing employees' knowledge, attitudes, and behavior

towards people with mental-health problems. However, due to methodological shortcomings in the majority of the included studies, the lack of follow-ups beyond post-intervention assessments, as well as heterogeneity in terms of intervention content, duration, and outcome measures, the evidence for the effectiveness of workplace anti-stigma interventions is inconclusive and must be interpreted with caution.

While prior systematic reviews of general population interventions corroborate our findings of poor evaluation study design, they also found stigma-reduction efforts to be effective in changing people's knowledge, attitudes, and behaviors towards people with mental-health problems [40-44]. The development and implementation of effective anti-stigma programs specifically designed for the workplace is, however, of high importance. First, while public efforts have returned mixed results, the development of tailored strategies targeting the workplace might prove a more promising route to stigma change, as awareness of public campaigns has often been found to be quite low [46,75]. Thus, while public anti-stigma efforts target a greater part of the population, more people might be reached effectively via more targeted interventions (e.g. at work). Second, participation in anti-stigma programs, for example in the scope of personnel development, could be made mandatory in an organizational setting, whereas public stigma campaigns require people to participate voluntarily. Third, by nature, exposure to mass-media approaches to stigma change can be short in time, whereas workplace interventions can be more intensive in terms of length and information.

Our review shows that workplace anti-stigma interventions can be particularly effective in changing employees' knowledge of mental disorders, as well as helping behavior, while results related to attitudinal change were mixed, but positive overall. In two studies [64,71], a spillover effect was identified, meaning that a change in one outcome measure (e.g. behavior) occurred even though the intervention exclusively targeted other outcomes (e.g. knowledge or attitudes). This implies that the three dimensions of stigma (knowledge, attitude, and behavior) might be interrelated, as has been suggested before [76]. The theory of health education [77] postulates that attitude mediates the relationship between knowledge and behavior. In contrast, the current review showed that attitudinal change is not required to achieve behavioral change. In line with prior research [70,78], three studies found that knowledge might directly trigger a behavior under certain conditions, even without any attitudinal change [63,66,68]. However, further research into how anti-stigma interventions

change or affect each of the three dimensions of stigma is required to fully understand the stigmatization process.

The debilitating impact of mental illness at work is widely recognized, and organizations are increasingly investing in workplace mental-health interventions. However, emerging evidence indicates that stigma towards mental illness, in part, contributes to the underutilization of costly mental-health services (e.g. EAP, workplace counseling) that are already offered by organizations [16, 18]. It is, therefore, important to address and remove stigma as a barrier to increase the effectiveness and 'value-for-money' of these interventions.

This review addresses the research gap regarding the behavioral dimension of stigma as an outcome and, more importantly, highlights that workplace anti-stigma interventions have the potential to change employee behavior [3]. In contrast, anti-stigma campaigns targeting the general public have often failed to change behavior [79]. Perhaps in an organizational context as compared to the public context, behavioral change (e.g. in supportive or help-seeking behavior) could be achieved more readily by giving clear calls for action in specific situations at work. This has important practical implications for organizations and employers alike, as behavioral change is considered the ultimate goal of efforts to reduce stigma and is likely to result in a more supportive work environment, which, in turn, is a necessary prerequisite for the success of any mental-health intervention (e.g. workplace counseling, EAP) [76, 80].

In light of the impact of stigma on seeking help and accounting for the fact that a large proportion of people experiencing mental-health problems do not seek help, it is essential to measure the impact of anti-stigma interventions on help-seeking behavior [81]. Despite the heterogeneity in the operationalization of behavior, however, none of the included studies examined help-seeking behavior as an outcome, focusing instead on potential intervention effects on participants' supportive behavior towards afflicted individuals. Future evaluations of workplace anti-stigma interventions should place stronger emphasis on assessing a potential impact on employees' help-seeking behavior (e.g. health-service utilization), as well as on their mental health (e.g. sick leave, presenteeism). This would help assess the cost-effectiveness of workplace anti-stigma interventions and strengthen the economic incentive for organizations to invest in stigma-reduction efforts.

The current review found some evidence indicating the positive impact of anti-stigma interventions on participants' general mental health [59,60]. Improved knowledge of signs of

mental illness and treatment options may lead employees to seek help earlier. This is supported by findings of a prior meta-analysis, which found that MHFA training helped improve participant mental health by improving self-recognition, increasing insight into one's own and others' mental well-being, and by increasing coping skills [45]. Workplace anti-stigma interventions might not only create a more supportive work environment by reducing stigmatizing attitudes and discrimination, but also lead to improved knowledge and awareness of mental illness and to improved employee mental health via increased and potentially earlier help-seeking. So far, economic evaluations of anti-stigma interventions are generally lacking; however, preliminary evidence indicates a potential return on investment for employers [82].

While the evaluated anti-stigma interventions themselves seem to be scientifically sound in terms of their theoretical background and content, the evaluation methods used need to be improved substantially. A prominent finding of this review was the large number of studies with methodological shortcomings, high risk of bias, no control groups, and small sample sizes. Studies frequently also reported high levels of dropouts and varied in terms of program completion. A potential reason for this might be the challenge of evaluating interventions in a scientifically sound manner in companies which might be unwilling to engage in such research or pose restrictions due to data-protection rights.

The current review further highlights a misfit between what some intervention studies claimed to target and what they actually assessed in terms of outcomes [64,71]. If studies fail to assess the impact on outcomes they claim to target in their intervention, important evaluation data gets lost. Studies targeting and assessing a change in only one dimension of stigma (e.g. attitude) might fail to detect a spillover effect on other dimensions of stigma (e.g. knowledge or behavior).

Previous research has questioned the retention of intervention effects over time, especially with regards to attitudinal and behavioral change [43,44]. The majority of studies in this review did not conduct a follow-up assessment of intervention effects. However, where reported, improvements in knowledge, attitudes, and behavior were maintained over time [62,62,70,72,74]. Future research needs to place greater emphasis on conducting follow-up evaluations that go beyond pre-post measurements.

Although this review generated important findings, there are several limitations that should be mentioned. First, only three electronic databases were used to gather articles for this review, and a search in languages other than English, German, Portuguese, and Spanish was

not undertaken. Despite the lack of breadth, the searches were supplemented by searching Google Scholar, checking references, and communication with experts, which yielded 14 further studies, three of which were unpublished. The possibility of publication bias needs to be considered, as there may have been relevant studies that did not produce positive results and, consequently, were not published.

A second limitation of the current review involves generalizability of the current findings. The majority of participants in the reviewed studies were well-educated employees, such as managers. This limits the generalizability of the findings to other occupations or sectors that employ less-educated workers (e.g. service industries). While it makes sense to address managers due to their supervisory role and their importance in recognizing and dealing with signs of mental illness in subordinates, it may be just as important to target less-educated workers because there is some evidence indicating that less-educated compared to more-educated people are more likely to hold stigmatizing attitudes towards people with mental illnesses [83]. It is also important to note that all of the studies included in this review were carried out in high-income countries and, therefore, the findings may not apply to low- and middle-income countries, where stigma towards mental illness might be particularly strong or prevailing.

This review provides a narrative synthesis of the evidence of anti-stigma intervention effectiveness rather than a meta-analysis of results, which limits the strength of the conclusions that can be drawn. Given the heterogeneity of the methodology and outcome data across studies, it was not possible to conduct a meta-analysis at this time.

It was beyond the scope of the current review to identify which types or components of anti-stigma interventions are particularly effective in improving employees' knowledge, attitudes, and behavior. Future research should compare and contrast different types of anti-stigma interventions to determine the optimal program content and duration for the workplace context. Although a positive impact was found in all types of anti-stigma interventions studied, it is crucial to emphasize a stronger evaluation methodology as much as improving anti-stigma content.

Future research in this field should engage in more standardized, high-quality evaluations which measure all dimensions of stigma towards mental illness to better understand the potential impact of anti-stigma interventions at the workplace. This would allow researchers to compare quantitative measures of stigma across studies more easily and

to conduct a meta-analysis which would help build a stronger evidence base for the effectiveness of workplace anti-stigma interventions.

To increase the generalizability of the current findings, anti-stigma interventions with larger, more diverse samples in terms of gender, race, socioeconomic status, education/hierarchy, geographic location, and type of workplace should be tested.

This review systematically examined the effectiveness of interventions targeting stigma towards mental illness at the workplace. There is tentative evidence that workplace anti-stigma interventions can have a positive impact on employees' knowledge, attitudes, and supportive behavior towards people with mental illness. The quality of evidence varied across studies, highlighting the need for more rigorous, higher-quality evaluations conducted with more diverse samples of the working population.

Future research needs to explore to what extent changes in employees' knowledge, attitudes, and supportive behavior translate into increased and earlier help-seeking by affected individuals. Such investigation is likely to inform important stakeholders, like human-resources or health-management personnel, about the beneficial impact of stigma-reduction programs on the effectiveness or acceptance of already existing mental-health interventions and, ultimately, on employee mental health.

4.5 Tables and Additional Files

Table 1 Overview of results of the included studies with regard to intervention effectiveness.

Author (Year)	Intervention Type	Knowledge	Attitudes	Behavior	Success Rate***
Svensson & Hansson (2014)	Mental Health First Aid (Adult)	T C	T	T C	2/3 (67%)
Krameddine et al. (2013)	Role plays	C		T C	1/1 (100%)
Hossain et al. (2009)	Mental Health First Aid (Adult)	T C	T C	T C	3/3 (100%)
Massey (2010)	Mental Health First Aid (Adult)	T C	T	T C	2/3 (67%)
Kitchener & Jorm (2004)	Mental Health First Aid (Adult)	T	T C	T C	2/3 (67%)
Luong et al. (2013)	Online Training, Group discussions		T		0/1 (0%)
Gould et al. (2007)	Trauma Risk Management		T C		1/1 (100%)
Stuart et al. (2013)	Online Training		T C	T C	2/2 (100%)
Knifton & Quinn (2009)	Anti-stigma workshop	T C	T C	T C	3/3 (100%)
Nishiuchi et al. (2007)	Psychoeducation	T C	T	T	1/3 (33%)
Compton et al. (2006)	Crisis Intervention Training	T C	T C		2/2 (100%)
Moffitt et al. (2014)	Training course or Mental Health First Aid vs. leaflet session	T C	T C	C	2/2 (100%)
Quinn et al. (2011)	Anti-stigma workshop		T C		1/1 (100%)
Jorm et al. (2010)	Mental Health First Aid (Youth)	T C	T C	T C	3/3 (100%)
Pierce et al. (2010)	Mental Health First Aid (Youth)	T C	T	T C	2/3 (67%)
Brandling & McKenna (2010)	Mental Health First Aid (Youth)	T C		T C	2/2 (100%)

*T = outcome targeted by intervention
**C = change occurred, intervention success
***Success rate = targets successfully changed/total targets

Additional file 1 Search strategy and eligibility criteria for study inclusion.

Primary search strategy for MEDLINE	
Step	**Search Statement**
1	Stereotyping/
2	(stereotyp* or stigma* or label* or negative image* or ignoran* or misconception* or misperception* or literacy or ((public* or community or social or popular) adj perception*)).tw.
3	Stigma or stigmas or stigmatiz* or stereotyp* or antistigma* or labelling or (social adj2 (accept* or approv*)).mp.
4	Social perception/
5	Public opinion/
6	Prejudice/
7	Exp attitude/
8	((public* or community or social or popular) adj attitude*).tw.
9	(((negative or positive or chang*) adj3 attitude*) or prejudice* or hostil* or intoleran*).tw.
10	Social distance/
11	Rejection psychology/
12	(rights or discriminat* or marginali* or rejecting behavior or injustice* or (social adj (distance or justice or rejection or acceptance or exclusion or inclusion))).tw.
13	Shame/
14	"discrimination (psychology)"/
15	Judgement/
16	Or/1-15
17	Mental health/
18	Mental health services/
19	Exp mental disorders/
20	Mentally ill persons/
21	((mental* or psychiatry* or psychological* or developmental* or learning or substance*) adj (ill* or disorder* or disease* or distress* or disab* or problem* or health* or well-being or wellbeing or patient* or treatment or counseling or retardation)).tw.
22	((chronic* or severe* or mild* or moderate* or serious* or persistent) adj (mental* or psychiatr* or psychological*)).tw.
23	(emotional adj3 (disorder* or problem*)).tw.
24	(psychos#s or psychotic* or schizo* or depression or depressive or bipolar or mania or manic or obsessi* or panic or phobic or phobia or anorexi* or bulimi* or borderline or narcissis* or personality adj1 disorder or self injur* or self harm or dementia or substance abuse).tw.
25	Occupational health/
26	Occupational health services/
27	Or/17-26
28	Employment/
29	Employment, supported/
30	Personnel downsizing/
31	Unemployment/
32	Workplace/
33	Occupations/
34	Exp occupations/
35	Exp occupational groups
36	OR/28-35
37	Exp evaluation studies as topic/
38	Health education/ or patient education as topic/ or exp teaching/
39	Health promotion/ or healthy people programs/
40	Program Development/
41	Interviews as a topic/ or focus groups/ or narration/ or questionnaires/ or self report/
42	Attitude/ or attitude of health personnel/ or attitude to health/ or health knowledge, attitudes, practice/ or public opinion/
43	Inservice training/ or staff development/
44	(campaign* or initiative* or aware* or program* or train* or workshop* or intervene* or seminar* or curriculum* or (booster adj2 session*) or strategy* or implement* or course* or symposi* or

	coach* or mentor* or blitz* or policy or policies or guideline* or recommend* or standard*).mp.
45	OR/37-44
46	16 AND 27 AND 36 AND 45
47	exp HIV/
48	primary prevention studies OR clinical trial, phase 1/ OR clinical trial, phase 2/ OR ecologic studies OR case reports/ OR case series OR exp Cross-Sectional Studies/ OR Qualitative Research/ OR exp Review/ OR Literature review as topic/
49	(Child OR Adolescent).mp.
50	mouse OR mice OR rat OR rats OR rabbit OR rabbits OR guinea?pig* OR animal model* OR chicken
51	Exp dementia/
52	Smok*.mp.
53	exp Substance-related disorders/
54	Nurs*.mp.
55	Care*.mp.
56	Psychiatrist*.mp.
57	Physical*.mp.
58	47 OR 48 OR 49 OR 50 OR 51 OR 52 OR 53 OR 54 OR 55 OR 56 OR 57
59	46 NOT 58
60	limit 59 to (yr="2004 -Current" and (english or german or portuguese or spanish) and journal article)
	Total number of records found in MEDLINE

Primary search strategy for PsycINFO

Step	Search Statement
1	Stigma/
2	labelling/
3	exp prejudice/
4	social acceptance/ or social approval/
5	exp social discrimination/
6	exp social perception/
7	stereotyped attitudes/
8	shame/
9	discrimination/ or disability discrimination/
10	judgment/
11	fairness/
12	(stigma or stigmas or stigmatiz* or stereotyp* or antistigma* or labelling or (social adj2 (accept* or approv*))).mp.
13	health services accessibility/ or treatment barriers/
14	Or/1-13
15	Exp mental disorders/
16	psychiatric patients/
17	psychiatric symptoms/
18	“recovery (disorders)”/
19	“relapse (disorders)”/
20	work related illnesses/
21	mental health/
22	well being/
23	Or/15-22
24	exp occupations/
25	employment history/
26	occupational adjustment/
27	exp occupational tenure/
28	exp personnel/
29	exp professional personnel/
30	working women/
31	exp employment status/
32	employability/

33	reemployment/
34	supported employment/
35	occupational health/
36	“industrial and organizational psychology”/
37	exp working conditions/
38	unemployment/
39	personnel termination/
40	downsizing/
41	workplace*.mp.
42	“quality of work life”/
43	occupational stress/
44	organizational climate/
45	OR/24-44
46	“mental illness (attitudes toward)”/
47	mental health program evaluation/ or mental health programs/
48	exp community mental health training/ or mental health inservice training/ or inservice training/ or professional development/
49	exp program development/
50	exp program evaluation/
51	health promotion/
52	exp health education/ or health knowledge/ or health literacy/ or social marketing/ or client education/ or (health adj2 people adj2 program*).mp.
53	structured clinical interview/ or interviews/ or exp psycho-diagnostic interview/ or interviewers/ or interviewing/ or qualitative research/ or questioning/ or narratives/ or “life review”/ or narrative therapy/ or storytelling/ or (focus adj2 group*).mp.
54	health attitudes/or attitudes/ or exp “disabled (attitudes toward)”/ or exp employee attitudes/ or employer attitudes/ or health attitudes/ or exp health personnel attitudes/ or occupational attitudes/ or public opinion/ or “work (attitude toward)”/ or attitude measurement/ or exp attitude measures/.mp.
55	(campaign* or initiative* or aware* or program* or train* or intervene* or workshop* or seminar* or curriculum* or (booster adj2 session*) or strategy* or implement* or course* or symposi* or coach* or mentor* or blitz* or policy or policies or guideline* or recommend* or standard*).mp.
56	questionnaires/ or mail surveys/ or exp surveys/ or telephone surveys/ or questionnaire*.mp.
57	OR/46-56
58	14 AND 23 AND 45 AND 57
59	exp HIV/
60	Surveys/ or Case Report/ or Literature Review/ primary prevention studies or phase I studies or phase II studies or ecologic studies or Cross-Sectional* or case series or economic evaluations or qualitative* or systematic review
61	(Child OR Adolescent).mp.
62	mouse OR mice OR rat OR rats OR rabbit OR rabbits OR guinea?pig* OR animal model* OR chicken
63	Exp dementia/
64	Tobacco Smoking.mp.
65	exp drugs/
66	Exp nurses/
67	Caregivers or caregiver burden
68	Exp physical illness (attitudes toward)
69	50 OR 60 OR 61 OR 62 OR 63 OR 64 OR 65 OR 66 OR 67 OR 68
70	58 NOT 69
71	limit 70 to (yr="2004 -Current" and (english or german or portuguese or spanish) and journal article)
	Total number of records found in PSYCINFO

Selection Criteria

a) Inclusion criteria:

- Study population: Adults (18-65 years) of the working population
- Study design: randomized controlled trials and quasi-experiments.
- Studies published in a scientific journal and written in English, German, Spanish or Portuguese.
- Studies published between 2004 and 2014 in order to identify the most recent publications.

b) Exclusion criteria:

- Participants not in employment or of the general public or those that fall out of the age range
- Study design: longitudinal cohort studies, primary prevention studies, phase I and II studies, ecologic studies, case reports, case series, cross-sectional studies, qualitative studies, economic evaluations.
- Interventions that aim to reduce self-stigma in clinical patients as well as studies in which mental health carers of those are targeted.
- Unpublished studies, book chapters, dissertations, commentaries, letters to the editors, editorials, conference reports.
- Articles not written in English, German, Spanish or Portuguese, published before 2004.

Additional file 2 Overview of study characteristics of included studies.

Reference	Intervention	Target	Participants	Workplace	Outcomes	Study design	Assess-ment time points	Control group	Quality
Svensson & Hansson (2014) Sweden	Mental Health First Aid Duration: 12 h course (6h per day)	Knowledge Attitudes Behavior	Managers	Public sector	Knowledge: improvements in knowledge on mental illness* Attitudes: limited effect for change in attitudes (significant positive change only with regards to personal stigma and becoming a neighbor of a depressed person) Behavior: improved readiness to provide help in mental health situations*	Randomized controlled trial	3 Time points: pre, 6 months post, 2 years follow-up. Improvements were to a great extent maintained	Yes	Allocation done by using a computer-generated randomization list Withdrawals: Of 406 participants, 64 in the experimental group and 65 in the control group did not complete the 6 months post questionnaire. 50% response rate for 2 year follow-up. Risk of bias: Low
Krameddine et al. (2013) Canada	Role Plays Duration: 1 day	Behavior	Police officers	Public sector Edmonton Police Service	Knowledge: increase in recognition of mental health issues*, mental illness knowledge per se did not improve significantly Attitudes: no changes in attitudes Behavior: improvements in direct and indirect measurements of behavior*	quasi-experimental	2 Time points: pre & 6 months post measurement	No	Allocation n/a Withdrawals: Of 663 police officers, 312 completed baseline assessments and 372 completed 6 months post assessments. Of these, 170 police officers completed both assessments. Risk of bias: high
Hossain et al. (2009) Australia	Mental Health First Aid Duration: 12h course	Knowledge Attitudes Behavior	Advisory and Extension Agents	Public sector Department of Primary Industries & Fisheries, the Department of Natural Resources & Water, the Queensland Murray Darling Committee, AgForce and the Condamine Alliance	Knowledge: improved* Attitudes: more positive* Behavior: increased confidence in helping someone with a mental health problem*. Social distance results are equivocal.	quasi-experimental	2 Time points: pre & 6 months post measurement	No	Allocation: organizations solicited self-nomination from their staff. Non-random allocation to two groups due to ongoing job commitments Withdrawals: None. Risk of bias: high

Reference	Intervention	Target	Participants	Workplace	Outcomes	Study design	Assess-ment time points	Control group	Quality
Massey (2010) Canada	Mental Health First Aid Duration: 12h course	Knowledge Attitudes Behavior	Student Affairs Staff	Public sector Queen's University	Knowledge: improvements in knowledge of mental ill health and increased recognition of mental health conditions in social interactions, recognition of more people with mental health problems* Attitudes: no change in openness toward individuals with mental health conditions Behavior: increased confidence to help in mental health situations*	quasi-experimental	2 Time points: pre & post measurement, no follow-up.	Yes	Allocation: voluntary participants; self-identified. Outcome assessment not blinded Withdrawals: Of 500 email surveys sent each time, 215 pre-assessments and 176 post-assessments were completed. 84 participants completed both surveys. Risk of bias: high
Kitchener & Jorm (2004) Australia	Mental Health First Aid Duration: 12h course	Knowledge Attitudes Behavior	Employees in two large government departments	Public sector General government	Knowledge: no significant differences between intervention and control group in terms of recognizing the correct disorder in a vignette Attitudes: improved concordance with health professionals about treatments*, reduced social distance (especially for depression)* Behavior: improvements in confidence to provide help to others and greater likelihood of advising people to seek professional help* Participants' health: mental*, physical	Randomized controlled trial	2 Time points: pre & 5 months post measurement.	Yes	Allocation: random assignment to training or wait-list condition using a computer-generated randomization list Withdrawals: 18 of 146 participants assigned to receive MHFA training did not complete the whole course. 39 out of 146 participants in the intervention group did not complete follow-up questionnaires, compared to only 22 out of 155 in the control group. Risk of bias: low

Reference	Intervention	Target	Participants	Workplace	Outcomes	Study design	Assess-ment time points	Control group	Quality
Luong et al. (2013) unpublished; not peer-reviewed Canada	Online training & discussion groups Duration: 2:15h	Attitudes	Supervisors	No information	Attitudes: no change in overall score concerning stigmatizing attitudes, however specific items significantly improved. Supervisors overall scores showed significantly less stigmatizing attitudes at follow-up*	quasi-experimental	3 Time points: pre, post measurement and 3 months follow-up. 41% of respondents' scores became less stigmatizing post program and dropped only to 36% at follow-up.	No	Allocation n/a Outcome assessment not blinded Withdrawals: Of 551 total participants, 271 completed the pre-survey. Of those 271, 171 completed the post-survey and of those 171, 139 completed the follow-up survey. The number of surveys completed at all three stages was 73. Risk of bias: high
Gould et al. (2007) United Kingdom	Trauma Risk Management (TRiM) Duration: 2.5 days	Attitudes	UK Armed forces; different divisions	Public sector UK Armed Forces	Attitudes: improvements in attitudes about PTSD*, stress* and help-seeking from TRiM-trained personnel* but not from normal military support networks General mental health: non-significant effect	quasi-experimental	3 Time points: pre, post measurement and 1 month follow-up.	Yes	Allocation: randomization was not possible for operational reasons; certain units had already been identified for training Withdrawals: 97% of the trained sample completed the post-survey. Of 124 total participants, follow-up data were collected on 66% of the training group and 74% on the control group. The drop-out rate was distributed relatively equally between the groups. Risk of bias: moderate
Stuart et al. (2013) unpublished; not peer-reviewed Canada	Online Training Duration: 1h	Attitudes Behavior	Staff at Student Support Services	Public sector Algonquin College	Attitudes: decrease in stigmatizing attitudes* Behavior: improved confidence in identifying and talking to students with mental health problems*	quasi-experimental	2 Time points: pre & post measurement, no follow-up.	No	Allocation n/a Withdrawals: Of 219 total participants, 219 completed the pre-test survey and 134 completed the post-test survey. Due to these great losses, pre & post test surveys were treated as two independent surveys. Risk of bias: high

Reference	Intervention	Target	Participants	Workplace	Outcomes	Study design	Assess-ment time points	Control group	Quality
Knifton & Quinn (2009) United Kingdom	Anti-Stigma Workshop Duration: 6h	Knowledge Attitudes Behavior	Participants from workplaces that are of importance to people who experience mental health problems	Public sector Benefits, housing, employment and voluntary sector agencies	Knowledge: improved* Attitudes: change was more complex with an overall significant improvement in attitudes, particularly in relation to unpredictability* and recovery, but not dangerousness Behavior: social distance had significant improvements in relation to moderate social contact only*	quasi-experimental	2 Time points: pre & 1 week post measurement, no follow-up.	No	Allocation n/a Outcome assessment not blinded Withdrawals: Baseline questionnaires were completed by 137 of the participants, and follow-up data at 1 week was collected from 63 participants. Those who have experienced mental health problems were more likely to complete follow-up surveys. Risk of bias: high
Nishiuchi et al. (2007) Japan	Psycho-education Duration: 4h	Knowledge Attitudes Behavior	Supervisors	Private sector Sake brewery	Knowledge: improved* Attitudes: no change in attitudes Behavior: the intervention effect was marginally significant	Randomized controlled trial	3 Time points: pre, 3 months post measurement and 6 months follow-up.	Yes	Allocation: a simple random allocation was undertaken of all eligible supervisors to either intervention or control group Withdrawals: response rates for the intervention group were 100%, 100% and 96% and 100%, 100% and 95% for the control group. Risk of bias: low
Compton et al. (2006) USA	Crisis Intervention Training (CIT) Duration: 40h (1h on schizophrenia)	Knowledge Attitudes	Police officers	Public sector Police Service	Knowledge: greater knowledge about schizophrenia* Attitudes: improved attitudes regarding aggressiveness among individuals with schizophrenia*, decreased social distance* and police officers became more supportive of treatment programs for schizophrenia*	quasi-experimental	2 Time points: pre & post measurement, no follow-up.	No	Allocation: n/a Withdrawals: Of about 180 participants in total, complete pre & post test data were available for 159 officers. Risk of bias: high

Reference	Intervention	Target	Participants	Workplace	Outcomes	Study design	Assess-ment time points	Control group	Quality
Moffitt et al. (2014) United Kingdom	Compare effectiveness of three types of anti-stigma interventions Duration: 2-Day Training Course (LWW), Mental Health First Aid (MHFA) 12h course, leaflet session (LS) 1h	Knowledge Attitudes	Line managers	Public sector Northumberland Fire and Rescue Service	Knowledge: improved* Attitudes: LLW and MHFA compared to LS were associated with significant improvements in attitudes to mental illness* Behavior: improved self-efficacy around mental health*	Randomized controlled trial	2 Time points: pre & post measurement, no follow-up.	Yes	Allocation: random allocation to one of the three training conditions Withdrawals: 176 participants in total were allocated to one of the three training conditions. Of those, 106 attended and 89 completed pre & post questionnaires (31 LWW, 41 MHFA, 17 LS). Risk of bias: low
Quinn et al. (2011) Scotland	Anti-Stigma Workshop Duration: 6h	Attitudes	Housing association and telecommunica tion workers	Public and private sector Housing association and telecommunication workers	Attitudes: reduction in stigmatizing attitudes for both first* and third person views*. The reduction of stigma was greater when assessing first person compared to third person stigma*	quasi-experimental (repeated-measures design)	2 Time points: pre & post measurement, no follow-up.	No	Allocation: n/a Withdrawals: A total of 101 participants attended the training and 87 completed the pre & post survey. Risk of bias: high
Jorm et al. (2010) Australia	Modified version of the Youth Mental Health First Aid course Duration: 2 days (7h per day)	Knowledge Attitudes Behavior	Teachers of the middle years in school (years 8-10)	Public sector High Schools (in the government, Catholic or independent systems)	Knowledge: increase in knowledge* Attitudes: changed beliefs about treatment to be more like those of mental health professionals, reduced some aspects of stigma* Behavior: increased confidence in providing help to students and colleagues* However, no effects were found on teachers' individual support towards students with mental health problems or on student mental health.	cluster randomized trial	3 Time points: pre, post measurement and 6 months follow-up Most of the changes found were sustained 6 months after training.	Yes	Allocation: use of a cluster design of schools because it was not feasible to randomly assign individual teachers who were working in the same school. Of 16 in total, 14 schools were randomly assigned to either receive training immediately or be placed on a wait list Withdrawals: 22% of teachers did not complete the post-test survey and 28% the follow-up survey. In relation to the students, 24% did not complete the follow-up survey. Risk of bias: low

Reference	Intervention	Target	Participants	Workplace	Outcomes	Study design	Assess-ment time points	Control group	Quality
Pierce et al. (2010) Australia	Mental Health First Aid Duration: 12h over 3 weeks	Knowledge Attitudes Behavior	Football Club leaders / Coaches	Others Football Clubs in the rural Australian football league	Knowledge: increased capacity to recognize mental illness* Attitudes: no significant change in attitudes about depression management strategies (except for more positive about antidepressants*) Behavior: increased confidence to respond to mental health difficulties in others* Indirect benefit to club players from this approach seemed limited as minimal changes in attitudes were reported by players	quasi-experimental	2 Time points: pre & post measurement, no follow-up.	No	Allocation: n/a Outcome assessment not blinded Withdrawals: Football club leaders' response rate for the pre-survey was 100% and 66% for the post-survey. Players' response rate for the pre-survey was 100% and 36% for the post-survey. Risk of bias: high
Brandling & McKenna (2010) United Kingdom unpublished; not peer-reviewed	Mental Health First Aid Duration: 12h course	Knowledge Behavior	Line managers and front line staff	Public sector Selwood Housing, Wiltshire Council, NHS Wiltshire	Knowledge: improved* Behavior: increased perceived confidence*	quasi-experimental	2 Time points: pre & 3 weeks post measurement, no follow-up.	No	Allocation: participants were recruited using a convenience sample Outcome assessment not blinded Withdrawals: 19 of 55 participants completed the pre & post survey. 35 of 55 completed the pre&post quiz and 10 of 55 completed a post-interview. Risk of bias: high

Additional file 3 Effect sizes reported for included studies.

Author (Year)	**Intervention**	**Knowledge****			**Attitude****			**Behavior****				
		Pre (mean sd)	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Follow-up**	**Comments**
Svensson & Hansson (2014) Sweden	Mental Health First Aid	7.2 (2.2)	8.7 (2.1)	0.63*	36.4 (4.5) 1.2 (0.5) 5.0 (1.1) 24.9 (6.5) 1.3 (0.5) 1.6 (0.6) 1.7 (0.7) 3.7 (1.1) 33.7 (4.5) 21.5 (5.9) 1.8 (0.6) 1.9 (0.7) 2.0 (0.7) 2.3 (0.6)	35.4 (5.3) 1.3 (0.5) 5.3 (1.1) 24.8 (6.7) 1.4 (0.5) 1.6 (0.6) 1.7 (0.6) 3.8 (1.1) 33.6 (4.7) 22.4 (5.8) 1.7 (0.6) 1.8 (0.6) 1.9 (0.6) 2.2 (0.6)	0.29* 0.34* -0.08 0.09 0.19 0.20 0.12 0.04 0.14 -0.17 0.10 0.06 0.08 0.22	2.9 (0.9) 2.4 (0.8)	3.1 (0.9) 2.7 (0.6)	0.22* 0.32*	Improved knowledge about mental ill health and treatment as well as behavior change is sustained over a period of 2 years*	
Krameddine et al. (2013) Canada	Role Plays	8.4 (2.6) 1.9 (2.8)	8.7 (2.7) 1.3 (2.9)*		24.5 (4.9) 37 (5.1) 23.3. (5.1) 31.4 (5.6)	25 (4.7) 36.3 (5.9) 25 (5.4) 31 (6.1)		3.49 (0.86) 3.39 (0.87) 3.51 (0.73) 11.5 (1.9)	3.73 (0.77)* 3.65 (0.79)* 3.73 (0.73)* 8.0 (1.2)* / 5.2 (0.9)*			Number of mental health calls significantly increased; costs of training per officer 120 USD
Hossain et al. (2009)	Mental Health First Aid			1.33*			0.28					Different data analysis; change in percentages, t statistics

Author (Year)	**Intervention**	**Knowledge****			**Attitude****			**Behavior****				
		Pre (mean sd)	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Follow-up**	**Comments**
Massey et al. (2010)	Mental Health First Aid	2.96 (0.98)	3.58 (0.69)	1.06*	3.72 (0.93)	3.55 (1.05)	-0.31	3.18 (0.88)	3.79 (0.83)	0.72*		
Kitchener & Jorm (2004)	Mental Health First Aid	90.2%	95.8%	0.22	82.10 (17.27) 84.28 (19.33) 83.28 (16.65) 8.74 (2.80) 12.12 (3.53) 20.88 (5.79)	86.29 (18.30) 87.41 (18.26) 86.98 (16.78)* 7.86 (2.50)* 11.27 (3.50) 19.14 (5.43)*	0.18	54.5% 71.5% 37.0% 28.1%	74.5%* 72.9% 39.0% 29.4%*	0.09		Significant improvement in participants' mental health (p=0.035) but not physical health
Luong et al. (2013)	Online training & discussion groups				61.2 (7.2) 29 (3.3)	60.9 (7.1) / 62.0 (6.8) 30 (3.6) / 31 (3.5)*					Evaluation did not show attitudinal change post-intervention; thus not sustained in follow-up.	Increase in tolerant attitudes from pre-training to follow-up, however not apparent immediate post-intervention
Gould et al. (2007)	Trauma Risk Management (TRiM)				26.9 (3.8) 26.6 (3.7) 17.2 (4.5) 19.1 (4.7)	28.0 (3.0)* 28.2 (3.4)* 18.2 (4.8) 21.5 (4.6)*					Generally changes remained significant at one-month follow-up.	Non-significant effect on participants' general mental health

Author (Year)	**Intervention**	**Knowledge****			**Attitude****			**Behavior****				
		Pre (mean sd)	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Follow-up**	**Comments**
Stuart et al. (2013)	Online Training											Different data analysis, percentage of correct answers on survey
Knifton & Quinn (2009)	Anti-Stigma Workshop	72%	85%*		3.20 (0.1) 2.6 3.1 4.1	2.98 (1.0)* 2.3 2.9 3.7*						
Nishiuchi et al. (2007)	Psycho-education	40.7 (1.5)	45.7 (1.3)* / (45.0 (1.5)		12.9 (0.5)	12.9 (0.6) / 12.6 (0.6)		46.8 (1.8)	50.9 (2.1) / 49.1 (1.7)		Change in knowledge is sustained over time.	
Compton et al. (2006)	Crisis Intervention Training (CIT)	6.4 (1.8)	7.4 (1.2)*		2.4 (0.9) 2.0 (0.9) 1.8 (0.8) 2.5 (0.8) 1.8 (0.9) 2.8 (0.8) 14 (3.9)	2.2 (0.9)* 1.9 (0.9) 2.0 (0.9) 2.7 (0.7)* 2.0 (0.9)* 2.8 (0.9) 16 (4.1)*						
Moffitt et al. (2014)	Training Course (LWW) vs. Mental Health First Aid (MHFA) vs. leaflet session (LS)											Different data analysis, z scores for differences between intervention types
Quinn et al. (2011)	Anti-Stigma Workshop				34.8 (5.33) 42.1 (8.18)	27.5 (5.66)* 38.7 (8.03)*						

Author (Year)	**Intervention**	**Knowledge****			**Attitude****			**Behavior****				
		Pre (mean sd)	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Pre**	**Post**	**Effect size**	**Follow-up**	**Comments**
Jorm et al. (2010)	Modified version of the Youth Mental Health First Aid course			0.39*			0.28			0.20	Most of the changes found were sustained 6 month post interventio n	Too many items to list here; for a full report on effect sizes, please refer to original article
Pierce et al. (2010)	Mental Health First Aid	44% 23%	100% 78%	1.13*	39% 68% 82% 26%	83% 88% 92% 46%						Different data analysis
Brandling et al. (2010)	Mental Health First Aid											Different data analysis, z scores for pre/post change

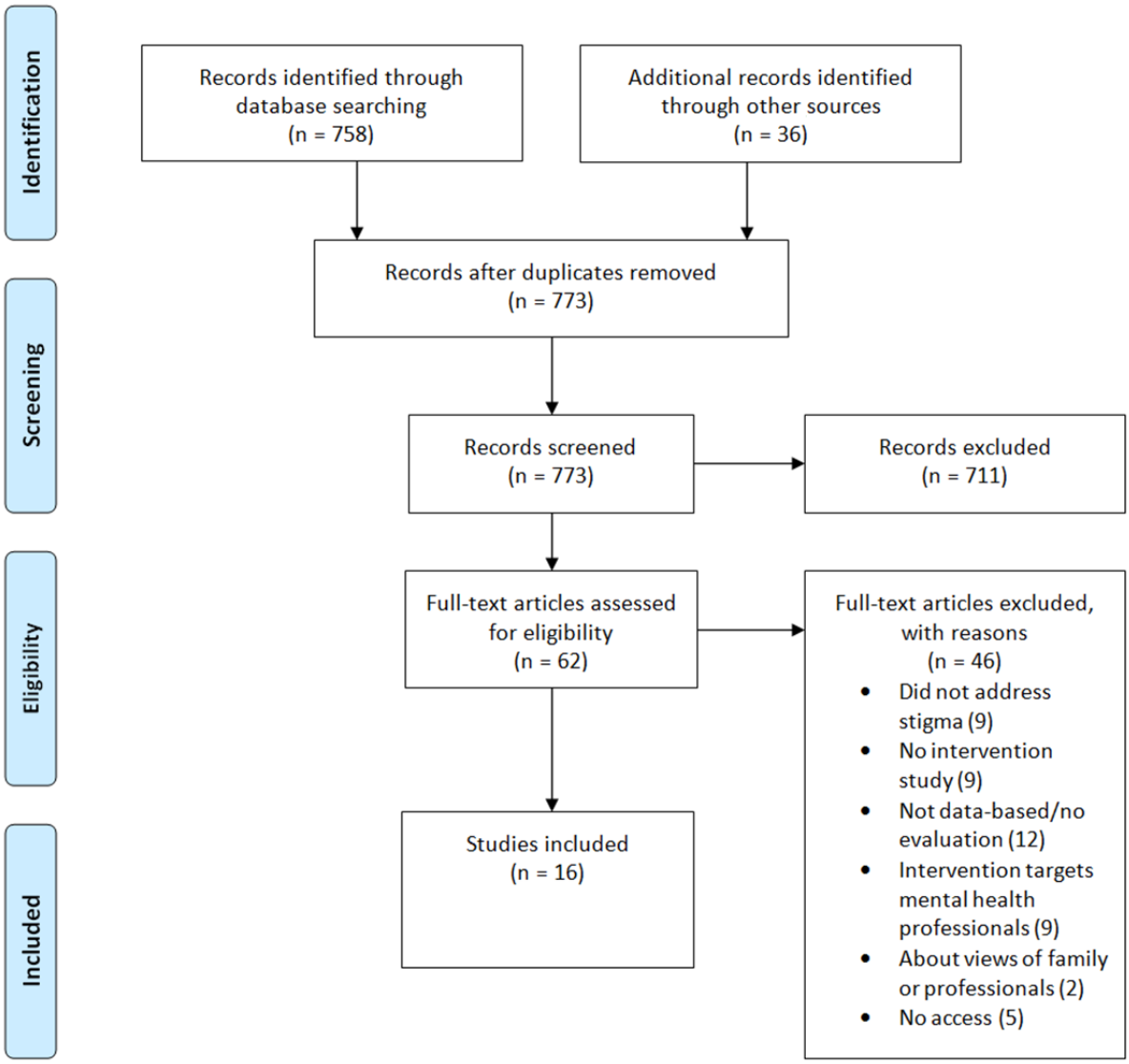
* significant ($p<.05$)

** data reported only for intervention group

*** effect size for difference between intervention vs. control group

4.6 Figures

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.



5 Publication II: Development and Evaluation of a Digital game-based Training for Managers to promote employee mental health and reduce mental illness stigma at work: a quasi-experimental study of program effectiveness

Published article:
Hanisch, S. E., Birner, U. W., Oberhauser, C., Nowak, D., Sabariego, C. (2017). Development and evaluation of digital game-based training for managers to promote employee mental health and reduce mental illness stigma at work: quasi-experimental study of program effectiveness. JMIR Mental Health 4 (3):e31.

5.1 Objective and specific aims

We followed 2 objectives: (1) to develop a digital game-based intervention to train leaders of a private sector organization to effectively manage employee mental health by addressing all 3 dimensions of stigma in order to prevent mental health problems and promote an open, inclusive, and supportive working culture, and (2) to evaluate the intervention in terms of its effectiveness and mid-term sustainability in a pilot study.

Specifically, we hypothesized that our digital game-based intervention, called Leadership Training in Mental Health Promotion (LMHP), would lead to (1) improved mental health knowledge, (2) increased positive attitudes toward people with mental health problems, (3) increased self-efficacy to deal with mental health situations at work, and (4) improved intentions to promote employee mental health at work in managers undertaking the training.

5.2 Methods

Objective 1: Intervention Development

The intervention was developed in a collaborative effort between the department of psychosocial health and well-being of a large global private sector company, which employed around 348,000 employees in more than 100 countries in 2015, and the Chair for Public Health and Health Services Research of Ludwig-Maximilians-University (LMU) in Munich, Germany.

Approach

In developing LMHP, we followed a systematic approach similar to intervention mapping [84] for designing theory- and evidence-based health promotion programs.

Specifically, we took several steps, from analyzing the problem of mental illness stigmatization and effective change methods [37], to assessing the needs for managerial training on mental health, and, finally, to developing the training, as well as an implementation and evaluation plan.

Content

We developed training content based on a review of workplace training programs on mental health [85-87] and on consultations with subject matter experts in the field of health management, human resources, and training and development. Furthermore, we carried out a needs assessment via 14 semi-structured interviews (7 managers, 7 employees) in the participating organization, investigating managerial training needs in terms of preferred content and mode of delivery (unpublished data). Results indicated a particular need for managers to be trained in spotting warning signs of mental distress, and in how to interact with and support affected employees.

Format

While e-learning is well established in larger enterprises, Web-based training in its most common form (animated slide-casts) is losing more and more in attractiveness and acceptance [88]. To counteract low participant engagement [89], LMHP was developed as a simulation game, a Web-based training program combining elements of both games and simulations [90]. By creating a real in-person environment with all the complexities of the formal and particularly social interactions typically found in the workplace, the program provides managers with the opportunity to directly apply what they learned about people management and to practice new skills in a safe virtual environment [91]. This way, managers can get a sense of the potential impact of different leadership styles on employee mental health without having to worry about real-world consequences.

Gamification

To facilitate an innovative and engaging learning experience [89], we used a subtle form of gamification in LMHP to fit the sensitivity of the training content. Gamification is defined as "the use of game design elements in non-game contexts" [92]. For example, while we refrained from providing badges for achievements or enabling competition between players, we did include several gamification strategies that were found to increase engagement and learning [93]. Those involved providing a storyline and clear goals, including

the capacity to overcome challenges by learning; providing feedback on performance; showing progress (in terms of how leader behavior affects employee mental health over time); and reinforcing learning by allocating points (e.g., for quiz questions answered correctly).

Objective 2: Intervention Evaluation

The goal of this pilot study was to evaluate the effectiveness of a digital game-based training program for managers, which we developed to promote employee mental health and reduce mental health-related stigma at work, using a 1-group pre-post design and a 3-month follow-up. The pilot study was carried out at a defined site of the participating organization near Oxford, United Kingdom.

Participants

All managers of this site were invited to take part in LMHP and its associated research study. To be included, participants had to be of working age (between 18 and 65 years) and be managing at least one employee at the time of the training. Informed consent was obtained from all individual participants included in the study.

Procedure

Invitations to participate in LMHP were sent out by email approximately a week in advance of the scheduled Web-based training. This invitation notified participants about the study's objectives, potential risks, data protection, etc.

Participants were then sent a personal link that allowed (1) participants to give their informed consent to participate in this study, (2) participants to access the training program for a limited time period of 3 weeks, (3) participants to access the pre- and post-questionnaire immediately before (T1) and after (T2) completion of the training, and (4) the researchers to allocate responses at T1, T2, and T3 to an individual. However, the link did not include any information that could be used to identify participants. At T3 (12 weeks after training completion), participants were resent their personal link in order to fill in a follow-up questionnaire to evaluate the first mid-term effects of the intervention.

Any communication about the training initiative (e.g., invitations), as well as personal links to training and questionnaires, was sent out via email by a human resources staff member of the participating organization, who was not involved in the study. Questionnaires were completed anonymously online, and responses were tracked and stored safely at the

external training provider. The external training provider then replaced participants' email addresses with a random, unique 3-digit identifier and posted the data back to the researchers at LMU Munich. To increase response rates, the external training provider informed the human resources staff member of the participating organization about any non-responders so that he could send out reminders. The researchers were never told the names of individual respondents, and the human resources staff member in the participating organization never saw any completed questionnaires or individually identifiable data.

Ethics

Ethical approval for the study was given by the Ethics Committee of LMU Munich, Germany. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Outcome Measures

Demographic questions included age, sex, level of education, marital status, whether they currently lived alone, and whether they knew someone with a mental health problem and had been diagnosed with or treated for a mental health problem themselves.

Other outcome measures matched the knowledge, attitudinal, and behavioral dimensions of stigma as defined above. We administered 4 validated instruments. To all of them, a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree") was applied. We calculated global scores on all instruments using sum scores, with higher scores indicating a better outcome, with the exception of stigmatizing attitudes. All measures were administrated at all 3 time points.

Knowledge

We assessed knowledge about mental health problems using the first 6 items, which are related to stigma, of the 12-item Mental Health Knowledge Schedule (MAKS) [94]. An example item is "Psychotherapy can be an effective treatment for people with mental health problems." Sum scores ranged from 6 to 30.

Additionally, we developed a set of 7 quiz questions to test participants' knowledge on specific training content of LMHP, with 3 answer options, of which 1 was correct. An

example item is “Which statement about business costs related to mental disorders is correct?” In this case, sum scores ranged from 0 to 7.

Attitudes

We assessed attitudes in the workplace toward coworkers who may have a mental illness using the 23-item Opening Minds Scale for Workplace Attitudes (OMS-WA), an adapted version of the Opening Minds Scale for Health Care Providers (OMS-HC) [95]. OMS-WA consists of 5 subscales: 6 items on avoidance, 5 on perceived dangerousness, 5 on work beliefs and competencies, 4 on helping, and 3 on responsibility of people with mental health problems. During evaluation, we considered attitudes as a whole, with sum scores ranging from 23 to 115, as well as the individual subscales, with sum scores ranging from 6 to 30 for avoidance, 5 to 25 for perceived dangerousness, 5 to 25 for work beliefs and competencies, 4 to 20 for helping, and 3 to 15 for responsibility. An example item is “I would try to avoid a coworker with a mental illness.”

Behavior

To assess behavioral change in leaders, we used proxy variables (e.g., self-efficacy to deal with mental health situations at work and intentions to promote employee mental health), since in a 3-month period not very many mental health situations are likely to arise at work where leaders could possibly demonstrate actual support. However, prior research found that enhanced intentions and high self-efficacy increase the likelihood that a person will engage in newly learned behaviors [96].

In this study, we measured self-efficacy with regard to managing employee mental health by a previously adapted version of the 9-item New General Self-Efficacy Scale [85,97]. Items included “When facing difficulties related to employee mental health, I am certain that I will handle them appropriately.” Sum scores ranged from 9 to 45.

To assess participants’ intentions to promote employee mental health, we used a previously adapted 3-item version of a safety scale designed to assess managers’ safety promotion intentions [85,98]. An example item is “I want to apply what I learn about employee mental health to my work setting.” Sum scores ranged from 3 to 15.

Statistical Methods

We used descriptive statistics (mean, median, SD) to describe the study population.

Multilevel growth models (with random intercept) were applied to investigate change over time in the dependent variables knowledge, attitudes, self-efficacy, and intentions to promote employee mental health [99]. An advantage of multilevel growth models is that missing data can be handled flexibly (using likelihood-based estimation) and thus allowed incorporation of all available data. First, we used time as a fixed factor in the models, as pre- and post-measurements were collected on the same day for each participant and variability in time from post- to follow-up measurements was very low across participants. Second, we investigated whether selected participant characteristics (age, educational level) predicted initial status. We applied the forward modeling approach, starting with models without any predictors (model A) and adding potential explanatory variables as fixed effects at subsequent steps (models B and C). To select the best model, we considered reductions of deviance (–2*log likelihood) and of Akaike information criterion and Bayesian information criterion values, with smaller values indicating a better-fitting model. We computed change as the difference in relation to the baseline (T1) score. Parameter estimates and standard errors (SE) are reported. Effects were judged significant at alpha≤.05, unless otherwise noted. Statistical analyses were performed using IBM SPSS 23.0 and SPSS MIXED (IBM Corporation) [100].

5.3 Results

Objective 1: Intervention Development

Taking all formative research described above into consideration, we designed LMHP in a way to train managers in (1) understanding mental health and mental illness, (2) spotting warning signs, (3) taking early and appropriate action, and (4) monitoring and self-monitoring.

Digital Game-Based Learning

The training consisted of one single session, which took between 1.5 and 2 hours to complete, thereby meeting managers' expectations of a particularly concise and time-efficient training format as expressed during interviews (see formative research described above). The setting was the office hub where, over a virtual time period of 7 weeks, the player was put into the position of a manager. During that time period, it was the manager's task to supervise a virtual team and manage employee mental health effectively.

The virtual team consisted of 4 employees showing diverse psychological profiles; thus, each represented a different mental health scenario likely to appear in real office life.

Scenarios contained examples of the promotion of mental health, the prevention of mental illness, and the rehabilitation of employees with common mental health problems such as anxiety or depressive disorders (see *Table 1*). Due to their relatively low prevalence rates, more severe mental disorders such as psychosis were not addressed in this workplace training. All scenarios required managers to develop and practice their skills in spotting warning signs, taking (early) action, and monitoring employees while building knowledge of mental health and mental illness and more positive attitudes toward employees with mental health problems at the same time (see *Table 1*).

For example, to sensitize managers in the recognition and identification of warning signs, certain hints were placed into the virtual work environment (e.g., medication, uneaten lunch, or work piling up on an employee's desk) that may or may not signal a growing underlying mental imbalance. Once the manager had spotted something unusual or alarming, he or she could choose to engage in a conversation with the respective employee. Different dialogue options were provided to choose from, which were more or less appropriate given the sensitivity of a certain topic. Depending on how the manager behaved, the respective employee chose to either shut down and end the conversation or open up and share further information the manager needed to be able to offer appropriate and effective support.

To ensure continuous learning and improved self-efficacy to manage mental health situations at work, the player was provided with instant feedback regarding his or her actions after the end of each conversation. Furthermore, a video of an actual affected employee of the participating organization sharing his or her experience with burnout was shown automatically to every player. The personal testimonial was presented in a way to counter prominent stereotypes of people with mental health problems and with a strong focus on the road toward recovery and well-being, thus involving many features considered fundamental to reducing stigma [101]. This video formed a very powerful part of the training, since contact with people with lived experience (face-to-face or video-based) is argued to be the strongest method to tackle mental illness stigma [102].

Mental Health Toolbox

Next to scenario-based learning, LMHP also offered a mental health toolbox that provided managers with practical information on topics found to be relevant to manage a given scenario successfully. The toolbox was presented in a way to improve managers' knowledge of mental health and mental illness, improve their attitudes toward employees with

mental health problems, and train them in skills to deal with mental health situations at work effectively. Topics of the mental health toolbox focused on 4 main areas: what mental health and mental illness mean, how to recognize signs of mental distress, how to start a conversation, and how to support affected employees effectively (see *Table 2*). Furthermore, the toolbox aimed to facilitate the application of newly learned skills in real everyday office life. For example, checklists with warning signs or guidelines for conversations on mental health could be downloaded as pdf files and serve as useful aids in interactions with employees.

Theoretical Foundation and Underlying Models

The idea behind the training—for example, the progression of employees' mental state in scenarios—followed the principles of the mental health continuum model [103,104]. This model postulates that mental health is spread out along a continuum, meaning that people are not either mentally healthy or mentally ill, but that they can move in and out of further phases in between.

In LMHP, we used an adapted version of the mental health continuum model to suit our specific needs. Each phase of this continuum (health, acute stress, chronic stress, and illness) is assigned certain warning signs and recommended actions to take as an affected individual but also as a manager supporting affected employees. In this way, mental health becomes more concrete, which, in turn, facilitates managers' understanding of mental health and warning signs.

On several occasions during the training, the manager was asked to assess each employee's mental state along the phases of the mental health continuum model. Afterward, the player was given feedback on an employee's actual mental state and on other parameters the manager influenced with his or her behavior, such as perceived managerial support or an employee's willingness to seek professional help. This exercise was designed to improve managers' self-efficacy in identifying warning signs and to strengthen their intentions to promote employee mental health.

Objective 2: Intervention Evaluation

Participants

Figure 1 shows the flow of participants at each stage of the study. Of 54 managers working at the site, 48 (89%) accepted our invitation, completed the baseline questionnaire,

and took part in the training. Of the 48 participants, 47 (98%) completed the post-questionnaire immediately after the training and 38 (79%) responded to the follow-up questionnaire 3 months later. Complete data from 3 waves were available for 37 (77%) participants and from at least two waves for 47 (98%) respondents.

Descriptive Analysis

Table 3 presents baseline demographic characteristics of the sample population: 92% of participants were male (44/48). Participants ranged in age from 32 to 58 (mean 46.0, SD 7.2) years. Among the 48 participants, 48% (23/48) had a university degree, 77% (37/48) were married, and 88% (42/48) were not living alone. Furthermore, 63% (30/48) knew someone with a mental health problem and 10% (5/48) had been diagnosed with or treated for a mental health problem themselves. Finally, 17% (8/48) received further training on mental health between the post-evaluation and follow-up evaluation.

Multilevel Analysis

Table 4 shows the mean scores of knowledge, attitudes, self-efficacy, and intentions to promote employee mental health at the 3 time points. In general, observed baseline scores indicated that, before the intervention, managers had quite good knowledge of mental health, fairly positive attitudes toward people with mental illness, and a high level of self-efficacy, as well as intentions to promote employee mental health.

Table 5 and *Table 6* show the results of the multilevel analysis. Adding age and education (refer to *Table 3*) to the models neither showed significant effects regarding initial status nor improved the goodness of fit. Thus, in the following, we focused on results of model A intercept and, particularly, model B intercept and time. Overall, the B models had good fit. These models indicated that knowledge of mental health and mental illness (measured by MAKS and the quiz) and self-efficacy to deal with mental health situations at work significantly increased over time and that this effect remained significant over the 3-month period (see *Table 5*). Regarding stigmatizing attitudes, attitudes (total scale; *Table 5*) and attitude subscales related to avoidance, perceived dangerousness, and responsibility (*Table 6*) significantly decreased over time with these effects also being sustained 3 months later. However, attitudes related to work and competency beliefs and to helping people with mental health problems did not change over time (*Table 6*). Moreover, managers' intentions to promote employee mental health did not change over time (*Table 5*).

5.4 Discussion

In this study we targeted the development and pilot evaluation of a digital game-based training program for managers to promote employee mental health and reduce mental illness stigma at work. Our study contributes to strengthen the evidence base that interventions targeting leaders may be effective in improving mental health literacy and reducing mental illness stigma in the workplace. In line with prior research and our hypotheses, we found statistically significant improvements in managers' knowledge of mental health and mental illness, attitudes toward people with mental health problems, and self-efficacy to deal with mental health situations at work, with the exception of intentions to promote employee mental health [59,61,64]. While these results can only be considered preliminary until replicated in a controlled trial, they nevertheless highlight some interesting findings that will help inform, first, the future development of effective anti-stigma interventions in the workplace and, second, relevant stakeholders such as personnel in human resources or health management about the benefits of investing in stigma reduction efforts.

Knowledge of mental health and mental illness is a key stigma component and a common target of anti-stigma interventions, as it enables recognition and is thus essential to the prevention of mental health problems [102]. In line with previous studies [8,63], we found improvements in managers' knowledge of mental health and mental illness (MAKS and quiz). Research shows that improved knowledge of mental health problems strongly influences a person's ability not only to recognize signs of mental illness, but also to seek help and support others in seeking help, and to accept treatment [62].

Evidence of the potential impact of workplace anti-stigma interventions on managers' attitudes toward people with mental health problems is generally mixed [37]. While some studies did not find any significant change in overall attitudes toward people with mental health problems [8,63], others reported improvements [71,76]. In our study, we evaluated not only overall attitude but also specific aspects of attitude, namely avoidance, perceived dangerousness, beliefs about workability and competencies, helping, and responsibility. While we found decreasing overall stigmatizing attitudes in managers over time, this did not apply to attitudes related to beliefs about workability and competency of people with mental health problems, nor to attitudes related to helping. An important finding of our study is therefore that a more thorough evaluation of attitudes considering specific themes, such as perceived dangerousness or social avoidance, is necessary and may be crucial to a better understanding of the effectiveness of anti-stigma interventions.

Behavioral change is key to creating an open and supportive work environment [73]. While public health efforts have often failed to change behavior, anti-stigma interventions in the workplace were suggested to be particularly promising because they allow for clear instructions with regard to how one is expected to behave in specific situations at work [46]. In line with prior studies, we found LMHP to have a positive impact on managers' self-efficacy to deal with mental health situations at work (e.g., provide support) [64,105]. This is very important, since, even more so than knowledge, the level of self-efficacy strongly influences whether a person will engage in learned behaviors [96,106].

An open question is why LMHP did not lead to improvements in attitudes related to beliefs about workability and competency of people with mental health problems, and in managers' intentions to promote employee mental health. One potential reason might be that managers in our sample already had quite positive attitudes at baseline regarding workability and competency of people with mental health problems, as well as intentions to promote employee mental health, which left little room for improvement post-intervention. Moreover, even though people with mental health problems can function productively at work, the literature shows that employers' beliefs about the workability and competency of people with mental health problems are often poor and may be particularly hard to change [107]. Somewhat surprisingly, attitudes related to helping employees with mental health problems if they, for example, got behind in their work were and remained relatively negative despite the training. This could be related to managers' concerns about the equity of the distribution of responsibilities and meeting productivity pressures [108]. Having in mind how important these outcomes are to reduce stigma and given that many people with mental health problems are either unemployed but want to work or are working [72,109], we recognize that LMHP and other future workplace anti-stigma interventions might need to incorporate modules that address those aspects more specifically.

Due to a lack of sufficient follow-up in relevant prior studies, conclusions regarding the effectiveness of workplace anti-stigma interventions over the long term are limited [37]. However, the few studies that conducted a follow-up reported that changes achieved in people's knowledge, attitudes, and behavior were, in part, sustained over time [8,63,71,74,85,110]. We also found that effects of LMHP on managers' knowledge, attitudes, and self-efficacy were largely sustained over a 3-month period (*Table 5* and *Table 6*). While still being significantly different from baseline values, scores seemed to slightly decrease

again from post- to follow-up assessment, indicating a potential need for booster sessions and further measures.

While the use of digital game-based interventions in mental health promotion is scarce and especially so in the workplace, research in other settings such as schools shows promising effects, including significant improvements in students' psychological well-being and increased engagement in a learning program [53,54,111]. While existing efforts, however, mainly focus on risk prevention [3,111], LMHP trained managers equally in how they can contribute to reducing symptoms of mental illness in employees and in how to enhance their psychological well-being. Digital mental health promotion interventions need to shift their traditional focus on treatment and risk prevention of mental health problems to emphasizing positive psychology, healthy leadership, and the strengthening of individual resources in healthy people in order to be of greater relevance and applicability for organizations. Compared with other non-gamified workplace mental health interventions with often low participant rates [53,110], this study confirmed the growing evidence that digital game-based interventions may increase user engagement and learning attainment, thus making it an attractive strategy to facilitate widespread behavioral and cultural change in organizations [88].

This pilot study contributes to strengthen the evidence base of (digital) workplace anti-stigma interventions. Previous efforts in mental health promotion have largely neglected the role of leaders and instead have focused on employee-level interventions to address stress at work [27,30]. A marked strength of this study is therefore its focus on managers. Additionally, it addressed (1) a lack of research in private sector organizations, (2) a lack of interventions targeting all 3 dimensions of stigma, and (3) a lack of long-term follow-up that characterizes the available literature. Furthermore, this study could help explain prior mixed findings on attitudinal change by investigating the impact of LMHP on attitudes related to specific themes rather than on a single attitude scale [37]. To the best of our knowledge, LMHP is the first digital game-based training for managers aiming to promote employee mental health and reduce mental illness stigma at work. Thus, this pilot adds to the small pool of digital workplace mental health promotion and anti-stigma interventions [112], providing further evidence suggesting, first, that brief Web-based interventions can be as effective as more time-consuming face-to-face equivalents, which often do not match business demands [48], and second, that incorporating gamification into the learning strategy can increase participant engagement [88].

This pilot study has some limitations that must be mentioned. First, the study lacked a control group due to formal restrictions of the participating site. To what extent observed changes were due to the intervention is therefore questionable. To account for that, we recorded whether managers participated in further interventions during the study time, and the majority did not (30/48, 63%). Second, to measure knowledge, we developed our own quiz, which was not validated. Therefore, we used a second standardized instrument (MAKS, see Methods) and found similar change patterns in knowledge over time with both instruments. Third, while the OMS-WA as an adapted version of the OMS-HC [95] has been used extensively in program evaluations [110], an evaluation of the psychometric properties of this measure has yet to be published. However, a validation study of OMS-WA is under review. Fourth, the intervention was carried out in the United Kingdom and, thus, participants might have been pre-sensitized as a result of increased stigma reduction efforts that have been going on in the United Kingdom in the past decade [86,113-115]. This might explain the good baseline values and small changes over time and ultimately may have led to an underestimation of the real training impact. Future evaluations should aim to investigate the effectiveness of LMHP in countries where mental illness stigma might be particularly strong and prevailing and where evidence about the effectiveness of anti-stigma interventions is scarce [115]. Fifth, we collected no data from employees on mental health, intentions to seek help, and perceived management support, nor on actual help-seeking in this study. However, in this pilot, we specifically wanted to gain first evidence on the effectiveness of LMHP before investigating any potential indirect effects on employees. Sixth, we collected no information on user satisfaction with the digital game-based training that would allow us to make objective inferences about acceptance of and engagement with the training. However, some pretests were done to rule out any technical obstacles that could possibly undermine user satisfaction, and the digital game-based training solution was developed based on suggestions made by employees of the participating organization during semi-structured interviews upfront. Furthermore, we received a vast amount of positive feedback on LMHP unofficially on completion of the pilot trial, which seems to be mirrored in the high participation rate of 89% (48/54).

Future analysis of data on employees and on EAP utilization, sickness absence rates, or the frequency and duration of disability claims before and after using the training program is essential in evaluating the full impact of LMHP. As the ultimate goal of the training was to create an inclusive and supportive working culture where employees feel comfortable to talk about mental health openly and seek help (early), it would be valuable to include employees'

perceptions on whether they feel supported by leaders, and whether and how that changed after the training. Investigating a change in objective data related to employee help-seeking would help establish the business case of investing in anti-stigma interventions in the workplace.

Even though we cannot be certain, it is very unlikely that a single intervention may be sufficient to end mental illness stigma and change the working culture in an organization. Hence, future research should explore whether training managers is an effective means of supporting employees with mental health problems or whether other interventions targeting employees instead or dual approaches (e.g., campaign and training) may be more efficient to achieve cultural change in the long term. Finally, to increase the generalizability of our findings, workplace anti-stigma interventions targeting employees of different hierarchies in different types of workplaces are needed. Another appealing contribution of future research would be to compare different training formats (game-based vs. standard Web-based vs. face-to-face) and their effect on user engagement and learning attainment. In general, more digital workplace mental health interventions are needed that incorporate elements of positive psychology and focus on keeping employees healthy, motivated, and productive.

This pilot study provides first evidence on the effectiveness of LMHP, demonstrating its ability to positively affect managers' knowledge, attitudes, and self-efficacy to deal with mental health situations at work. Further evaluation is needed to investigate potential beneficial effects on employees' perceptions of management support, on their acceptance and use of existing mental health interventions (e.g., EAP), and on the working culture in an organization. The benefits of digital game-based learning, such as increased participant engagement and reach, make it an effective strategy to facilitate widespread behavioral and cultural change in organizations.

5.5 Tables

Table 1 Outline of content and psychological constructs covered in the virtual scenarios of the Leadership Training in Mental Health Promotion program.

Scenario-based learning				
Scenario	*Objective*	*Knowledge*	*Attitude*	*Skills*
1. Psychological well-being	Promotion of mental health	Create awareness of the importance of mental health at work and that stress or mental ill health affects everyone	Develop more positive attitudes towards promoting mental health at work	Communication and behavioral strategies to ensure that healthy employees stay healthy
2. Acute stress	Prevention of mental ill health	Acute stress can result in psychological as well as physical symptoms	Develop more positive attitudes towards discussing the topic of stress more openly at work and to promote employee mental health	Communication, identification of warning signs, support strategies
3. Chronic stress	Prevention of mental ill health	Persistent stress has severe detrimental effects on the body and the mind and if not dealt with can lead to long-term sickness absence	Develop more positive attitudes towards employees with mental health problems with regards to avoidance, work competency, responsibility, and helping	Communication, identification of warning signs, support and referral strategies
4. Mental Illness	Rehabilitation and Return to Work	Knowledge of common mental health problems as well as of return to work policies and procedures	Develop more positive attitudes towards employees with mental health problems with regards to perceived dangerousness, work competency, responsibility, avoidance, and helping	Communication, planning of a successful return to work, workplace accommodations, monitoring, actively counteract stigma and discrimination, facilitate open discussions

Table 2 Outline of content and psychological constructs covered in the Mental Health Toolbox of LMHP.

Mental Health Toolbox	
Focus Areas of Training	*Module*
A Understanding mental (ill) health	A1 Mental health affects us all A2 Understanding mental (ill) health A3 Economic impact of mental ill health A4 Risk factors and treatment of mental disorders
B Recognizing signs of mental distress	B1 What is stress? B2 Work-related stressors and resources B3 Warning signs B4 Common mental disorders at work
C Starting the conversation	C1 Stigma – a barrier to help-seeking C2 Communication techniques C3 Guidance for leaders C4 In-house support services
D Supporting effectively	D1 Key role of managers D2 Providing support D3 Return-to-work D4 Self-care

Table 3 Baseline demographic characteristics of the sample population (n=48).

Characteristics	Data
Age (years), mean (SD), median (years	46.0 (7.2), 45.5
Age groups[a], n (%)	
< 45.5 years	24 (50%)
≥ 45.5 years	24 (50%)
Gender	
Male	44 (92%)
Female	4 (8%)
Education	
Graduate degree	11 (23%)
Bachelor degree	12 (25%)
Non-university certificate	13 (27%)
High school	10 (21%)
Less than high school	2 (4%)
Education groups[a]	
University degree	23 (48%)
Non-university degree	25 (52%)
Marital Status	
Married	37 (77%)
Divorced or separated	6 (13%)
Single	3 (6%)
Common-law	2 (4%)
Live Alone	
No	42 (88%)
Yes	5 (10%)
Prefer not to answer	1 (2%)
Know smo. with mental health problem	
No	13 (27%)
Yes	30 (63%)
Prefer not to answer	5 (10%)
Been diagnosed or treated for mental health problem	
No	41 (85%)
Yes	5 (10%)
Prefer not to answer	2 (4%)
Received further training post-intervention	
No	30 (63%)
Yes	8 (17%)
Missing values	10 (21%)

[a]Variables included in multilevel analysis (model C).

Table 4 Descriptive statistics for respondents who participated at all 3 time points[a] (n=37).

	Wave 0		Wave 1		Wave 2	
	Mean	SD	Mean	SD	Mean	SD
Knowledge (MAKS[b])	22.1	2.6	24.2	2.5	24.0	2.8
Knowledge (quiz)	4.4	1.4	5.6	1.4	4.9	1.2
Attitude total	45.9	10.7	43.1	11.5	42.3	10.3
Attitude avoidance	11.4	3.6	10.1	3.0	9.8	3.2
Attitude dangerousness	10.5	3.0	9.3	3.3	9.1	2.7
Attitude work	10.9	3.0	11.2	3.3	10.4	3.1
Attitude help	8.0	1.6	8.0	2.2	8.6	2.7
Attitude responsibility	5.0	2.0	4.5	1.6	4.4	1.7
Self-efficacy	31.5	3.6	34.7	3.4	34.2	2.9
Promotion intentions	12.2	1.3	12.4	1.2	12.3	1.2

[a]Wave 0, baseline; wave 1, post-intervention; wave 2, 3-month follow-up.
[b]MAKS: Mental Health Knowledge Schedule.

Table 5 Mixed models (with random intercept) considering knowledge (MAKS), knowledge (Quiz), attitude (total), self-efficacy and intentions to promote employee mental health as the dependent variable (N=48).

Dependent variable (N=48)	*Predictors of change over time on dependant variable*	*Model A Unconditional means model*	*Model B Unconditional growth (with time)*	*Model C Time & age & education*
Knowledge (MAKS)	Fixed Effects			
	Intercept (initial status)	23.27 (0.324)[c]	21.98 (0.372)[c]	21.84 (0.572)[c]
	Time (rate of change)			
	Wave = 1		2.16 (0.335)[c]	2.16 (0.335)[c]
	Wave = 2		1.88 (0.361)[c]	1.87 (0.361)[c]
	Age			-0.09 (0.641)
	Education			0.38 (0.642)
	Variance components			
	Level-1: Within person (residual)	4.13 (0.633)[c]	2.65 (0.407)[c]	2.65 (0.407)[c]
	Level-2: In intercept	3.51 (1.052)[b]	3.99 (1.024)[c]	3.95 (1.017)[c]
	Goodness of fit			
	Deviance	623.88	585.60	585.23
	AIC	629.88	595.60	599.23
	BIC	638.55	610.05	619.47
Knowledge (Quiz)	Fixed Effects			
	Intercept (initial status)	5.01 (0.138)[c]	4.38 (0.191)[c]	4.36 (0.259)[c]
	Time (rate of change)			
	Wave = 1		1.36 (0.239)[c]	1.36 (0.239)[c]
	Wave = 2		0.55 (0.256)[a]	0.53 (0.256)[a]
	Age			-0.34 (0.263)
	Education			0.38 (0.642)
	Variance components			
	Level-1: Within person (residual)	1.86 (0.284)[c]	1.36 (0.208)[c]	1.36 (0.208)[c]
	Level-2: In intercept	0.24 (0.211)	0.40 (0.197)[a]	0.33 (0.185)
	Goodness of fit			
	Deviance	474.48	446.59	443.09
	AIC	480.48	456.59	457.09
	BIC	489.15	471.04	477.32
Attitude (total)	Fixed Effects			
	Intercept (initial status)	43.77 (1.511)[c]	46.13 (1.633)[c]	47.93 (2.601)[c]
	Time (rate of change)			
	Wave = 1		-3.49 (1.095)[b]	-3.49 (1.095)[b]
	Wave = 2		-4.08 (1.185)[b]	-4.06 (1.185)[b]
	Age			-1.09 (3.002)
	Education			-2.64 (3.004)
	Variance components			
	Level-1: Within person (residual)	33.47 (5.147)[c]	28.33 (4.356)[c]	28.34 (4.361)[c]
	Level-2: In intercept	97.211 (22.562)[c]	99.63 (22.644)[c]	97.43 (22.218)[c]
	Goodness of fit			
	Deviance	949.58	935.62	934.70
	AIC	955.58	945.62	948.70
	BIC	964.26	960.07	968.93

Dependent variable (N=48)	*Predictors of change over time on dependant variable*	*Model A Unconditional means model*	*Model B Unconditional growth (with time)*	*Model C Time & age & education*
Self-efficacy	Fixed Effects			
	Intercept (initial status)	33.59 (0.396)[c]	31.54 (0.507)[c]	31.14 (0.742)[c]
	Time (rate of change)			
	Wave = 1		3.62 (0.551)[c]	3.62 (0.551)[c]
	Wave = 2		2.78 (0.225)[c]	2.77 (0.592)[c]
	Age			0.47 (0.801)
	Education			0.36 (0.801)
	Variance components			
	Level-1: Within person (residual)	11.28 (1.752)[c]	7.18 (1.113)[c]	7.20 (1.119)[c]
	Level-2: In intercept	3.41 (1.714)[a]	5.16 (1.685)[b]	5.03 (1.670)[b]
	Goodness of fit			
	Deviance	728.85	691.95	691.39
	AIC	734.86	701.95	705.39
	BIC	743.53	716.40	725.62
Promotion Intentions	Fixed Effects			
	Intercept (initial status)	12.46 (0.151)[c]	12.31 (0.185)[c]	12.08 (0.269)[c]
	Time (rate of change)			
	Wave = 1		0.36 (0.192)	0.36 (0.192)
	Wave = 2		0.08 (0.207)	0.07 (0.207)
	Age			0.00 (0.292)
	Education			0.48 (0.292)
	Variance components			
	Level-1: Within person (residual)	0.91 (0.140)[c]	0.87 (0.135)[c]	0.88 (0.136)[c]
	Level-2: In intercept	0.76 (0.233)[b]	0.76 (0.231)[b]	0.70 (0.220)[b]
	Goodness of fit			
	Deviance	421.88	418.22	415.58
	AIC	427.88	428.22	429.58
	BIC	436.55	442.67	449.81

Note: Parameter estimates and standard errors (SE) are reported. AIC, Akaike information criterion; BIC, Bayesian information criterion. [a]$P < .05$; [b]$P < .01$; [c]$P < .001$.

Table 6 Mixed models (with random intercept) considering attitude avoidance, attitude dangerousness, attitude workability, attitude helping and attitude responsibility as the dependent variable (N=48).

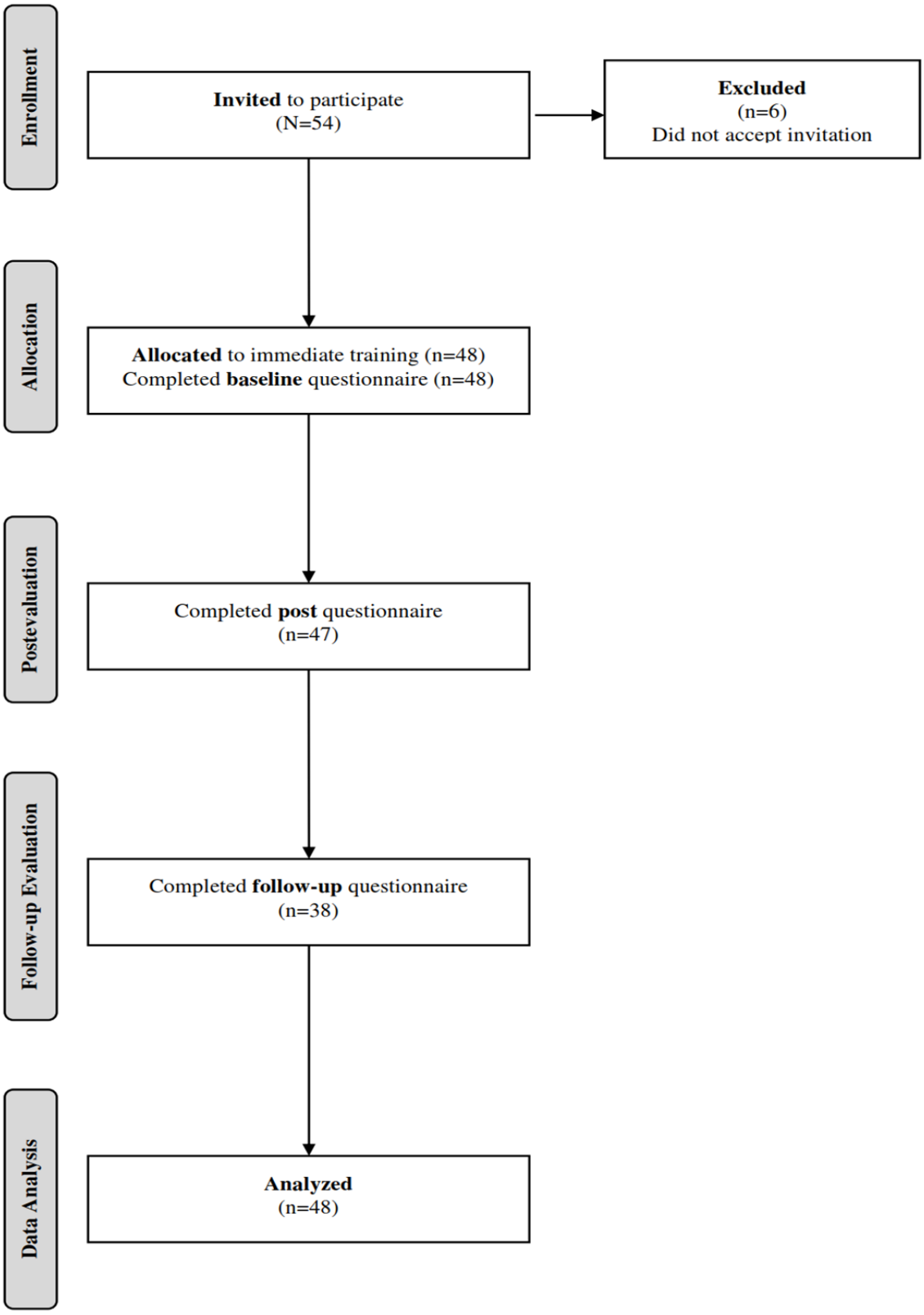
Dependent variable (N=48)	*Predictors of change over time on dependant variable*	*Model A Unconditional means model*	*Model B Unconditional growth (with time)*	*Model C Time & age & education*
Attitude Avoidance	Fixed Effects			
	Intercept (initial status)	10.50 (0.439)[c]	11.44 (0.492)[c]	11.69 (0.773)[c]
	Time (rate of change)			
	Wave = 1		-1.37 (0.390)[b]	-1.37 (0.390)[b]
	Wave = 2		-1.66 (0.422)[c]	-1.66 (0.422)[c]
	Age			-0.39 (0.880)
	Education			-0.12 (0.881)
	Variance components			
	Level-1: Within person (residual)	4.43 (0.681)[c]	3.60 (0.554)[c]	3.60 (0.555)[c]
	Level-2: In intercept	7.63 (1.926)[c]	8.00 (1.932)[c]	7.95 (1.924)[c]
	Goodness of fit			
	Deviance	659.03	641.77	641.55
	AIC	665.03	651.77	655.55
	BIC	673.70	666.22	675.78
Attitude Dangerousness	Fixed Effects			
	Intercept (initial status)	9.72 (0.404)[c]	10.60 (0.440)[c]	11.33 (0.688)[c]
	Time (rate of change)			
	Wave = 1		-1.32 (0.308)[c]	-1.32 (0.308)[c]
	Wave = 2		-1.52 (0.333)[c]	-1.51 (0.333)[c]
	Age			-0.40 (0.791)
	Education			-1.10 (0.792)
	Variance components			
	Level-1: Within person (residual)	2.96 (0.454)[c]	2.24 (0.345)[c]	2.25 (0.345)[c]
	Level-2: In intercept	6.76 (1.615)[c]	7.03 (1.614)[c]	6.67 (1.543)[c]
	Goodness of fit			
	Deviance	616.80	593.42	591.23
	AIC	622.80	603.42	605.23
	BIC	631.47	617.87	625.46
Attitude Workability	Fixed Effects	10.68 (0.409)[c]	10.83 (0.472)[c]	11.83 (0.707)[c]
	Intercept (initial status)			
	Time (rate of change)			
	Wave = 1		-0.08 (0.415)	-0.08 (0.415)
	Wave = 2		-0.47 (0.451)	-0.46 (0.452)
	Age			-1.24 (0.791)
	Education			-0.78 (0.792)
	Variance components			
	Level-1: Within person (residual)	4.20 (0.642)[c]	4.13 (0.632)[c]	4.14 (0.635)[c]
	Level-2: In intercept	6.50 (1.666)[c]	6.58 (1.676)[c]	5.98 (1.565)[c]
	Goodness of fit			
	Deviance	652.52	651.35	647.93
	AIC	658.52	661.35	661.93
	BIC	667.21	675.84	682.21

Dependent variable (N=48)	*Predictors of change over time on dependant variable*	*Model A Unconditional means model*	*Model B Unconditional growth (with time)*	*Model C Time & age & education*
Attitude Helping	Fixed Effects			
	Intercept (initial status)	8.07 (0.241)[c]	8.17 (0.315)[c]	8.00 (0.452)[c]
	Time (rate of change)			
	Wave = 1		1.16 (0.587)	-0.51 (0.365)
	Wave = 2		0.31 (0.484)	0.31 (0.392)
	Age			0.38 (0.479)
	Education			-0.04 (0.479)
	Variance components			
	Level-1: Within person (residual)	3.32 (0.507)[c]	3.17 (0.484)[c]	3.16 (0.482)[c]
	Level-2: In intercept	1.58 (0.594)[b]	1.61 (0.587)[b]	1.59 (0.580)[b]
	Goodness of fit			
	Deviance	577.25	572.78	572.15
	AIC	583.25	582.78	586.15
	BIC	591.92	597.24	606.39
Attitude Responsibility	Fixed Effects			
	Intercept (initial status)	4.68 (0.248)[c]	5.08 (0.274)[c]	4.99 (0.428)[c]
	Time (rate of change)			
	Wave = 1		-0.62 (0.208)[b]	-0.61 (0.208)[b]
	Wave = 2		-0.69 (0.225)[b]	-0.68 (0.225)[b]
	Age			0.54 (0.489)
	Education			-0.37 (0.490)
	Variance components			
	Level-1: Within person (residual)	1.18 (0.181)[c]	1.02 (0.157)[c]	1.02 (0.157)[c]
	Level-2: In intercept	2.52 (0.611)[c]	2.58 (0.612)[c]	2.49 (0.591)[c]
	Goodness of fit			
	Deviance	491.42	479.80	478.11
	AIC	497.42	489.80	492.11
	BIC	506.09	504.25	512.34

Note: Parameter estimates and standard errors (SE) are reported. AIC, Akaike information criterion; BIC, Bayesian information criterion. [a]$P < .05$; [b]$P < .01$; [c]$P < .001$.

5.6 Figures

Figure 1 Flow diagram showing progress through the phases of the trial.



6 General Discussion & Summary

Mental health problems, such as depression and anxiety are common, roughly affecting 1 in 4 people in their lifetime [2]. Associated work loss due to sickness absence, lost at-work productivity (presenteeism), and turnover is costly for organizations which are becoming increasingly aware of the debilitating impact of mental ill health at work. In the UK alone, mental illness is estimated to cost organizations £26 billion a year [22].

To prevent the negative impact of mental health problems on business, employers increasingly invest in mental health promotion and intervention measures such as EAPs. However, due to fear of stigmatization, employees are often reluctant to make use of those services. Stigma has been defined as (1) the lack of knowledge of the symptoms of mental disorders and how to access treatment, (2) negative or prejudicial attitudes, and (3) real or anticipated acts of discrimination against people who have mental illnesses [1].

Although mental illness stigma has been extensively researched among the general public, surprisingly, despite its far-reaching impact on employees' willingness to seek help and associated costs, current research and health promotion practice largely fail to address the stigma of mental illness in the workplace [17]. However, public stigma reduction efforts need to be complemented by more target-oriented interventions (e.g. at the workplace) in order to achieve promising results and widespread change [46,75]. Hence, raising awareness of the importance of mental health, reducing stigma, and creating an organizational culture of acceptance, diversity, and respect may be a necessary prerequisite for the acceptance, use, and, thus, effectiveness of mental health interventions such as EAPs [39].

The general objective of this doctoral thesis, therefore, was to gain an in-depth understanding of current workplace stigma reduction programs and their effectiveness and provide recommendations for future research as well as workplace practice.

Study 1 - The effectiveness of interventions aiming to reduce mental illness stigma in the workplace: a systematic review

The objective of this study was to provide an overview of the evidence on the effectiveness of workplace interventions targeting mental illness stigma.

A systematic literature review was performed. The literature search was conducted in Medline and PsycINFO. To identify relevant grey literature, which is either unpublished or not published in peer-reviewed journals, an additional Google Scholar search was made.

Information on objectives, study design and population, the workplace, the type of intervention and intervention effectiveness as well as the methodological quality of the studies was extracted, summarized and evaluated.

A total of 16 mainly quasi-experimental studies were identified. The effectiveness of workplace stigma reduction programs was assessed by examining changes in: (1) knowledge of mental illnesses and their treatment and recognition of signs/symptoms of mental illness, (2) attitudes towards people with mental health problems, and (3) supportive behavior. The results show that workplace stigma reduction programs can have a positive impact on employees' knowledge and supportive behavior towards people with mental health problems. The interventions' impact on employees' attitudes towards people with mental health problems were mixed, but generally positive. Moreover, the quality of evidence was found to vary across studies.

Therefore, more rigorous, higher-quality evaluations with more diverse samples of the working population need to be conducted in the future. Furthermore, the extent to which changes in employees' knowledge, attitudes, and supportive behavior lead to affected individuals seeking help earlier needs to be explored. Such investigations could a) provide guidance for the development and implementation of effective future interventions, and b) inform relevant stakeholders about potential benefits (e.g. inferred impact on utilization rates of healthcare services/EAP and on employee mental health) and thereby strengthen the incentive for organizations to invest in stigma-reduction efforts.

Study 2- Development and evaluation of digital game-based intervention for managers to promote employee mental health and reduce mental illness stigma at work: a quasi-experimental study of program evaluation

The objective of this study was to develop and evaluate a digital game-based training program for managers to promote employee mental health and reduce mental illness stigma at work.

We described the empirical development of Leadership Training in Mental Health Promotion (LMHP), a digital game-based training program for leaders. A 1-group pre-post design and a 3-month follow-up were used for training evaluation. We applied multilevel growth models to investigate change over time in the dependent variables knowledge, attitudes, self-efficacy, and intentions to promote employee mental health in 48 managers of a global enterprise in the United Kingdom. Participants ranged in age from 32 to 58 (mean 46.0, SD 7.2) years and were mainly male (44/48, 92%).

We found the Web-based training program to positively influence managers' knowledge of mental health and mental illness ($P<.001$), their attitudes toward colleagues with mental health problems ($P<.01$), and their self-efficacy to deal with mental health situations at work ($P<.001$), with the exception of intentions to promote employee mental health, which was initially high.

Results provide the first evidence of the effectiveness of LMHP in having a positive impact on managers' skills to promote employee mental health at work. Furthermore, given the high rate of participation in LMHP (48/54, 89%), this study supports the use of digital game-based interventions to increase user engagement and user experience in workplace training programs on mental health.

General Discussion

The general objective of this doctoral thesis was to gain an in-depth understanding of current workplace stigma reduction programs and their effectiveness and provide recommendations for future research as well as workplace practice.

Results of the systematic literature review (Study 1) and the quasi-experimental study, (Study 2) highlighted the importance and benefits of developing and evaluating interventions that specifically address mental illness stigma in the workplace. The systematic literature review showed that workplace stigma reduction programs have a positive impact on employees' knowledge of mental illnesses, as well as supportive behavior, while results related to attitudes were mixed, but positive overall. Furthermore, several limitations of current research were noted to guide future efforts: (1) most interventions targeted the public sector, (2) half of the studies included did not target all 3 dimensions of stigma, which is key in achieving ultimate behavioral change, (3) there is a lack of evidence concerning the sustainability of workplace anti-stigma interventions due to insufficient follow-up beyond pre- and post-intervention assessments, and (4) most interventions were delivered face-to-face, thus having only a limited reach and impact on stigma among the wider workforce. Study 2 provides guidelines for the empirical development of a workplace anti-stigma intervention while aiming to address some of the limitations found in study 1. The quasi-experimental study showed that LMHP had a positive impact on managers' knowledge, attitudes and self-efficacy to deal with mental health situations at work. This study confirms prior research on the effectiveness of stigma reduction programs in the workplace, and moreover, shows that digital interventions can be as effective as face-to-face delivered

interventions, and potentially, even be superior to them in terms of reach, user experience and engagement [48,88].

Overall, evidence on the effectiveness of workplace stigma reduction programs is still limited and would benefit from research of higher methodological quality, more diverse samples and the comparison of different intervention types and modes of delivery (face-to-face vs. digital vs. blended learning). A stronger focus should be placed on behavioral outcomes of stigma reduction efforts with regards to their impact on actual help-seeking, as well as on employee mental health, perceived working climate (organizational culture) and on the number of sick days.

The current doctoral thesis provided sound evidence for the significance of reducing mental illness stigma in the workplace and may serve as the basis for the development of future, effective workplace mental health promotion initiatives aiming to promote employee mental health at work.

7 Allgemeine Diskussion & Zusammenfassung

Psychische Erkrankungen, wie z.B. Depressionen und Angststörungen treten häufig auf und betreffen grob 1 von 4 Menschen im Laufe seines Lebens [2]. Der damit verbundene Arbeitsverlust durch Fehlzeiten, Präsentismus und Fluktuation ist kostspielig für Unternehmen, die sich zunehmend der gravierenden Auswirkung der psychischen Befindlichkeit auf die Arbeit bewusst werden. Alleine in Großbritannien fallen Schätzungen zufolge £ 26 Milliarden pro Jahr an Kosten für Unternehmen an in Folge von psychisch erkrankten Mitarbeitern [22].

Um den negativen Auswirkungen psychischer Erkrankungen auf die Produktivität entgegenzuwirken, investieren Unternehmen zunehmend in Maßnahmen, die die psychische Gesundheit der Mitarbeiter fördern sollen. Oftmals werden diese Angebote allerdings nur geringfügig genutzt, was zu einem Großteil auf die Stigmatisierung psychischer Erkrankungen zurückzuführen ist. ‚Stigma' wurde wie folgt definiert: (1) als falsches oder Nicht-Wissen zu Symptomen und Behandlungsmöglichkeiten, (2) als Vorurteile und daraus resultierenden negativen Einstellungen und (3) als Ausgrenzung und Diskriminierung von Menschen mit psychischen Erkrankungen [1].

Obwohl die mit psychischen Erkrankungen verbundene Stigmatisierung in der allgemeinen Bevölkerung eingängig untersucht wurde, mangelt es trotz verringerter Inanspruchnahme psychologischer Unterstützungsangebote und hoher anfallender Kosten für Unternehmen an vergleichbaren Studien zu Ausmaß und Konsequenzen von Stigmatisierung im Arbeitskontext und Anti-Stigma Interventionen in der Praxis [17]. Interventionen, die eine bestimmte Zielgruppe ansprechen (z.B. in der Arbeit), scheinen jedoch eine vielversprechende und nötige Ergänzung zu bereits bestehenden Kampagnen zu sein, die an die Öffentlichkeit gerichtet sind [46,75]. Um die Akzeptanz und Inanspruchnahme psychologischer Unterstützungsangebote (wie EAPs) in der Arbeit zu steigern, ist es eine unabdingbar, ein Bewusstsein zur Wichtigkeit von psychischer Gesundheit sowie eine Kultur im Unternehmen von Toleranz und Offenheit zu schaffen und Stigmatisierung zu reduzieren [39].

Das übergreifende Ziel dieser Doktorarbeit war es daher, ein vertieftes Verständnis von derzeitigen Anti-Stigma Intervention in Arbeitskontext und deren Effektivität zu erhalten und desweiteren, den aktuellen Forschungs- und Praxisstand durch valide und zukunftsweisende Empfehlungen voranzubringen.

Studie 1 - The effectiveness of interventions aiming to reduce mental illness stigma in the workplace: a systematic review

Das Ziel dieser Studie war es, eine Übersicht bezüglich der Effektivität von Interventionen zu erstellen, welche darauf abzielen, die Stigmatisierung psychischer Erkrankungen in der Arbeit zu reduzieren.

Ein systematischer Literaturreview wurde durchgeführt. Die Literatursuche erfolgte in den Datenbanken Medline und PsycINFO. Zusätzlich wurde Google Scholar durchsucht, um Literatur zu identifizieren, die entweder nicht veröffentlicht oder nicht in peer-reviewed Journalen veröffentlicht ist. Informationen zu Zielen, Studiendesigns und –populationen, dem Arbeitssetting, der Art der Interventionen, und zu der Effektivität der Interventionen sowie der methodischen Qualität der Studien wurden extrahiert, zusammengefasst und evaluiert.

Insgesamt wurde 16 Studien, hauptsächlich quasi-experimentelle Studien, identifiziert. Die Effektivität der Interventionen wurde anhand Veränderungen in den folgenden Variablen gemessen: (1) Wissen über psychische Erkrankungen und Behandlungsmöglichkeiten sowie dem Erkennen von Warnzeichen/Symptomen von psychischen Erkrankungen, (2) Einstellungen gegenüber Menschen mit psychischen Erkrankungen und (3) unterstützendes (Führungs-)Verhalten gegenüber Betroffenen. Die Ergebnisse belegen, dass Anti-Stigma Interventionen in der Arbeit zu vermehrten Wissen über psychische Erkrankungen und zu verbesserten unterstützenden Verhalten führen können. Für den Einfluss der Interventionen auf Einstellungen gegenüber Menschen mit psychischen Erkrankungen erhielten wir gemischte Ergebnisse, die grundsätzlich aber eine Veränderung in eine positive Richtung aufwiesen. Die methodische Qualität variierte stark zwischen den Studien.

Diese Studie hebt den Bedarf an Evaluationen von besserer methodischer Qualität hervor, welche unterschiedliche Berufsgruppen und Arbeitssettings untersuchen. Zukünftige Forschung sollte ebenso untersuchen, in wie weit Veränderungen in Wissen über psychische Erkrankungen, positivere Einstellungen und unterstützendes Verhalten sich auf die Bereitschaft von Mitarbeitern, psychologische Unterstützungsangebote in der Arbeit anzunehmen, auswirken. Untersuchungen dieser Art leisten einen Beitrag, relevante Stakeholder über die Vorteile von Anti-Stigma Interventionen in der Arbeit zu informieren und liefern gleichzeitig Richtlinien für die Entwicklung und Implementierung zukünftiger, effektiver Maßnahmen um Stigmatisierung zu reduzieren.

Studie 2- Development and evaluation of digital game-based intervention for managers to promote employee mental health and reduce mental illness stigma at work: a quasi-experimental study of program effectiveness

Ziel dieser Studie war es, eine digitale, Spiel-basierte Intervention zu entwickeln, die Führungskräfte darin schult, die psychische Gesundheit von Mitarbeitern zu fördern und die Stigmatisierung psychischer Erkrankungen in der Arbeit zu reduzieren.

Wir beschrieben die empirische Entwicklung von ‚Leadership Training in Mental Health Promotion' (LMHP), einem digitalen, Spiel-basierten Trainingsprogramm für Führungskräfte. Ein 1-group pre post design mit einem 3-monatigen Follow-up wurde zur Evaluation der Intervention gewählt. Wir benutzten Mehrebenenanalysen (Wachstumskurvenmodelle), um Veränderungen in den Variablen Wissen, Einstellungen, Selbstwirksamkeit und der Bereitschaft psychische Gesundheit in der Arbeit zu fördern, über einen Zeitraum in 48 Führungskräften eines Großkonzerns in Oxford, Großbritannien, zu messen. Die Mehrheit der Teilnehmer war männlich (44/48, 92%) und war zwischen 32 und 58 Jahren (mean 46.0, SD 7.2) alt.

Wir fanden einen positiven Einfluss des Trainings auf das Wissen von Führungskräften über psychische Erkrankungen (P<.001), deren Einstellung gegenüber Betroffenen (P<.01), sowie auf deren Selbstwirksamkeit, die psychische Gesundheit der Mitarbeiter effektiv zu managen (P<.001). Wir stellten keinerlei Einfluss des Trainings auf die Bereitschaft der Führungskräfte fest, die psychische Gesundheit der Mitarbeiter in der Arbeit zu fördern, allerdings war diese zu Beginn bereits hoch ausgeprägt.

Die Ergebnisse liefern erste Belege für die Wirksamkeit von LMHP, Führungskräfte in Ihren Fähigkeiten, psychische Gesundheit in der Arbeit zu fördern, effektiv zu schulen. Diese Studie stellt außerdem den Nutzen von digitalen Interventionen heraus, User Engagement und User Experience in Trainingsprogrammen zu psychischer Gesundheit in der Arbeit zu steigern, was sich in der hohen Teilnahmequote an LMHP (48/54, 89%) wiederspiegelt.

Allgemeine Diskussion

Das übergreifende Ziel dieser Doktorarbeit war es daher, ein vertieftes Verständnis von derzeitigen Anti-Stigma Intervention in Arbeitskontext und deren Effektivität zu erhalten und desweiteren, den aktuellen Forschungs- und Praxisstand durch valide und zukunftsweisende Empfehlungen voranzubringen.

Die Ergebnisse des systematischen Literaturreviews (Studie 1) und der quasi-experimentellen Studie (Studie 2) unterstreichen die Wichtigkeit und Vorteile von Anti-Stigma Interventionen im Arbeitskontext. Der systematische Literaturreview zeigte, dass Anti-Stigma Interventionen in der Arbeit besonders effektiv Wissen über psychische Erkrankungen sowie unterstützendes (Führungs-) Verhalten positiv beeinflussen können, während der Einfluss auf Einstelllungen gemischt, grundsätzlich aber ebenfalls positiv war. Außerdem wurde auf Mängel bzw. Lücken im aktuellen Forschungsstand hingewiesen, welche u.a. beinhalteten: (1) einen Mangel an Interventionen in privaten Unternehmen, (2) die Hälfte der Studien adressierten nicht alle drei Dimensionen von Stigmatisierung, was jedoch unabdingbar scheint, um Verhalten nachhaltig zu ändern, (3) einen Mangel an Nachweis für die Nachhaltigkeit von Anti-Stigma Interventionen aufgrund von fehlender Follow-up Evaluationen und (4) einen Mangel an digitalen Interventionen im Vergleich zu Präsenzveranstaltungen. Studie 2 liefert Leitlinien für die empirische Entwicklung einer Anti-Stigma Interventionen für den Arbeitskontext unter besonderer Berücksichtigung einiger in Studie 1 identifizierten Forschungslücken. Die Quasi-experimentelle Studie zeigte, dass LMHP einen positiven Einfluss auf das Wissen über psychische Erkrankungen, die Einstellungen und die Selbstwirksamkeit die psychische Gesundheit von Mitarbeitern zu managen, von Führungskräften hat. Damit bestätigt die Studie vorhergehende Arbeiten und erweitert die bestehende Beweisgrundlage noch um digitale Interventionen, welche Vorteile, wie einen größeren Wirkradius, sowie ein verbessertes User Engagement und Experience bergen [48,88].

Insgesamt ist der Forschungsstand zur Wirksamkeit von Anti-Stigma Interventionen im Arbeitskontext limitiert. Es bedarf Studien von höherer methodischer Qualität, mit unterschiedlichen Populationen, die verschiedene Interventionsarten inhaltlich und bezüglich Ihrer Vermittlungsmethode (Digital vs. Präsenz vs. Blended learning) miteinander vergleichen. Ein verstärkter Fokus sollte auf die Wirksamkeit von Anti-Stigma Interventionen bezüglich Verhaltensänderungen wie tatsächliches Hilfesuchverhalten gelegt werden, ebenso wie auf die psychische Gesundheit der Mitarbeiter, das Arbeitsklima bzw. die Unternehmenskultur und den Krankenstand.

Die vorliegende Dissertation liefert valide Evidenz für die Wichtigkeit und Notwendigkeit, die Stigmatisierung psychischer Erkrankungen in Unternehmen zu reduzieren. Sie kann als Grundlage für die Entwicklung zukünftiger, effektiver Maßnahmen dienen, welche die psychische Gesundheit von Mitarbeitern in Unternehmen fördern.

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