

Title: Increasing our understanding of technology-based psychological interventions for suicide prevention.

A thesis submitted to the University of Manchester in part towards a Clinical Psychology
Doctorate (ClinPsyD) in the Faculty of Medical and Human Sciences, 2015.

Laura Maxon

Section for Clinical and Health Psychology

School of Psychological Sciences

Corresponding Author:

Laura Maxon

The University of Manchester, Section for Clinical and Health Psychology, 2nd Floor,
Zochonis Building, Brunswick Street, Manchester, M13 9PL

laura.maxon@nhs.net

Tel: +44 (0)161 306 0401

Fax: +44 (0)161 306 0406

Copyright: Laura Maxon and the University of Manchester

Running head: TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR
SUICIDE PREVENTION

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Table of contents	Page
Title page	1
Contents	2
Paper one contents	3
Paper two contents	5
Paper three contents	8
Diagram contents	9
Word counts	10
Overall abstract	11
Declaration	12
Copyright	13
Acknowledgements	14

Paper one contents	Page
Introduction to paper one	15
1. Abstract	16
2. Introduction	17
Suicide	17
Suicide prevention	17
Technology-based interventions	19
Technology for suicide prevention	20
Telecommunications for suicide prevention	21
Aims	22
3. Method	23
Inclusion and exclusion criteria	23
Databases	23
Search terms	23
Appraisal tool	24
Search Strategy	25
Overview of study quality	34
Overview of technology-based interventions	34
Locations	35
4. Results	36
Research design	37
Samples	38
Quality tool	38

Paper one contents continued	Page
Effectiveness	39
5. Discussion	44
Limitations	46
Implications	47
Conclusions	49
6. Appendix A	50
7. References	54

Paper two contents	Page
Title	61
Introduction to paper two	62
1. Abstract	63
2. Introduction	64
Suicide	64
Self-harm	64
Psychological models of suicide	65
Interventions through technology	67
Interventions for self-harm and suicide prevention	67
Experience sampling methodology studies	68
Feasibility and acceptability	70
Aims of research and hypothesis	71
3. Method	72
Ethical approval	72
Design	72
Sampling & Recruitment	72
Risk management	76
Materials	76
-Feasibility	76
-Acceptability	77
-Pre and post-measures	77
-The Beck Depression Inventory	78
-The Beck scale for suicidal Ideation	78
-The Beck Hopelessness Scale	78

Paper two contents continued	Page
-Diary measures	78
Interventions	82
Procedure	83
Data analysis	85
Aversive events	86
4. Results	87
Aversive events results	87
Descriptive statistics	87
Feasibility	90
Acceptability	93
Online diary data	92
Multi- Level Modelling	97
Pre and post measures	99
Intervention data	101
5. Discussion	103
Implications	107
Limitations	109
Conclusions	112
6. References	114
7. Appendix	
Appendix A, Journal instructions for authors	121
Appendix B, Ethical approval letters	129
Appendix C, Risk protocol	135

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Paper two contents continued	Page
Appendix D, Advertisement	136
Appendix E, Participant information Sheet	137
Appendix F, Exit Interview– Acceptability	140
Appendix G, End of study Questionnaire – Feasibility	141
Appendix H, Demographics Questionnaire	143
Appendix I, Measures, BDI, BHS and BSS	144
Appendix J, Booklet – Intervention	149
Appendix K, Online Diary	152
Appendix L, Care coordinator Screening Questions	156
Appendix M, Telephone screening questions.	157
Appendix N, Consent form	158
Appendix O, Helpline numbers	159
Appendix P, Letter to GP	160
Appendix Q, Letter to GP re: risk	161
Interventions (audio CD format)	Back cover
1. Relaxation (deep breathing)	CD
2. Hope box	CD
3. Mindful check in	CD
4. Safe Place imagery	CD

Paper three contents	Page
Title page	162
Introduction to paper three	163
1. Reflections on paper one	163
Introduction	163
Overview	164
Rationale of topic	164
Process	165
Choice of search terms	165
Quality assessment tool	166
Choice of synthesis	167
Implications	168
Strengths	168
Limitations	169
Conclusions	169
2. Reflections on Paper two	170
Overview	170
Rationale	171
Methodology	171
Recruitment	173
Implications	176
Strengths	180
Limitations	181
Conclusion	181
Overall Conclusion	181
3. References	182

Diagram contents	Page
Paper one	
Figure 1, Papers for inclusion flow chart	26
Figure 2, Characteristics of studies	27
Paper two	
Figure 1, Recruitment flow chart	75
Figure 2, Online diary questions, screen shots	80
Figure 3, Online diary Questions	81
Figure 4, Means scores for each construct by day	94
Figure 5, mean scores of helpfulness by intervention	102
Table 1, Feasibility questionnaire results	90
Table 2, Diary data, Wilcoxon signed rank test	96
Table 3, MLM regression analysis	98
Table 4, Pre and Post Measures, Wilcoxon signed ranks test	100

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Word Counts (excluding references, tables, figures and appendices)

Papers	Word counts
Systematic Review	8,033
Research Paper	11,248
Critical Reflections paper	5,487
Total word count	23,831

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Overall abstract

Suicide is a complex phenomenon that occurs on a continuum with thoughts of suicide, plans and attempts that can eventually result in death. Suicide is one of the top ten reasons for death in most countries. Governments are challenging healthcare systems to reduce suicide through preventative healthcare.

The first paper explores psychological interventions for people with suicidal thoughts and behaviours delivered through technology. It explores the evidence-base for internet-based Cognitive Behavioural Therapy, telephone based interventions, CD-ROMs and other Internet-based therapies. Nineteen papers were identified with four papers of good quality evidence supporting Internet-based cognitive behavioural interventions.

The second paper is a feasibility and acceptability study which explores a diary and intervention delivered through a mobile phone. Twenty participants were recruited through adult secondary care community mental health teams in the North West of England. High completion rates and low dropout rates were found. Participants rated the technology and interventions high in terms of practicality, ease of use and overall satisfaction with the programme and reported that it was moderately helpful. Preliminary data on effectiveness suggests reactivity to the method in the short term but a reduction in symptoms overall. These results and ESM methodology must be treated with caution for people with suicidal thoughts due to the increase in symptoms found following the intervention.

The third paper offers a critical reflection on the first and second papers.

The University of Manchester

Laura Maxon

Clinical Psychology Doctorate

Increasing our understanding of technology-based psychological interventions for suicide prevention.

(2015)

Keywords: Suicide, technology, interventions, internet, mobile phone, suicide prevention

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Declaration: No part of the work referred to in the thesis has been submitted in support of an application for another degree or qualification at this or any other university or institute of learning.

Copyright Statement

- i.** The author of this thesis (including any appendices and/or schedules to this thesis) owns certain copyright or related rights in it (the “Copyright”) and she has given The University of Manchester certain rights to use such Copyright, including for administrative purposes.
- ii.** Copies of this thesis, either in full or in extracts and whether in hard or electronic copy, may be made only in accordance with the Copyright, Designs and Patents Act 1988 (as amended) and regulations issued under it or, where appropriate, in accordance with licensing agreements which the University has from time to time. This page must form part of any such copies made.
- iii.** The ownership of certain Copyright, patents, designs, trade marks and other intellectual property (the “Intellectual Property”) and any reproductions of copyright works in the thesis, for example graphs and tables (“Reproductions”), which may be described in this thesis, may not be owned by the author and may be owned by third parties. Such Intellectual Property and Reproductions cannot and must not be made available for use without the prior written permission of the owner(s) of the relevant Intellectual Property and/or Reproductions.
- iv.** Further information on the conditions under which disclosure, publication and commercialisation of this thesis, the Copyright and any Intellectual Property and/or Reproductions described in it may take place is available in the University IP Policy (see <http://documents.manchester.ac.uk/DocuInfo.aspx?DocID=487>), in any relevant Thesis restriction declarations deposited in the University Library, The University Library’s regulations (see <http://www.manchester.ac.uk/library/aboutus/regulations>) and in The University’s policy on Presentation of Theses.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Acknowledgements

I would like to thank all the participants for taking part in the research to further our understanding of suicide prevention. Thank you to all the care coordinators who asked their clients if they wished to take part in the research.

Thank you to Dr. Daniel Pratt, Research Supervisor for all his guidance, support, patience and supervision throughout the project. Many thanks to Dr. Linda Steen, Clinical Tutor, for all her support, encouragement and empathy throughout my three years on the doctorate.

Thanks to Dr. David Robinson, Field Supervisor, for all his assistance throughout the project, particularly in terms of recruitment, project management and supervision. Thanks to Dr. Dougal Hare, Academic tutor for all your knowledge and guidance. Thanks to Austin Lockwood for all the IT support on the project without which none of this would have been possible. Thanks to Dr. Richard Emsley, for his knowledge and guidance on statistics.

Thank you to my amazing cohort, particularly Dr. Jasper Palmier-Claus for all his advice and knowledge on Experience Sampling Methodology, Rebecca Gillham for her grammatical and academic knowledge and Charlotte Russell for independently checking the quality assessment for the systematic review.

I would like to thank my mum for her helping me to achieve my goals. Thanks to my fantastic fiancé Jonathan Marshall for his belief in me.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Paper one: Technology-based psychological interventions for suicide prevention.

Introduction to paper one

This paper has been prepared for submission to the Journal of Suicide and Life Threatening Behaviour and is prepared as outlined in the journal guidelines for authors (appendix A). Paper one is a systematic review of the literature for psychology based interventions for suicide prevention. To the author's knowledge, no other reviews have focused on this aspect of technology-based psychological interventions for suicide. The literature is relevant to paper two which focuses on a technology-based psychological diary and intervention for people with suicidal thoughts.

1. Abstract

Importance: Suicide is one of the top ten reasons for death in most countries. Technology is accessible, anonymous and available.

Objective: The present study aimed to critically review the current literature for technology-based suicide prevention interventions.

Evidence Review: Three broad search areas were used in the review, suicide, technology and psychological interventions.

Findings: Nineteen studies were included, four good quality studies favoured internet-based cognitive behavioural therapy, telephone based interventions had mixed evidence and CD-ROMs had no support.

Conclusions and Relevance: Internet-based cognitive therapy was the only technology-based intervention that had good quality evidence for reducing suicidal thoughts.

2. Introduction

This section will explore suicide definition, rates, prevalence, technology-based interventions used in the prevention of suicide and the aims of this paper.

Suicide

Suicide is one of the top ten reasons for death in most countries (Gelder, Mayou, & Cowen, 2001). Suicide is defined as intentional self-harm, injury or poisoning or an event of unknown intent (ICD-10; World Health Organisation, 2004). Additionally, there has been a 4% increase in suicide rates in the UK in 2013 according to the Office of National Statistics (2015). Suicide and injury/poisoning of unknown intent were the leading causes of death for 20-34 year old men. Therefore, it is particularly important to determine effective interventions for suicide prevention in this population. Furthermore, Williams (2014) highlighted that the governments are challenging healthcare systems to reduce rates of suicide through preventative healthcare.

Suicide prevention

The national strategy for suicide prevention by the Office of the Surgeon General (2012) explores suicide prevention in terms of risk and protective factors across four areas including an individual, relational, community and societal basis. Furthermore, the Suicide Prevention Resource Centre (2015) provides a framework for suicide prevention in the 21st Century. This spans three levels, public health, strategic planning and a comprehensive approach. The public health approach is population –based, prevention focused, evidence-based and interdisciplinary. Strategic planning involves five steps to understand the prevention from a community perspective. These steps involve describing the problem, identifying risk factors, setting goals, selecting interventions, planning

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

evaluation and then implement. The comprehensive approach has seven strategies that include identifying at risk people, improve help-seeking behaviour, increase access to mental health services, establish crisis management and prevention systems, restriction of lethal means access, enhancing life skills and promoting connectedness and social networks.

Nice guidelines (2001) for the long term management of self-harm recommend that psychosocial interventions include a comprehensive assessment of needs and risks of engaging people who self harm (Kendall, Taylor, Bhatti, Chan & Kapur, 2011). This includes assessing for strengths and current coping strategies. It recommends offering three to twelve sessions of psychological interventions that are tailored to the individuals need with the aim of reducing self harm. This therapy could include CBT, Psychodynamic or problem solving therapy elements

CBT is defined as a short term talking therapy which focuses on developing links between beliefs, thoughts, feelings and behaviours (Greenberger & Padesky, 1995). Cognitive Behavioural Therapy focuses on appraisals, conditional assumptions, personal rules, cognitive processes and schemas/core beliefs. Interventions focus on psychoeducation, challenging habitual patterns of thinking and examining the evidence for and against beliefs around these processes and challenging any negative beliefs. In addition, behavioural activation can be used (increasing one's daily activities) in order to increase mood.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Internet-based CBT has been gaining popularity and has been implemented for people with depression (Hedman et al., 2013; Mewton & Andrews; 2015; Hetrick, Simmons, Sanci & Gunn 2014). Hedman et al. (2013) describe their Internet-based CBT (ICBT) intervention as including psychoeducation, behavioural activation and cognitive restructuring and found a significant reduction in suicidal thoughts.

Technology-based interventions

Technology is defined by the Oxford English Dictionary (2002) as “the application of scientific knowledge for practical purposes particularly in industry”. Technology is constantly changing and updating. In research technology includes computers, telephones, the internet, mobile phones, pocket computers (Ipad’s, personal tablets), personal digital assistants and CD-ROMs (compact disks). Interventions that are delivered via technology have become increasingly popular in the health care system. Donker et al. (2013) undertook a systematic review and found 3,000 smart phone applications were available for the treatment of mental health. 300 of these were for suicide prevention, however only five of these applications had published studies that demonstrated effectiveness for substance misuse, depression and anxiety. They concluded that the majority of mobile phone applications that are currently available lacked scientific evaluation of their effectiveness.

In contrast, Software applications (computer programs) delivered via mobile phones have been found to be a feasible and valid way of accessing psychotic phenomena for the purposes of research and in the management of participants’ symptoms (Palmier-Claus et al., 2012).

Technology for suicide prevention

People with mental health difficulties are turning to the internet for support, over half of people seeking help on the internet for mental health problems reported suicidal ideation (Hemelrijk van Ballegooijen, Donker, van Straten, & Kerkhof, 2012). The internet can be accessed at any time of the day or night, provides anonymity and there are no waiting times to access it. Previous systematic reviews on the use of technology in suicide have focused on internet-based suicide prevention programs, mobile phones and E-Health technologies (Christensen, Batterham and O'Dea, 2014 & Donker et al., 2013).

Participants with suicidal thoughts have been excluded from research studies in internet-based therapies due to potential risk issues of harm to self (Knaevelsrud et al., 2014; Spence et al., 2014 and Ly et al., 2014). This can make it difficult to develop evidence-based suicide prevention programs delivered through technology.

A systematic review of web-based suicide prevention programs found limited good quality research in this area with only ten studies rated as medium or high quality (Lai, Maniam, Chan, & Ravindran, 2014). Two randomised controlled trials (RCTs) delivered internetbased Cognitive Behavioural Therapy (ICBT) and found a reduction in suicidal ideation (van Spijker, 2012 & Christensen et al, 2013) however the effect sizes were small. Other prevention strategies utilised the internet email, online support (individual and group) or website postings (Lai et al., 2014). Descriptive reports found that the internet may improve access to face-to face mental health services as the initial contacts are anonymous (Haas et al., 2008; Moutier et al., 2012; Manning & Vandeusen, 2012). A limitation of this review is that it focused solely on studies targeting suicidal thoughts and did not include studies for depression that looked at suicidality as a secondary outcome.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Christensen et al. (2014) reviewed E-Health interventions for suicide prevention, in particular the use of online screening for suicide and interventions to prevent suicide based on social media postings. It was found that asking about suicidal thoughts did not increase the risk of suicidal behaviour and screening patients online offered an opportunity to identify patients with suicidal thoughts. However, they did not find any studies which evaluated the effect of screening on increasing help seeking behaviours and/or reducing suicidal thoughts and behaviours. The authors found evidence from two studies which suggested that suicide prevention interventions via the web may be effective when they target suicidal thoughts rather than depression (van Spiker, van Straten & Kerkhof, 2014; van Spiker, Majo, Smit, van Straten & Kerkhof, 2012).

Telecommunications for suicide prevention

Telecommunications is the exchange of information by electronic means over significant distances (Rouse, 2007). Krynska & De Leo (2007) reviewed the use of telecommunications in suicide prevention which include the internet, telephone and video conferencing. They found evidence that suggested hotlines and suicide prevention centres may be more useful for people of a particular age, gender and clinical subgroup.

Specifically, it was found that females preferred to use crisis intervention hotlines (Miller et al., 1984; Mishara et al., 2005) and males preferred the use of email communication (Howlett & Langdon, 2004; Wilson & Lester, 1998). Krynska and De Leo (2007) found that older people and adolescents did not use telecommunications as frequently (Burns & Patton, 2000; Gould & Kramer, 2001). College students, particularly teenagers (aged 13-19) with suicidal thoughts used the internet to access support (Gould et al., 2002).

Krynska and De Leo (2007) concluded that a wide variety of telecommunication interventions were utilised including telephone, (crisis intervention,

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

brief therapy and video conferencing) and the internet (email, self-help, chat rooms and web based suicide assessment), however the effectiveness of these interventions remained unclear. The authors did not use a quality measure for their studies and the present review aims to improve upon this. Technology can play a role in suicide prevention in terms of its accessibility and availability to people with suicidal thoughts at any time of the day or night. This is particularly important as a preventive measure to increase psychological wellbeing and access to support outside of the therapy room.

Aims

The present study aimed to critically review the current literature in terms of technology-based suicide prevention intervention strategies. Furthermore, it aimed to update Krysinska & De Leo's (2007) review of telecommunication interventions in suicide prevention. The present review included newly developed technologies such as Internet-based CBT (ICBT), internet-based therapy, telephone-based interventions, interventions delivered through computers and software applications. Additionally, it aimed to provide a high quality review with the use of a quality tool and to focus on the evidence-base for psychological interventions to prevent suicide delivered via technology.

3. Method

Inclusion and exclusion criteria

Studies were classed as an intervention if they included a psychological or psychosocial therapy delivered through technology which included a measure of suicidal thoughts or behaviour. Studies were included that targeted psychological difficulties including anxiety and depression, on the condition that a measure of suicidality was used and participants with suicidal thoughts were included in the research. The measure was defined as a published psychological scale, a question within a scale indicating suicidal thoughts or a measure of suicide rates (attempted or completed). The studies were published in peer reviewed journals, in English. Studies were not included that excluded participants with suicidal thoughts. Studies were excluded that did not contain an intervention aspect.

Databases

OVID was used to search three databases: “Embase (1974 to 2015)”, “Ovid MEDLINE (R) (1946 to 2015)”, and “PsychINFO (1806 to 2015)”. Three broad search term groupings were identified for the review, suicide, technology and interventions.

Search terms

The following search terms were used to identify papers relating to suicide: suicid* or parasuicid* or self harm* or selfharm* or self-harm* or self injur* or self mutil* or self destruct*. Technology terms used included: Internet* or computer* or techno* or web* or online* or facebook* or twitter* or tablet* or ipad*. Additionally, mobile* or cell* or tele* and phone* were searched for. Intervention search terms included: Interven* or therap* or self-help* or selfhelp* or psychotherap* or program* or application* or self help* or psych*.

Appraisal tool

Qualitative and quantitative research was found when the literature was searched. The papers were analysed using The Mixed Methods Appraisal Tool (MMAT) to assess the quality of the papers (Pace et al., 2012). The MMAT allows for the assessment of qualitative and quantitative research. The conceptualisation of mixed methods research is new and no other standardised valid critical appraisal tool for mixed methods research exists (Pace et al., 2012; Simera, Moher, Hoey, Schulz, & Altman, 2010; O’Cathain, 2010). Pace et al., (2012) reported that the MMAT was efficient, taking 15 minutes to review each study once read, and reliable with an inter-rater correlation of 0.8. Pace et al. (2012) tested the reliability and efficiency of a pilot version of the MMAT and found moderate to perfect agreement between reviewers in relation to the MMAT criteria. They found substantial agreement when the overall quality score was compared. Pluye et al., (2011) report that the MMAT should be treated with caution as the critical appraisal tool was still in development and feedback on this tool was encouraged. The MMAT has been cited in over 30 review papers as a quality measure and used successfully in a number of studies including Peek et al., (2004); Heyvaert, Hannes, Maes, & Onghena, (2013); Dahan-Oliel, Shikako-Thomas, & Majnemer, (2012). The MMAT quality tool requires that all papers must meet the two screening questions to be included in the review, “are there clear research questions?” and “does the collected data address the research question?” Following a positive response to these questions, the MMAT asks a further four questions regarding the quality of the paper which allows for a rating to be given based on these. The questions asked depend on the type of study, for example the four questions for RCTs are: is there a clear description of the randomisation process, is there a clear description of the blinding process, is there complete outcome data (above 80%) and

are there low dropout rates. The quality ratings for each paper range from 0-100%, 25% indicated one criterion was met, 50% indicated that two were met and so forth. The studies were assessed for quality by two independent researchers to ensure consistency in ratings. Any discrepancies in quality rating were resolved through discussion and reaching a consensus.

Search Strategy

The initial searches took place in Jan 2015 and yielded 5,535 titles, duplicates were then removed which left 4,203 titles. Titles were reviewed by the researcher and those not relevant were excluded. For example, a large number of studies referred to “suicide cell therapy” which is used as a treatment for cancer, however this was not relevant to the present review. Of these titles, 495 abstracts were selected to be read further. Of these abstracts, 134 were selected for further reading and the full texts were read. One study was selected from other sources; in this case it was through word of mouth within the University. Following this 18 full texts were included. The searches were undertaken again to cover the period of Jan 2015 to June 2015 and 139 titles were searched and one further text was identified which led to 19 studies being included. The 19 studies included in the systematic review are outlined in Figure 1 and the characteristics of the study outlined in Table 2.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

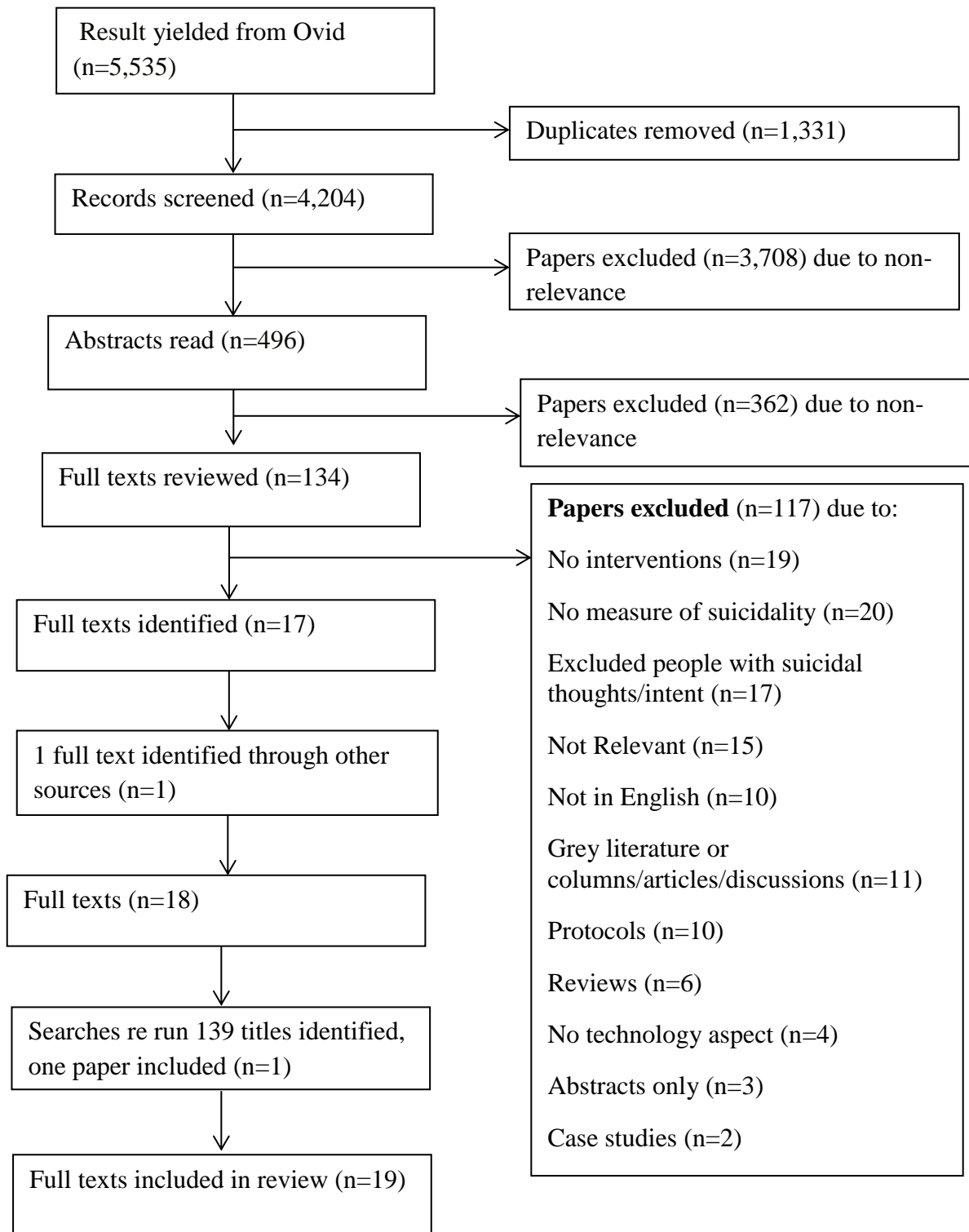


Figure 1: Papers for inclusion flow chart

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Table 2, Characteristics of studies

	Authors	Design	Participants	Interventions	Suicidality Measure	Quality	Results
1	Christensen et al. (2013)	Randomised Control Trial	N=155: Telephone counselling service (life line) in Australia	Web-based depression intervention with and without telephone intervention	Four items from the General Health Questionnaire (GHQ) -28	50%	A statistically significant decline in suicidal thoughts was found in all web-based CBT intervention groups with telephone contact (effect size .45) and without (effect size. 28) at 12 months. Analyses based on Intention to treat.
2	Coveney, Pollock, Armstrong and Moore (2012)	Online Survey	N=1,287: Sample of callers to the Samaritans in the UK	Telephone callers' experiences of contacting a national suicide prevention hotline	Participants were asked if they had felt suicidal at the last contact with the Samaritans.	0%	46.3% of participants indicated that they had felt suicidal at their last contact with the Samaritans, 8.6% indicated that they were in the process of a suicide attempt at their last contact. Analyses based on completers of the survey.
3	Cukrowicz, Smith and Hohmeister (2009)	Time series	N=165: Non-clinical sample of college students in Texas, USA	CD- Rom, early intervention program for anxiety and depression	Depression Severity Index-Suicide Subscale (DSI-SS), 4 items	50%	The program was found to be more effective for reducing symptoms of anxiety and depression for people without suicidal thoughts than those with. Analyses based on Intention to treat.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Table 2, Continued

	Authors	Design	Participants	Interventions	Suicidality Measure	Quality	Results
4	Glatt (1987)	Qualitative	N=30: People planning to act on suicidal thoughts at a suicide site (a bridge) in New York	Telephone helpline installed at a suicide site	Suicide rates	50%	Average of 5 deaths per year prior to intervention. Post intervention this reduced to an average of 3 deaths per year (reviewer calculated these figures). Analyses based on people who used the telephone line.
5	Handley et al. (2013)	2 Randomised Control Trials	N=236: Participants with depressive symptoms and hazardous alcohol use in Australia	CD-ROM, computer delivered CBT and Motivational Interviewing	Item 9 of the Beck Depression Inventory-II (BDI)	0%	No significant differences were found in the severity of suicidal ideation across the sample or between conditions. Analyses based on completers of the intervention.
6	Hassanzadeh, Khajeddin, Nojomi, Fleischmann, and Eshrati, (2010)	Randomised Control Trial	N=632: Adults who had attempted suicide in Iran recruited from five emergency care departments.	Telephone, brief one-hour psycho-educational session delivered through professionals with follow-up contacts by phone calls	The Multisite Intervention Study on Suicidal Behaviours (SUPRE-MISS) questionnaire and suicide attempts data	50%	There was a significant difference in the number of suicide attempts between the intervention and treatment as usual groups ($p<0.05$); there were less attempts in the treatment as usual group. Analyses based on completers of the intervention.

Table 2, continued

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

	Authors	Design	Participants	Interventions	Suicidality Measure	Quality	Results
7	Hedman et al. (2013)	Cohort Study	N=1,203: Patients who received ICBT for depression in Sweden in a routine care outpatient setting	ICBT	Montgomery-Asberg Depression Rating Scale Self-rated (MADRS-S), Item 9 assesses suicidal ideation	50%	There was a significant reduction in suicidal thoughts over the treatment phase. Analyses based on intention to treat.
8	Kapur et al. (2013)	Pilot Randomised Control Trial	N=66: Adults presenting with Self Harm to two hospitals in Manchester UK	Information leaflet, listing sources of help, two telephone calls and a series of letters over 12 months	Repeated episodes of self harm	100%	Those who received the intervention were more likely to repeat self-harm than those who received treatment as usual. Analyses based on Intention to treat.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Table 2, continued

	Authors	Design	Participants	Interventions	Suicidality Measure	Quality	Results
9	Marasinghe, Edirippulige, Kavanagh, Smith and Jiffry (2012)	Randomised Control Trial	N=68: Suicide Attempters in Sri Lanka	Mobile phone delivered psychotherapy for suicide prevention	Beck Suicidal Ideation Scale (BSS)	50%	Compared to the control group, participants who received the brief mobile phone treatments demonstrated significant improvements in suicidal ideation. Analyses based on Intention to treat.
10	Mewton and Andrews (2015)	Naturalistic Study	N=484: People prescribed ICBT by their primary care physician in Australia	ICBT for Depression	Patient Health Questionnaire (PHQ-9), Q9 on suicidal ideation.	50%	Scores on the PHQ-9 were reported and a statistically significant reduction in the prevalence of suicidal ideation was found from 50% to 27%. Analyses based on completers of the intervention.
11	Moritz et al. (2012)	Randomised Control Trial	N=210: Participants with elevated depression scores were recruited online in Germany	Internet delivered therapy	Suicide Behaviours Questionnaire - Revised (SBQ-R)	50%	No significant changes were found in terms of suicidal ideation. Analyses based on Intention to treat.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Table 2, continued

	Authors	Design	Participants	Interventions	Suicidality measure	Quality	Results
12	Nakao, Nishikitani, Shima and Yano (2007)	Cohort Study	N=283: Male employees at a Japanese information-technology company, n=22 indicated suicidal thoughts	Telephone, email and visiting a clinic, contacts delivered as part of an Employee Assistance Program (EAP) targeting depression, anxiety and suicidal thoughts.	Q3 on the Hamilton Depression Scale.	75%	Suicidal thoughts were found to significantly reduce over a two year period. Analyses based on completion of the intervention.
13	Saulsberry et al. (2013)	Randomised Control Trial	N=58: Adolescents who screened positive for depression were recruited from primary care in USA	Internet-based Intervention for depression	Thoughts of suicide and self-harm were assessed from adolescents' responses to two items from the PHQ-Adolescences.	0%	The number of adolescences endorsing self-harm significantly reduced overall in both groups. No significant reduction was found in serious thoughts of suicide or self-harm measures within or between groups. Analyses based on Intention to treat.

Table 2, continued

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION						
Authors	Design	Participants	Intervention	Suicidality Measure	Quality	Results
14 Silverstone et al. (2015)	Pilot Cohort study	N=2,790: Students at school aged 10-19 years in Japan	ICBT, 8 sessions	PHQ-9	75%	A reduction was found in students who were actively suicidal. At baseline, 125 students were identified at high to moderate risk of suicide at compared to 30 post intervention. Analyses based on Intention to treat.
15 Wagner, Horn & Maercker (2013)	Randomised Control Trial	n=62: People with depression in Switzerland	ICBT for depression	BDI (Q9) and BSS	75%	No changes were found for suicidal thoughts in the online group. A significant change was found in suicidal ideation in the face to face group. Analyses based on Intention to treat.
16 Watts, Newby, Newton and Andrews (2012)	Clinical Audit	n=299: Patients prescribed ICBT in primary Care in Australia	ICBT	PHQ-9, Q9 on suicidal ideation.	0%	A statistically significant reduction in suicidal ideation was found, 54% reported suicidal thoughts at baseline and 30% reported suicidal ideation post intervention. Paper does not specify if the analyses is based on completers or Intention to treat.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Table 2, continued

	Authors	Design	Participants	Interventions	Suicidality Measure	Quality	Results
17	Whiteside et al. (2014)	Pilot study	n=39: recruited from health care delivery system in Washington, USA	ICBT	The Symptom Checklist-20, Q13 measures suicidality	25%	Suicidal thoughts decreased overall. 59% of participants reported suicidal thoughts prior to the intervention compared to 38% post intervention. The statistical significance of this and the effect size was not reported. Analyses based on completion of the intervention.
18	Williams and Andrews (2013)	Naturalistic study	n=359: Depression, n=186 suicidal thoughts Patients prescribed the sadness program in Australia	ICBT for depression	PHQ-9, Q9 on suicidal ideation.	0%	Results demonstrated a statistically significant reduction in suicidal ideation following the intervention with an effect size of 1.12. Analyses based on Intention to treat.
19	van Spijker, van Straten and Kerkhof (2014)	Randomised Control Trial	n=236: People with mild to moderate depression who speak Dutch were recruited through the internet	Unguided web-based self-help programme	BSS and BDI (Q9)	75%	A statistically significant improvement in suicidal thoughts was found for the intervention group compared to the control group. A small effect size of .28 was found. Analyses based on Intention to treat.

Overview of study quality

The quality of the studies in relation to suicide varied from 0% to 100% as outlined by the MMAT. Quality ratings achieved are outlined below:

- Five studies were rated as 0% (Coveney et al., 2012; Handley et al., 2013; Saulsberry et al., 2013; Williams & Andrews, 2013; Watts et al., 2012).
- One study received 25% (Whiteside et al., 2014).
- Eight studies demonstrated 50% (Christensen et al., 2013; Cukrowicz et al., 2012; Glatt, 1987; Hassanzadeh et al., 2010; Hedman et al., 2013; Marasinghe et al., 2012; Mewton & Andrews, 2015; Moritz et al., 2012).
- Four studies obtained 75% (Nako et al., 2007; Silverstone et al., 2015; van Spiker et al., 2014; Wager et al., 2013).
- One study achieved 100% quality rating (Kapur et al., 2013).

Overview of technology-based interventions

Interventions delivered through technology included:

- Seven studies that delivered ICBT as a suicide prevention intervention (Hedman et al., 2013; Mewton & Andrews, 2015; Wager et al., 2013; Watts et al., 2012; Whiteside et al., 2014; Williams & Andrews, 2013; Silverstone et al., 2015)
- Seven studies utilised a telephone, three of these were a hotline (Coveney et al., 2012; Glatt et al., 1987; Christensen et al., 2013) and two followed up via telephone after a face to face contact (Hassanzadeh et al., 2010; Kapur et al., 2013). One study utilised mobile phones (Marasinghe et al., 2012) and one study had a mixture of telephone and email (Nako et al., 2007).

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

- Two studies employed interventions delivered through the use of CD-ROM (Cukrowicz et al., 2009; Handley et al., 2013).
- A further three studies focused on internet-based therapy (Moritz et al., 2012; Saulsberry et al., 2013; van Spiker et al., 2014).

Locations

The studies took place across a wide variety of countries:

- Five were undertaken in Australia (Christensen et al., 2013; Handley et al., 2013; Mewton & Andrews, 2015; Watts et al., 2012; Williams & Andrews, 2013).
- Four in the USA (Cukrowicz et al., 2009; Glatt, 1987; Whiteside et al., 2014; Saulsberry et al., 2013).
- Two in the UK (Covney et al., 2012; Kapur et al., 2013).
- Two in Japan (Silverstone et al., 2015; Nako et al., 2007).

The remaining studies took place in:

- Germany (Moritz et al., 2012).
- Iran (Hassanzadeh et al., 2010).
- Holland (van Spijker et al., 2014).
- Sri Lanka (Marasinghe et al., 2012).
- Switzerland (Wager et al., 2013).
- Sweden (Hedman et al., 2013).

4. Results

Nineteen studies were included in the review, the following will explore the good quality studies (50% or above) in terms of strengths and weaknesses. Seven studies used one question to measure suicidal thoughts which is a limitation (Handley et al., 2013; Hedman et al., 2013; Mewton & Andrews, 2015; Nako et al., 2007; Watts et al., 2012; Whiteside et al., 2014; Williams & Andrews, 2013). A number of measures of suicidality were used, the most frequent was Item 9 on the Patient Health Questionnaire (PHQ; Kroenke, Spitzer & Williams, 2001) which was used in four studies (Mewton & Andrews, 2015; Silverstone et al., 2015; Watts et al., 2012; Williams & Andrews, 2013). Question 9 on the PHQ asks participants if they have had: “thoughts that you would be better off dead or of hurting yourself in some way?” They are then asked to rate this question on a scale ranging from “not at all” to “everyday”. Question 9 on The Beck Depression Inventory (BDI) and the Beck Suicide Scale (BSS) were both used in two studies (Wagner et al., 2013; van Spijker et al., 2014). Additionally, the BDI was used alone in one study (Handley et al., 2013) and the BSS used alone in another (Marasinghe et al., 2012). Question 9 on the BDI asks participants if they have had any “suicidal thoughts or wishes” and asks them to rate this on a scale ranging from “I don’t have any thoughts of killing myself” to “I would kill myself if I had the chance”. Suicide rates in the population (Glatt, 1987) were used in two studies and episodes of repeated self-harm in another (Kapur et al., 2013). A variety of different measures were used therefore it is difficult to directly compare the findings.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Research design

Research designs included eight randomised control trials (Christensen et al., 2013; Handley et al., 2013; Hassanzah et al., 2010; Marasinghe et al., 2012; Moritz et al., 2012; Saulsberry et al., 2013; Wagner et al., 2013; van Spijker et al., 2014), two naturalistic studies (Mewton & Andrews, 2015; Williams & Andrews, 2013), two cohort studies (Hedman et al., 2013; Nako et al., 2007), one qualitative study (Glatt, 1987), one clinical audit (Watts et al., 2012), one survey (Coveney et al., 2012), one time series (Cukrowicz, 2009) and three pilot studies (Whiteside et al., 2014; Silverstone et al., 2015; Kapur et al., 2013). The author acknowledges that the studies in the review vary in terms of methodology and types of intervention. This limits the findings of the review. The author wondered if it was appropriate to compare findings when the interventions varied widely from ICBT to telephone based interventions. The author reflects that this is what was found in the literature and therefore this reflects how varied psychological interventions delivered through technology are.

Intention to treat

Hollis and Campbell (1999) undertook a review of intention to treat studies and noted that the principles of these are inadequately described and applied in the research studies they reviewed. They found half of RCT's reported an intention to treat analysis. Montori and Guyatt (2001) report that excluding participants who did not adhere to treatments in RCT's is seriously flawed. Reasons for non-adherence may relate to outcome. They report that empirical evidence suggests that participants who adhere to protocols tend to do better than those who do not. Of the thirteen studies in the present review that demonstrated

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

good quality ratings, nine were analysed using intention to treat analysis and four were based on completers of the intervention.

Samples

Participant sample sizes ranged from 30 (Glatt, 1987) to 2,790 (Silverstone et al., 2015). In terms of population samples, eleven studies included participants with depression (Christensen et al., 2013; Handley et al., 2013; Hedman et al., 2013; Mewton & Andrews, 2015; Wagner et al., 2013; Watts et al., 2012; Williams & Andrews, 2013; Whiteside et al., 2014; Moritz et al., 2012; Silverstone et al., 2015; van Spijker et al., 2014). A further two studies included telephone callers to a help line (Christensen et al., 2013; Coveney et al., 2012), two studies included participants that presented to emergency services for suicide attempts (Hassanzadeh et al., 2010; Marasinghe et al., 2012). One study included participants that presented to emergency services for self-harm (Kapur et al., 2013) and one included adolescents who reported self-harm (Saulsberry et al., 2013). The remaining studies included college students (Cukrowicz et al., 2009) and employees (Nako et al., 2007).

Quality tool

The MMAT measure is influenced by high dropout rates which may reflect the nature of the participants being studied rather than the quality of the studies. For example, depression can affect motivation levels and reduce the willingness to take part in activities that one may have previously enjoyed (DSM-V; APA, 2003). Guthrie et al., (2001) reported that in their RCT of brief intervention following self-poisoning, only 51% of the eligible participants took part in the research, which reflects the difficulty of engaging

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

participants with suicidal ideation. Additionally, Hassanzadeh et al., (2010) found that one third of the possible sample declined to participate in the research study.

Effectiveness

When considering studies of medium to high quality (50% and above) four studies provide evidence to support ICBT's effectiveness (Christensen et al., 2013; Hedman et al., 2013; Mewton & Andrews, 2015; Silverstone et al., 2015) and one study did not (Wagner et al., 2013). Christensen et al., (2013) delivered ICBT with four groups: with and without telephone call back, telephone contact alone and treatment as usual which was to use a helpline called lifeline as required. The interventions included psychoeducation (a website named blue pages) and modules of CBT (named MoodGym). A significant decline in suicidal ideation was found across all treatment groups with no differences between groups. Strengths of this study are that it used a control group (treatment as usual) and had a number of conditions. Limitations include the difficulty in identifying the mechanism of change in relation to reducing suicidal thoughts. It is not clear which aspect was most helpful; telephone contact, psychoeducation or web-based CBT as a decline in suicidal thoughts was seen in all groups. A further study by Hedman et al. (2013) used an ICBT intervention including psychoeducation, behavioural activation and cognitive restructuring. A strength of this study is its large sample size of 1,203 participants. Support was found with large effect sizes for ICBT's effectiveness in reducing suicidal ideation when used in routine care. A weakness of this study was that the attrition rate was large with 63% drop out at 6 month follow up. This limits the findings as it is not known why these clients dropped out and how this may have affected the results (i.e. those with severe depression may have dropped out which would biased the results). Mewton & Andrews (2015) evaluated an ICBT intervention and found a reduction in suicidal ideation from 50% pre-treatment to 27% post treatment. A strength is their sample size of 448

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

participants, however participants were prescribed ICBT by their physician which means that no random allocation of groups occurred and could lead to a biased sample (i.e. those prescribed it may be the most likely to benefit from it). This limits the generalizability of their findings. Silverstone et al., 2015 found a reduction in suicide risk in school aged students in a guided eight module ICBT intervention. This study had a large sample size of 2,790 but did not include any randomisation or control groups.

Lack of randomisation of participants to groups can result in the effect size being overestimated. This can lead to a bias in the results and they may appear more significant than they actually are. Kunz and Oxman (1998) found that failure to use randomisation distorted results and could lead to a relative increases in effect sizes up to 150%.

Wagner et al. (2013) found no support for an ICBT intervention. No reductions in suicidal thoughts were found in the ICBT group. A reduction in suicidal thoughts was found in the face to face therapy group. A strength of the study is that they provided a detailed description of the ICBT intervention including introduction, behavioural analysis and planning, however the small sample size (62 participants) limits the generalisability of their findings.

One study provided support for internet-based interventions that included other therapeutic approaches (van Spijker et al., 2014) and one study of good quality contradicted this (Moritz et al., 2012). Van Spijker et al., (2014) found evidence to support an internet-based unguided self-help program based on psychoeducation and compared it to waitlist control. Van Spiker, et al., (2014) utilised an online unguided self-help intervention for suicide prevention.

This consisted of six modules including elements from CBT, Dialectical Behaviour Therapy (DBT) and Mindfulness techniques with motivational emails. A significant

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

reduction in suicidal thoughts was found for the intervention group. A strength of this study is that the primary outcome was suicidal thoughts and two measures were used, the BSS and BDI. A low attrition rate of 10% was achieved and a control group was included. A further strength is that a power calculation was performed which outlined that 100 people were required in each group. 236 participants were recruited; the attrition rate was accounted for by over subscribing participants.

Two studies of good quality (50% and above) supported telephone interventions (Glatt, 1987; Nako et al., 2007) and two studies did not (Hassanzadeh et al., 2010; Kapur et al., 2013). Glatt's (1987) study focused on a suicide prevention telephone installed at a suicide site (a bridge). Although this is not a recent study and had a small sample size of 30 people, they measured suicide rates and found a decrease following the intervention. Despite the small sample size, the results are encouraging as the study is high on ecological validity in that it is measuring what it intends to which is important for research. A limitation of this study is a lack of control group that would have improved the study to determine if rates were reducing due to another reason rather than intervention. A study by Nakao et al. (2007) implemented an employee assistance program which focused on telephone contact, email and face-to-face therapy. They found suicidal thoughts significantly reduced. Although this study had a medium sample size (n=283), only a small proportionate (n=22) reported thoughts of suicide. Additionally, a separate control group for the entire sample was also small (n=22). The program was mandatory and provided by the participants' workplace. This raises concerns regarding confidentiality and possibly participants' willingness to be open about their difficulties which may introduce bias. Participants may have been motivated to demonstrate improvement to please their employers. Hassanzadeh et al. (2010) delivered a brief one-hour psychoeducation intervention delivered through professionals at an emergency service in

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Iran. This included follow-up by telephone. Rates of suicide were measured and no support was found for its effectiveness. It was found suicide attempts increased in the intervention group and the patients' need to access support also increased. This has high ecological validity and a high number of participants were recruited (N=632). However, the study was undertaken in Iran which may limit the generalisability of its findings due to different cultural beliefs in relation to help seeking behaviours and suicide. A further study by Kapur et al. (2013) focused on adults with self-harm in two hospitals in Manchester and found similar results. It was found that a telephone based follow-up intervention was less effective than treatment as usual and help seeking behaviour increased. It may be that increasing contact reinforced secondary gains of self-harm behaviour (Shmagin, & Pearlmutter, 1977). Increased contact following self-harm may have increased the likelihood of this behaviour reoccurring as participants may have unknowingly had some emotional needs met through this contact.

Moritz et al. (2012) delivered an online self-help program via the internet (Deprexis) and found no significant changes in suicidality in the internet group compared to a waiting list control. A strength of this study is the detail of the aspects of the intervention which were psychoeducation, behavioural activation, cognitive modification, mindfulness and problem solving and allows for replication.

One good quality paper demonstrated no support for CD-ROM based interventions in suicide prevention (Cukrowicz et al., 2009). The intervention consisted of a 2 hour education based intervention and was more effective for reducing symptoms of depression in people without suicidal ideation (Cukrowicz et al., 2009). Due to advances in technology, CD-ROMs may now represent an outdated form of technology. The participants were college students (mean age 19.19) which limits the generalisability of its

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

findings to college students. This study utilised four items from a scale (DSI-SS), which is superior to other studies that only used one question.

One study by Marasinghe et al. (2012) provided support for a mobile phone based intervention and no studies were found that contradicted this. Marasinghe et al. (2012) implemented a brief mobile phone intervention in Sri Lanka with people who had attempted suicide. The intervention included problem solving, meditation, an intervention to increase social support and education on drugs and alcohol. Strengths of this study are that the BSS measure was used, a 21 item validated measure of suicidality with high internal consistency (Beck, 1991) and randomisation of groups including a waitlist control. Limitations include that the randomisation process was not described in the paper and the active component of this intervention was unclear.

5. Discussion

It is clear that this area of suicide prevention through technology lacks good quality research as six of the nineteen studies were rated between 0% and 25% in terms of quality rating (Coveney et al., 2012; Handley et al., 2013; Saulsberry et al., 2013; Watts et al., 2012; Whiteside et al., 2014; Williams & Andrews, 2013). Good quality evidence supports ICBT with four studies supporting its effectiveness (Christensen et al., 2013; Hedman et al., 2013; Mewton & Andrews, 2015; Silverstone et al., 2015). Seven studies only used one question to measure suicidality (Handley et al., 2013; Hedman et al., 2013; Mewton & Andrews, 2015; Nako et al., 2007; Watts et al., 2012; Whiteside et al., 2014; Williams & Andrews, 2013). A scale to measure suicidal thoughts is superior to one question. The reliability and validity of scales are used to ensure that it is actually measuring what it intends to and is accurately measuring this. However, in contrast research by Simon et al., (2013) found the PHQ-9 was a strong predictor for suicide (.4 to 4% cumulative increase). Additionally, the risk increased cumulative over time and they concluded that suicidal ideation indicated an underlying vulnerability rather than crisis in the short-term.

CD-ROMs were found to have no support from one good quality study (Cukrowicz et al., 2009). Telephone interventions had mixed evidence with two good quality studies which supported its effectiveness (Glatt, 1987; Nako et al., 2007) and two which did not (Hassanzadeh et al. 2010; Kapur et al., 2013).

An increase in suicide attempts and self-harm was found in two telephone based studies (Hassanzadeh et al., 2010; Kapur et al., 2013). The author wondered if secondary gains in terms of increased social contact when distress is expressed may contribute to these findings. For example, Gunderson & Ridolfi (2001) describe a treatment plan for people with borderline personality disorder that outline an approach whereby “minimal initiative to rescue by therapists” is encouraged to reduce suicidal behaviour. Telephone contact

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

may be reinforcing to some participants; particularly those with traits of borderline personality disorder due to interpersonal difficulties (Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004).

The measures used by each study varied widely but had some commonalities among studies the BDI, BSS and suicide rates. Therefore, it is difficult to compare studies on this basis as they may be measuring different aspects of suicidality. One reason for this may be that eight papers of good quality undertook interventions that focused on depression and suicidal thoughts were a secondary outcome (Christensen et al., 2013; Cukrowicz et al., 2009; Hedman et al., 2013; Mewton & Andrews, 2015; Moritz et al., 2012; Nako et al., 2007; Wagner et al., 2013; van Spijker et al., 2014). When participants are asked one question, it is easier for participants to deny this based on perceptions of what may happen if they disclose this, for example, escalating their perceived risk or exclusion from studies. One study measured rates of suicide (Glatt, 1987) and one measured attempted suicides (Marasinghe et al., 2012) although there may be difficulties in measuring the phenomenon, this is the most accurate measure used when compared to a control group as it is measuring it directly. However, a limitation of this is that it may not be possible to determine whether a death was by accident or suicide. One study measured rates of self-harm in people presenting to the emergency room (Kapur et al., 2013). In terms of intervention, the commonality between studies was that the ICBT was psychoeducation, behavioural activation and cognitive restructuring (Christensen et al., 2013; Hedman et al., 2013; Mewton & Andrews, 2015).

Christensen et al. (2014) reviewed suicide prevention strategies for E-Health and found that internet-based web programs appeared to show evidence of effectiveness. The current review included more studies and focused specifically on psychological interventions for suicide prevention. Lai et al., (2014) reviewed internet-based CBT for suicidality and also

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

found a limited number of studies that were considered high quality. The present review included interventions targeted at depression with a measure of suicidality which Lai et al., (2014) did not and is a strength of this review. This review provided an updated review of that by Krysinska & De Leo (2007) and used a quality measure with a table of studies that the previous review did not.

A significant number of studies (n=10) were excluded due to being protocols (an outline of a study to be undertaken), these ranged from mobile phone applications, text messages and computerised therapy in a variety of populations and including suicidality measures. The results of these, when published, will add a wealth of information to the literature on technology-based interventions in suicidality and will significantly increase the evidence base.

Limitations

The results of this review must be treated with caution as the MMAT tool is still in development (Pluye et al., 2011). It is important to note that publication bias may lead to studies not being published that provide contradictory evidence. For example, when studies are found to be non-significant they may not be published. This leads to an over representation of statistically significant studies in favour of an intervention in the literature.

Only articles which were published in English were included in this review which may have led to a bias in that other cultures may not have been represented thoroughly in relation to the topic area. However, research from a range of countries were included in the review despite this.

Three databases were searched; it is possible that searching more databases would have increased the number of papers found. The search terms may have been too broad which

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

could have resulted in a number of studies being included that were not relevant to the review aims.

The samples in the studies varied from people with depression to people presenting at emergency services. It is therefore not possible to generalise the results to one sample group as they varied significantly. The studies did include people with suicidal thoughts or self-harm and is representative of this client group.

This review focused on the phenomenon of suicide rather than a particular diagnosis which may limit the generalisability of its results. For example, the reasons behind a suicide attempt may be different for a person with depression than a person with Borderline Personality Disorder (BPD); therefore this would need to be considered in treatment.

The current review did not focus on crisis prevention of suicides which may have limited its results. NICE guidelines for severe depression recommend pharmacological interventions (Middleton, Shaw, Hull, & Feder, 2005). NICE guidelines for self-harm have been criticised for the absence of considering psychological factors (Pitman, & Tyrer, 2008). Crisis interventions focus less on psychological issues and more on the medical aspects which may explain why not many good quality studies in technology-based psychology interventions were found in this review.

Implications

This research has important implications for future practice, when introducing technology based interventions for suicidality, the only evidence based approach, according to this review, is an ICBT based intervention. Caution must be taken when implementing

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

telephone based interventions as although they are seen as ecologically valid, they lack good quality scientific evidence to support this for suicide prevention. No support was found for CD-ROMs therefore these should not be implemented in practice according to this review. ICBT should be available to participants with thoughts of suicide. With further evidence, multi-site trials which demonstrate efficacy may be implemented in NICE guidelines in the treatment of suicidal thoughts and behaviour.

Therapeutic alliance in therapy has been found to have a moderate relationship with outcome of therapy in a systematic review (Martin, Garske, & Davis, 2000), therefore it is important that any intervention delivered through technology includes a therapeutic alliance where possible. It is important that therapists who deliver the technology-based interventions are properly trained in therapy techniques and that they are available as a point of contact for a client using a technology-based intervention.

Future research could focus on meeting the needs of people with self harm behaviours and reinforcement for using alternative strategies to elicit this support (i.e. phoning a friend or professional before self-harming). Future research could focus on suicide prevalence rates as this is a true measure of the phenomenon and arguably the most relevant measure.

Where it is not possible to measure this phenomenon, validated scales of suicidality such as the BSS should be used rather than one question.

Future research could focus on the advent of mobile technology due to the serious lack of evidence for their use and effectiveness despite mobile phone applications being widely used in the population for mental health difficulties. For example there are 300 mobile phone applications available focusing on suicide prevention (Donker et al., 2013) however none were found to have an evidence base in this review. Future research in mobile phone

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

applications could focus on ICBT techniques as these are the only evidence based technological interventions (according to this review) for suicidality at this point in time.

Telephone interventions, although widely used in suicide prevention and deemed ecologically valid, lack a good quality evidence base. Future research should focus on randomised controlled trials in this area with clear outcome measures, ideally rates of suicide. There was evidence for a suicide prevention intervention via a telephone booth installed at a suicide site (a bridge) to detour people who may attempt suicide (Glatt, 1987). This could be replicated on a larger scale with a control group to be further evaluated to determine if it can save lives.

Conclusions

This review concludes that the only evidence-based psychological intervention delivered through technology for suicide prevention is ICBT. This review demonstrated the lack of good quality research for technological interventions in suicide prevention. The research available favoured ICBT. There was a small amount of evidence for other internet based therapy, limited good quality research for telephone interventions and no evidence for the use of CD-ROMs in suicidality. Only one paper that utilised mobile phone interventions in suicide prevention was found in this review (Marasinghe et al., 2012). This may represent the fairly recent application of this technology to suicide prevention.

6. Appendix A

Author Guidelines

Submissions

As of December 1, 2010 all manuscript submissions to *Suicide and Life-Threatening Behavior* can be made online via Manuscript Central, the web-based submission, tracking and peer review system.

Suicide and Life-Threatening Behavior is devoted to emergent theoretical, scientific, clinical, and public health approaches related to violent, self-destructive, and life-threatening behaviors. It is multidisciplinary and concerned with a broad range of related topics including, but not limited to, suicide, suicide prevention, death, accidents, biology of suicide, epidemiology, crisis intervention, postvention with survivors, nomenclature, standards of care, clinical training and interventions, violence.

Brief Summary. Manuscripts should be submitted with a 100-word abstract. The entire manuscript, including references, quotations, text, and tables, and be double-spaced. American Psychological Association (APA) standard style should be used. Manuscript length, except under unusual circumstances, should not be over 20 double-spaced pages, and, ordinarily, should be shorter.

Original Contributions. Authors should only submit manuscripts that have not been published elsewhere, and are not under review by another publication. Cover Letter. With your submission include a cover letter designating one author as correspondent for the review process, and provide a complete address, including phone and fax. In this letter please attest that neither the manuscript nor any other substantially similar paper has been published, except as described in the letter. The corresponding author should also attest that in the case of several authors, each one has studied the manuscript in the form submitted, agreed to be cited as a coauthor, and has accepted the order of authorship. If author affiliations are given with regard to academic, hospital, or institutional affiliations, it is the author[s] responsibility to obtain any required permissions from the proper authorities to utilize such affiliations.

Editing. Manuscripts will be copyedited, and page proofs will be sent to the authors for review. Authors are responsible for all statements made in their work. Manuscripts should not only be well written in the sense of organization and clarity, but should be explained in a manner that is interesting and engaging to readers with a wide range of backgrounds. All manuscripts should begin with an abstract of the paper.

Manuscript Preparation. Your paper should be double spaced and submitted in Microsoft Word. On the title page list the full names, affiliations, and professional degrees

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

of all the authors. Abbreviations should not be used in the title or abstract, and should be very limited in the text.

Abstracts. The abstract should be displayed on a separate page and consist of not more than 100 words. It should present the reason for the study, the main findings, and the principal conclusions.

References. Reference lists should be prepared according to the style illustrated in the articles in this issue of the journal. This approach minimizes punctuation in the specific references, but utilizes the author and date in the text of the articles, to provide maximum information quickly to the reader.

Illustrations. Graphics should be executed in Microsoft Excel in either Mac or IBM formats for making graphs. If this is not possible, please submit camera ready copy. In all cases indicate the correct positioning of the item in the text. Illustrations should be cited in order in the text using Arabic numerals. A legend should accompany each illustration, and not exceed 40 words. Please include reproductions of all illustrations. As the author you are ultimately responsible for any required permissions regarding material quoted in your text, tables, or illustrations of any kind.

Tables. Tables should be cited in order in the text using Arabic numerals. Each table should be displayed on a separate page, and each must have a title.

Reviews and Decisions. Manuscripts are generally sent to outside reviewers, and you will be informed of the editorial decision as soon as possible. Ordinarily a decision will be reached in about 3 months after submission is acknowledged. A request for revising the manuscript along the lines suggested by the Editor and reviewers does not constitute a decision to publish. All revised manuscripts will be re-evaluated, and the Editors reserve the right to reject a paper at any point during the revision process.

Author Services. Free access to the final PDF offprint or your article will be available via author services only. Please therefore sign up for author services if you would like to access your article PDF offprint and enjoy the many other benefits the service offers. Visit <http://authorservices.wiley.com/bauthor/> to sign up for author services.

Copyright Transfer Agreement

If your paper is accepted, the author identified as the formal corresponding author for the paper will receive an email prompting them to login into Author Services; where via the Wiley Author Licensing Service (WALS) they will be able to complete the license agreement on behalf of all authors on the paper.

For authors signing the copyright transfer agreement

If the OnlineOpen option is not selected the corresponding author will be presented with the copyright transfer agreement (CTA) to sign. The terms and conditions of the CTA can

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

be previewed in the samples associated with the Copyright FAQs below:

CTA Terms and Conditions http://authorservices.wiley.com/bauthor/faqs_copyright.asp

For authors choosing OnlineOpen

If the OnlineOpen option is selected the corresponding author will have a choice of the following Creative Commons License Open Access Agreements (OAA):

Creative Commons Attribution License OAA

Creative Commons Attribution Non-Commercial License OAA

Creative Commons Attribution Non-Commercial -NoDerivs License OAA

To preview the terms and conditions of these open access agreements please visit the Copyright FAQs hosted on Wiley Author Services

http://authorservices.wiley.com/bauthor/faqs_copyright.asp and visit

<http://www.wileyopenaccess.com/details/content/12f25db4c87/Copyright--License.html>.

If you select the OnlineOpen option and your research is funded by The Wellcome Trust and members of the Research Councils UK (RCUK) you will be given the opportunity to publish your article under a CC-BY license supporting you in complying with Wellcome Trust and Research Councils UK requirements. For more information on this policy and the Journal's compliant self-archiving policy please visit:

<http://www.wiley.com/go/funderstatement>.

OnlineOpen is available to authors of primary research articles who wish to make their article available to non-subscribers on publication, or whose funding agency requires grantees to archive the final version of their article. With OnlineOpen, the author, the author's funding agency, or the author's institution pays a fee to ensure that the article is made available to non-subscribers upon publication via Wiley Online Library, as well as deposited in the funding agency's preferred archive. Please see the full list of [terms and conditions](#).

Any authors wishing to send their paper OnlineOpen will be required to complete the [payment form](#).

Prior to acceptance there is no requirement to inform an Editorial Office that you intend to publish your paper OnlineOpen if you do not wish to. All OnlineOpen articles are treated in the same way as any other article. They go through the journal's standard peer-review process and will be accepted or rejected based on their own merit.

Membership. Information about membership in the American Association of Suicidology can be obtained by writing to:

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Michelle Cornette, Ph.D.
Executive Director
American Association of Suicidology
5221 Wisconsin Ave., NW
Washington, DC 20015
telephone: (202) 237-2280
fax: (202) 237-2282
email: cornette@suicidology.org

7. References

- American Psychiatric Association. (APA; 2003). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. ManMag. American Psychiatric Association.
- Beck, A. T., & Steer, R. A. (1988). Beck hopelessness scale. The Psychological Corporation, San Antonio.
- Beck, A. T., & Steer, R. A. (1991). *Manual for the Beck scale for suicide ideation*. San Antonio, TX: Psychological Corporation.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory-II*. San Antonio.
- Beck, J. S. (2011). *Cognitive Behavior Therapy: Basics and Beyond*. Guilford Press.
- Buchanan, L. M., & Khazanchi, D. (2010). A PDA intervention to sustain smoking cessation in clients with socioeconomic vulnerability. *Western Journal of Nursing Research*, 32(3), 281-304. doi: 10.1177/0193945909352664
- Burns, J. M., & Patton, G. C. (2000). Preventive interventions for youth suicide: A risk factor-based approach. *Australian and New Zealand Journal of Psychiatry*, 34, 388-407. doi: 10.1046/j.1440-1614.2000.00738.x
- Christensen, H., Farrer, L., Batterham, P. J., Mackinnon, A., Griffiths, K. M., & Donker, T. (2013). The effect of a web-based depression intervention on suicide ideation: secondary outcome from a randomised controlled trial in a helpline. *BMJ open*, 3 (6). doi:10.1136/bmjopen-2013-002886
- Coveney, C. M., Pollock, K., Armstrong, S., & Moore, J. (2012). Callers' experiences of contacting a national suicide prevention helpline. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 33(6), 313-324. doi: 10.1111/sltb.12049
- Cukrowicz, K. C., Smith, P. N., Hohmeister, H. C., & Joiner, T. E. (2009). The moderation of an early intervention program for anxiety and depression by specific psychological symptoms. *Journal of Clinical Psychology*, 65(4), 337-351. doi: 10.1002/jclp.20560
- Dahan-Oliel, N., Shikako-Thomas, K., & Majnemer, A. (2012). Quality of life and leisure participation in children with neurodevelopmental disabilities: A thematic analysis of the literature. *Quality of Life Research*, 21(3), 427-439. doi: 10.1007/s11136-011-0063-9
- Donker, T., Petrie, K., Proudfoot, J., Clarke, J., Birch, M. R., & Christensen, H. (2013). Smartphones for smarter delivery of mental health programs: a systematic review. *Journal of Medical Internet Research*, 15(11). doi: 10.2196/jmir.2791
- Gelder, M., Mayou, R., & Cowen, P. (2001). Suicide and deliberate self-harm. *Shorter Oxford textbook of psychiatry*, 507-532. doi: 10.1177/0145445507304728
- Glatt, K. M. (1987). Helpline: suicide prevention at a suicide site. *Suicide and Life-Threatening Behaviour*, 17(4), 299-309. doi: 10.1111/j.1943-278X

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Gould, M. S., & Kramer, R. A. (2001). Youth suicide prevention. *Suicide and Life-Threatening Behaviour*, 31, 6-31. Retrieved from: <http://onlinelibrary.wiley.com/doi/10.1521/suli.31.1.5.6.24219/epdf>

Gould, M. S., Munfakh, J. L. H., Lubell, K., Lubell, K., Kleinman, M., & Parker, S. (2002). Seeking help from the Internet during adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, 41, 1182-1189. doi: 10.1097/01.CHI.0000020280.43550.C9

Greenberger, D., & Padesky, C. A. (1995). *Mind over mood: Change how you feel by changing the way you think*. Guilford press.

Gunderson, J. G., & Ridolfi, M. E. (2001). Borderline personality disorder. Suicidality and Self-Mutilation. *Annals of the New York Academy of Sciences*, 932(1), 61-77. doi: 10.1111/j.1749-6632.2001.tb05798.x

Guthrie, E., Patton, G. C., Kapur, N., Mackway-Jones, K., Chew-Graham, C., Moorey, J Mendel, E., Marino-Francis, F., Sanderson, S., Turpin, C., Boddy, G., & Tomenson, B. (2001). Randomised controlled trial of brief psychological intervention after deliberate self poisoning Commentary: Another kind of talk that works? *Bmj*, 323(7305), 135. doi: <http://dx.doi.org/10.1136/bmj.323.7305.135>

Haas, A., Koestner B., Rosenberg, J., Moore, D., Garlow, S., J., Sedway, J., et al. (2008). An interactive Web-based method of outreach to college students at risk for suicide. *J Am Coll Health*; 57(1):15-22. DOI: 10.3200/ JACH.57.1.15-22

Handley, T. E., Kay-Lambkin, F. J., Baker, A. L., Lewin, T. J., Kelly, B. J., Inder, K. J., Attia, J., & Kavanagh, D. J. (2013). Incidental treatment effects of CBT on suicidal ideation and hopelessness. *Journal of Affective Disorders*, 151(1), 275-283. Retrieved from: <http://dx.doi.org/10.1016/j.jad.2013.06.005>

Hassanzadeh, M., Khajeddin, N., Nojomi, M., Fleischmann, A., & Eshrati, T. (2010). Brief intervention and contact after deliberate self-harm: an Iranian randomized controlled trial. *Iranian Journal of Psychiatry and Behavioral Sciences*, 4(2), 5-12. Retrieved from: http://ijpbs.mazums.ac.ir/browse.php?a_code=A-10-2-52&slc_lang=en&sid=1

Hedman, E., Ljótsson, B., Rück, C., Bergström, J., Andersson, G., Kaldø, V., Jansson, L., Andersson, E., Blom, K., Alaoui, S., Falk, L., Ivarsson, J., Nasri, B., Rydh, S., & Lindefors, N. (2013). Effectiveness of Internet-based cognitive behaviour therapy for panic disorder in routine psychiatric care. *Acta Psychiatrica Scandinavica*, 128(6), 457-467. doi: 10.2196/jmir.2818

Hetrick, S., Simmons, M., Sanci, L. A., & Gunn, J. (2014). Primary care monitoring of depressive symptoms in young people. *Australian family physician*, 43(3), 147. Retrieved from: <http://search.proquest.com/openview/f6338180a2e90d94d591d597d7d84cf0/1?pq-origsite=gscholar>

Hemelrijk, E., van Ballegooijen, W., Donker, T., van Straten, A., & Kerkhof, A. (2012). Internet-based screening for suicidal ideation in common mental disorders. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 33(4), 215. doi: 10.1111/sltb.12105

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Hollis, S., & Campbell, F. (1999). What is meant by intention to treat analysis? Survey of published randomised controlled trials. *Bmj*, 319(7211), 670-674.

Horn, N., Johnstone, L., & Brooke, S. (2007). Some service user perspectives on the diagnosis of borderline personality disorder. *Journal of Mental Health*, 16(2), 255-269. doi: 10.1080/09638230601056371

Howlett, S., & Langdon, R. (2004). Messages to Jo: The Samaritans' experience of email befriending. In G. Bolton, S. Howlett, C. Lago, & J. K. Wright (Eds.), *Writing cures: An Introductory Handbook of Writing in Counselling and Psychotherapy* (pp. 160-167). Hove/New York: Brunner-Routledge.

Heyvaert, M., Hannes, K., Maes, B., & Onghena, P. (2013). Critical appraisal of mixed methods studies. *Journal of Mixed Methods Research*. doi:10.1177/1558689813479449

Kapur, N., Gunnell, D., Hawton, K., Nadeem, S., Khalil, S., Longson, D., ... & Cooper, J. (2013). Messages from Manchester: pilot randomised controlled trial following self-harm. *The British Journal of Psychiatry*, 203(1), 73-74. doi: 10.1192/bjp.bp.113.126425

Kendall, T., Taylor, C., Bhatti, H., Chan, M., & Kapur, N. (2011). Longer term management of self harm: summary of NICE guidance. *BMJ*, 343.

Knaevelsrud, C., Böttche, M., Pietrzak, R. H., Freyberger, H. J., Renneberg, B., & Kuwert, P. (2014). Integrative Testimonial Therapy: An Internet-Based, Therapist-Assisted Therapy for German Elderly Survivors of the World War II with Posttraumatic Stress Symptoms. *The Journal of Nervous and Mental Disease*, 202(9), 651-658. doi: 10.1097/NMD.0000000000000178

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The Phq-9. *Journal of General Internal Medicine*, 16(9), 606-613.

Krysinska, K. E., & De Leo, D. (2007). Telecommunication and suicide prevention: hopes and challenges for the new century. *OMEGA--Journal of Death and Dying*, 55(3), 237-253. doi: 10.2190/OM.55.3.e

Lai, M. H., Maniam, T., Chan, L. F., & Ravindran, A. V. (2014). Caught in the web: a review of web-based suicide prevention. *Journal of Medical Internet Research*, 16(1). doi: 10.2196/jmir.2973

Lieb, K., Zanarini, M. C., Schmahl, C., Linehan, M. M., & Bohus, M. (2004). Borderline personality disorder. *The Lancet*, 364(9432), 453-461. doi:10.1016/S0140-6736(04)16770-6

Ly, K. H., Trüschel, A., Jarl, L., Magnusson, S., Windahl, T., Johansson, R., ... & Andersson, G. (2014). Behavioural activation versus mindfulness-based guided self-help treatment administered through a smartphone application: a randomised controlled trial. *BMJ open*, 4(1), e003440. doi:10.1136/bmjopen-2013-003440

Manning, J., Vandeusen, K. (2011) Suicide prevention in the dot com era: technological aspects of a university suicide prevention program. *J Am Coll Health* 2011;59(5):431-433. doi: 10.1080/07448480903540507

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Marasinghe, R. B., Edirippulige, S., Kavanagh, D., Smith, A., & Jiffry, M. T. (2012). Effect of mobile phone-based psychotherapy in suicide prevention: a randomized controlled trial in Sri Lanka. *Journal of Telemedicine and Telecare*, 18(3), 151-155. Retrieved from: <http://www.researchgate.net/>

Martin, D. J., Garske, J. P., & Davis, M. K. (2000). Relation of the therapeutic alliance with outcome and other variables: a meta-analytic review. *Journal of Consulting and Clinical Psychology*, 68(3), 438. <http://dx.doi.org/10.1037/0022-006X.68.3.438>

Mewton, L., & Andrews, G. (2015). Cognitive behaviour therapy via the internet for depression: A useful strategy to reduce suicidal ideation. *Journal of Affective Disorders*, 170, 78-84. Retrieved from: <http://dx.doi.org/10.1016/j.jad.2014.08.038> 0165-0327/

Middleton, H., Shaw, I., Hull, S., & Feder, G. (2005). NICE guidelines for the management of depression: Are clear for severe depression, but uncertain for mild or moderate depression. *BMJ: British Medical Journal*, 330(7486), 267. doi: 10.1136/bmj.330.7486.267

Miller, H. L., Coombs, D. W., Leeper, J. D., & Barton, S. N. (1984). An analysis of the effects of suicide prevention facilities on suicide rates in the United States. *American Journal of Public Health*, 74, 340-343. doi: 10.2105/AJPH.74.4.340

Mishara, B. (2005). A Silent Monitoring Study of telephone help provided over the Hopeline Network and its short-term effects. In Suicide prevention hotlines in Georgia: July 2004–June 2005 FY *Annual Summary*. Atlanta, GA: Behavioural Health

Montgomery, S. A., & Asberg, M. A. R. I. E. (1979). A new depression scale designed to be sensitive to change. *The British Journal of Psychiatry*, 134(4), 382-389. Retrieved from: <http://bjp.rcpsych.org/content/bjprcpsych/134/4/382.full.pdf>

Montori, V. M., & Guyatt, G. H. (2001). Intention-to-treat principle. *Canadian Medical Association Journal*, 165(10), 1339-1341.

Moritz, S., Schilling, L., Hauschildt, M., Schröder, J., & Treszl, A. (2012). A randomized controlled trial of internet-based therapy in depression. *Behaviour Research and Therapy*, 50(7), 513-521. doi:10.1016/j.brat.2012.04.006

Moutier, C., Norcross, W., Jong, P., Norman, M., Kirby, B., McGuire, T., et al. (2012). The suicide prevention and depression awareness program at the University of California, San Diego School of Medicine. *Acad Med Mar*; 87(3):320-326. In: Lai, M. H., Maniam, T., Chan, L. F., & Ravindran, A. V. (2014). Caught in the web: a review of web-based suicide prevention. *Journal of Medical Internet Research*, 16(1). doi: 10.2196/jmir.2973

Nakao, M., Nishikitani, M., Shima, S., & Yano, E. (2007). A 2-year cohort study on the impact of an Employee Assistance Programme (EAP) on depression and suicidal thoughts in male Japanese workers. *International Archives of Occupational and Environmental Health*, 81(2), 151-157. doi: 10.1007/s00420-007-0196-x

National Institute of Clinical Excellence (2011) National Collaborating Centre for Mental Health commissioned by the National Institute for Health and Clinical Excellence. Self-harm: Longer-term management. National Clinical Guideline Number 133, 2011. *The British Psychological Society and the Royal College of Psychiatrists*. London.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

O’Cathain, A. (2010). Assessing the quality of mixed methods research: Towards a comprehensive framework. *Handbook of Mixed Methods in Social and Behavioural Research*, 531-555

Office of national Statistics (2015) Suicides in the United Kingdom, 2013 registrations retrieved from: [http://www.ons.gov.uk/ons/dcp171778_395145.pdf]

Office of the Surgeon General, US, & National Action Alliance for Suicide Prevention US. (2012). 2012 National Strategy for Suicide Prevention: Goals and Objectives for Action: A Report of the US Surgeon General and of the National Action Alliance for Suicide Prevention. Retrieved from: <http://www.surgeongeneral.gov/library/reports/national-strategy-suicide-prevention/full-report.pdf>

Oerlemans, S., van Cranenburgh, O., Herremans, P. J., Spreeuwenberg, P., & van Dulmen, S. (2011). Intervening on cognitions and behavior in irritable bowel syndrome: A feasibility trial using PDAs. *Journal of Psychosomatic Research*, 70(3), 267-277. doi:10.1016/j.jpsychores.2010.09.018

Oxford English Dictionary, O. E. (2002). Concise Oxford English Dictionary. accessed at <http://www.oxforddictionaries.com/definition/english/technology> on [02/05/2015]

Pace, R., Pluye, P., Bartlett, G., Macaulay, A. C., Salsberg, J., Jagosh, J., & Seller, R. (2012). Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *International Journal of Nursing Studies*, 49(1), 47-53. doi:10.1016/j.ijnurstu.2011.07.002

Palmier-Claus, J., Ainsworth, J., Machin, M., Barrowclough, C., Dunn, G., Barkus, E., ... & Lewis, S. (2012). The feasibility and validity of ambulatory self-report of psychotic symptoms using a smartphone software application. *BMC psychiatry*, 12(1), 172. doi:10.1186/1471-244X-12-172

Peek, S. T., Wouters, E. J., van Hoof, J., Luijkx, K. G., Boeije, H. R., & Vrijhoef, H. J. (2014). Factors influencing acceptance of technology for aging in place: a systematic review. *International Journal of Medical Informatics*, 83(4), 235-248. Peek, S. T., Wouters, E. J., van Hoof, J., Luijkx, K. G., Boeije, H. R., &

Pluye, P., Robert, E., Cargo, M., Bartlett, G., O’Cathain, A., Griffiths, F., ... & Rousseau, M. C. (2011). Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. *Montréal: McGill University*.

Pitman, A., & Tyrer, P. (2008). Implementing clinical guidelines for self harm—highlighting key issues arising from the NICE guideline for self-harm. *Psychology and Psychotherapy: Theory, Research and Practice*, 81(4), 377-397. doi: 10.1348/147608308X306897

Rouse, M. (2007) Telecommunications, internet source, retrieved from [<http://searchtelecom.techtarget.com/definition/telecommunications>]

Saulsberry, A., Marko-Holguin, M., Blomeke, K., Hinkle, C., Fogel, J., Gladstone, T., ... & Van Voorhees, B. W. (2013). Randomized clinical trial of a primary care internet-based

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

intervention to prevent adolescent depression: One-year outcomes. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 22(2), 106. Retrieved from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3647626/>

Shmagin, B. G., & Pearlmutter, D. R. (1977). The pursuit of UN happiness: The secondary gains of depression. *Perspectives in psychiatric care*, 15(2), 63-65. doi: 10.1111/j.1744-6163.1977.tb00892.x

Simera, I., Moher, D., Hoey, J., Schulz, K. F., & Altman, D. G. (2010). A catalogue of reporting guidelines for health research. *European Journal of Clinical Investigation*, 40(1), 35-53. doi: 10.1111/j.1365-2362.2009.02234.x

Simon GE, Rutter CM, Peterson D, Oliver M, Whiteside U, Operskalski B, et al. Does response on thePHQ-9 Depression Questionnaire predict subsequent suicide attempt or suicide death? *Psychiatr Serv.* 2013; 64: 1195–1202. doi: 10.1176/appi.ps.201200587

Spence, J., Titov, N., Johnston, L., Jones, M. P., Dear, B. F., & Solley, K. (2014). Internet-based trauma-focused cognitive behavioural therapy for PTSD with and without exposure components: A randomised controlled trial. *Journal of Affective Disorders*, 162, 73-80. doi:10.1016/j.jad.2014.03.009

Suicide prevention resource centre (2015) Retrieved from: <http://www.sprc.org/basics/about-suicide-prevention>

van Spijker, B. A., van Straten, A., & Kerkhof, A. J. (2014). Effectiveness of online self-help for suicidal thoughts: Results of a randomised controlled trial. *PloS one*, 9(2), e90118. doi: 10.1371/journal.pone.0090118

van Spijker, B. A., Majo, M. C., Smit, F., van Straten, A., & Kerkhof, A. J. (2012). Reducing suicidal ideation: Cost-effectiveness analysis of a randomized controlled trial of unguided web-based self-help. *Journal of Medical Internet Research*, 14(5). 26. doi: 10.2196/jmir.1966

van Spijker, B. A. (2012). *Reducing the Burden of Suicidal Thoughts Through Online Self-Help*. (Doctoral thesis) VU University: Amsterdam.

van Voorhees, B. W., Fogel, J., Reinecke, M. A., Gladstone, T., Stuart, S., Gollan, J., Bradford, N., Domanico, R., Fagan., B., Ross, Ruth., Larson., J., Watson, N., Paunesku, D., Melkonian, B., Kuwabara, Holper, B., Shank, N., Saner, B., Butler, A., Chandler, M., Louie, T., Weinstein, C., Collins, S., Baldwin, M., Wassel, B., Vanderplough-Booth, M., Humensky, J., & Bell, C. (2009). Randomized clinical trial of an Internet-based depression prevention program for adolescents (Project CATCH-IT) in primary care: 12-week outcomes. *Journal of Developmental & Behavioral Pediatrics*, 30(1), 23-37. doi: 10.1097/DBP.0b013e3181966c2a

Wagner, B., Horn, A. B., & Maercker, A. (2014). Internet-based versus face-to-face cognitive-behavioral intervention for depression: A randomized controlled non-inferiority trial. *Journal of Affective Disorders*, 152, 113-121. doi:10.1016/j.jad.2013.06.032

Watts, S., Newby, J. M., Mewton, L., & Andrews, G. (2012). A clinical audit of changes in suicide ideas with internet treatment for depression. *BMJ open*, 2(5), e001558. doi:10.1136/bmjopen-2012-001558

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Whiteside, U., Richards, J., Steinfeld, B., Simon, G., Caka, S., Tachibana, C., ... & Ludman, E. (2014). Online cognitive behavioral therapy for depressed primary care patients: a pilot feasibility project. *The Permanente Journal*, 18(2), 21. Retrieved from: <http://dx.doi.org/10.7812/TPP/13-155>

Williams, A. D., & Andrews, G. (2013). The effectiveness of Internet cognitive behavioural therapy (iCBT) for depression in primary care: a quality assurance study. *PLoS One*, 8(2), e57447. DOI: 10.1371/journal.pone.0057447

Williams, M. (2014). *Cry of Pain: Understanding Suicide and the Suicidal Mind* (kindle version). Retrieved from Amazon.com

Wilson, G., & Lester, D. (1998). Suicide prevention by e-mail. *Crisis Intervention*, 4, 81-87. In: Krysinska, K. E., & De Leo, D. (2007). Telecommunication and suicide prevention: hopes and challenges for the new century. *OMEGA--Journal of Death and Dying*, 55(3), 237-253. doi: 10.2190/OM.55.3.e

World Health Organisation (2004). *International Statistical Classification of Diseases and Related Health Problems (Vol. 1)*. World Health Organisation.

**Title: Psychological interventions delivered through technology for suicide
prevention: An acceptability and feasibility study using experience sampling
methodology**

Laura Maxon

University of Manchester,

Clinical Psychology Doctorate

Corresponding Author:

Laura Maxon

The University of Manchester, Section for Clinical and Health Psychology, 2nd Floor,
Zochonis Building, Brunswick Street, Manchester, M13 9PL

laura.maxon@nhs.net

Tel: +44 (0)161 306 0401

Fax: +44 (0)161 306 0406

Introduction to paper two

This paper has been prepared for submission to the Journal of Cognitive Therapy and Research and prepared as outlined in the journal guidelines for authors (Appendix A). Copyright will be transferred to Springer Science & Business Media.

Suicidal thoughts and behaviour can result in injury and death. Technology is available to a person at any time of the day or night, is anonymous and quick to access. Technology can be used to support people and to teach psychological skills for suicide prevention. Paper two is an empirical research paper which explores the use of a mobile phone diary and intervention for people with suicidal thoughts. The author declares that they have no conflict of interest. This research complies with Ethical Standards. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

1. Abstract

Objectives: Suicidal thoughts are a complex phenomenon that if acted upon can result in serious injury or death. This study aimed to assess the feasibility and acceptability of an online diary and intervention for people with suicidal thoughts.

Design: An open trial with participants' acting as their own controls.

Method: Twenty participants with suicidal thoughts were recruited from adult secondary care mental health services in the North West of England. Participants completed an online diary and intervention using experience sampling methodology.

Results: High completion rates and low dropout rates were found. Participants rated the diary and intervention high in terms of practicality, ease of use, overall satisfaction with the programme and that it was moderately helpful. Preliminary data on effectiveness suggests reactivity to the method in the short term but a reduction in symptoms overall.

Conclusions: The diary and intervention were found to be acceptable to participants with suicidal thoughts. These results and ESM methodology must be treated with caution for people with suicidal thoughts due to the increase in symptoms found following the intervention.

2. Introduction

Suicide

The Samaritans (2014) define suicide as a complex phenomenon that occurs along a continuum with thoughts of suicide, plans and attempts which can eventually result in death. The Diagnostic and Statistical Manual of Mental Health Disorders (DSM-V; APA 2003) reported suicidal thoughts as a symptom of depression and Borderline Personality Disorder (BPD). Suicide has been linked with other mental health disorders including Post Traumatic Stress Disorder (PTSD; Panagioti, Gooding & Tarrier, 2012), Schizophrenia (Hor & Taylor, 2010) and substance misuse problems (Harris, & Barraclough, 1997).

Risk factors for suicide have been identified as severe depression, hopelessness, unemployment, bipolar disorder and suicidal ideation (Brown, Beck, Steer & Grisham, 2000). The male suicide rate is three times higher than that of women, the highest rates of suicide by age category are in men aged 45 to 59 years old (Office of National Statistics, 2015). Suicide rates are on the increase in most countries, particularly for men (Williams, 2014).

Self-harm

The National Health Service (NHS; 2013) define self-harm as intentional damage or injury to the body as a way of coping with emotional distress, with or without the intention to die. In a systematic review it was found that people who self harm are at increased risk of suicide compared to the general population. Non-fatal self-harm is the strongest risk factor for subsequent suicide. One in 25 patients who present at A and E with self-harm will subsequently complete suicide after 5 years follow up (Carroll, Metcalfe & Gunnell, 2014).

Psychological models of suicide

There are a number of psychological models of suicide which assist our understanding of why people attempt suicide. Barzilay and Apter (2014) and Tarrier et al. (2013) gave an overview of psychological theories. Cognitive based models include Beck, Brown, Berchick, Stewart and Steer (1990) who conceptualise suicidal behaviour as a bias in attention, information processing and impaired memory (limited ability to recall positive life events). However, Shneidman's (1993, 1998) Psychache model included great psychological pain, reduced ability to tolerate this pain, an inability to cope and death by suicide seen as the only option.

Johnson, Gooding & Tarrier, (2008) describe a schematic appraisal model of suicide (SAMS) with an information processing bias, a suicide schema and an appraisals system which includes questioning the ability to cope with the situation. In contrast, Wells (2009) proposed that it is the processes that are important in depression rather than the content of the thoughts and beliefs. It is not what a person thinks but how they think and the perceived controllability of these thoughts that determines subsequent emotions. This is described in a metacognitive model of depression, the Cognitive Attentional Syndrome (CAS) which consists of worry rumination, fixed attention and unhelpful coping styles (Wells, 2009). Rumination is a broad class of repetitive thoughts linked primarily with depression (Papa-georgiou & Wells, 2004). Rumination on past failures makes these negative evaluations more available to the thought process and future decisions are based on these. This process activates a sense of threat that maintains the person's depression. This may have important implications in suicidality; Morrison and O'Connor (2008)

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

reviewed the literature on rumination and suicidality and found eleven studies that supported an association between these factors and one study that did not. Coping behaviours such as avoidance and substance misuse also play a part in the maintenance of difficulties. When a person uses these strategies it prevents the process of learning that they can cope with emotions and that these emotions are not harmful (Wells, 2009).

William's (2014) cry of pain model included external life events (stressors), the appraisal of these events, feelings of worthlessness, helplessness, hopelessness and entrapment. In addition, there is an absence of rescue factors and the presence of suicidal impulses. Beck (1986) found hopelessness a strong risk factor for suicidal behaviour. However, Gilbert and Allan (1998) found defeat and entrapment accounted for a proportion of the variance in depression when accounting for hopelessness. Preliminary support was found for the association of defeat and entrapment with suicidality (Taylor, Gooding, Wood & Tarrier, 2011). Pollock and Williams, (2004) reported that a feature of people with suicidal thoughts is difficulty with problem-solving ability, particularly if this is inter-personal or social in nature. The models propose a variety of processes involved in suicidal processes including cognitive elements, memory deficits, information bias, beliefs, hopelessness, rumination, avoidance, defeat and entrapment. Acceptance and Commitment Therapy (ACT) has a small emerging evidence based for anxiety and depression which may also have an impact on suicidal thoughts. Forman, Herbert, Moitra Yeomans, & Geller (2007) found improvements in depressive symptoms in a Randomised Controlled Trial (RCT) using an ACT intervention. This focused on the process of experiential avoidance (avoiding thoughts, feelings, emotions, memories, sensations or any internal experience) and learning to act with awareness and acceptance.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Interventions through technology

A variety of technological interventions have been used in assessment and therapy including the use of smart phone applications (Donker et al., 2013; Palmier-Claus et al., 2012) personal digital assistants, (Buchanan & Khazanchi, 2010; Hartley, Barrowclough & Haddock, 2013) and internet-based interventions (Lai et al., 2014) for a number of physical health and mental health difficulties. Luxton, June and Kinn (2011) highlighted the important role of technology in suicide prevention; internet-based interventions can be accessed at any time of the day or night and provide anonymity and privacy. They note that further empirical evidence is needed to determine best practice and cost-benefit analysis. Christensen and Hickie (2010) undertook a systematic review and explored the use of technology for people with suicide and categorised interventions into screening, e-health interventions (defined as technology and medicine) and intervention via web postings. They concluded that more research was needed in the area of e-health interventions.

Psychological interventions for self-harm and suicide prevention

Hawton et al., (1998) found in a systematic review of interventions for self-harm, that there was some evidence for problem solving therapy (for crisis problem solving and for interpersonal issues) over standard aftercare (Hawton, Salkovskis, Kirk & Clark, 1989). Evidence was found for long term therapy for people with BPD and self-harm (Linehan, Armstrong, Suarez, Allmari, Heard, 1991) and for giving participants details of emergency services on a card (Morgan, Jones & Owen, 1993; Cotgrove, Zirinsky, Black & Weston, 1995). However, more research was needed to determine effectiveness of these interventions for self-harm. Townsend et al., (2001) found in a meta-analysis that

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

problem-solving therapy performed better than treatment as usual or less intensive treatment for deliberate self-harm. Cognitive behavioural therapy (CBT) has demonstrated efficacy in reducing suicidal thoughts and behaviours. A treatment manual has been developed for Cognitive Behavioural suicide prevention for people with psychosis (Tarrier et al., 2013). A meta-analysis was undertaken and a highly significant effect for CBT was found in terms of reducing suicidal thoughts (Tarrier, Taylor & Gooding, 2008). Williams et al. (2008) explored a Mindfulness Based Cognitive Therapy Intervention for people with bipolar who had thoughts of suicide and found preliminary evidence that this had an immediate effect on anxiety and depression. The Samaritans have a suicide prevention telephone helpline that has been running since 1953; it is a long established method of helping to prevent death by suicide and it was perceived as helpful by callers who reported high levels of satisfaction with this service (Coveney, Pollock, Armstrong and Moore, 2015).

Experience sampling methodology studies

Experience sampling methodology (ESM) is a structured diary method where participants are asked to record their thoughts, feelings and difficulties in the moment. Myin-Germeys et al. (2009) reported it has been used in research for people with anxiety disorders, affective disorders, psychotic disorders, eating disorders, pervasive developmental disorders, attention deficit hyperactivity disorder (ADHD), Borderline Personality Disorder (BPD), stress reactions and understanding cannabis use. Furthermore, it has been used to investigate psychological phenomena including the relationship of anxiety with Autism Spectrum Disorder (Hare, Wood, Wastell & Skirrow, 2014) and to test the hopelessness-helplessness theory of depression (Swendsen, 1997). Questions can be asked about context and beliefs in relation to difficulties experienced (Myin-Germeys et al., 2009). This methodology reduces the bias that retrospective questionnaires introduce in

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

terms of reliance on memory. Diary studies can record information close to the time it was experienced and can provide a richer account of a person's experience (Bolger, Davis, Rafaeli, 2003). Advantages of this method are that it is in-vivo, in real time and has high ecological validity; it produces multiple assessments and allows for unconscious processing to be elicited. Disadvantages include that it is lengthy for participants to complete (several times a day) and it may cause reactivity to the method by inducing the difficulties measured. Previous studies have looked at the acceptability and feasibility of mobile phone technology in the assessment of psychological therapy for people with psychosis (Palmier-Claus et al., 2012; Hartley et al., 2013). Feasibility is defined as how easy or convenient the technology is to use; acceptability relates to how much it meets a particular need. Monitoring people's thoughts and feelings through ESM provides an opportunity to provide people with an intervention to help them to manage difficult feelings.

Husky et al. (2014) evaluated the acceptability and feasibility of ESM in the investigation of suicide risk. They found ESM was acceptable and feasible with compliance rates of 67% to 88%; no increase was found in terms of negative or suicidal thoughts. Kelly et al. (2012) proposed that intelligent real-time technology could facilitate therapeutic learning through providing resources and teaching the use of therapeutic tools. This utilises machine learning and reinforces skills taught and identified through therapy. This may be applied to suicidality as an addition to CBT and may bridge the gap between theory and practice for clients (Kelly et al., 2012). Traditional therapies rely on memory of situations where participants were feeling suicidal whereas ESM can measure this and provide options for interventions in that moment. ESM allows for direct challenging and management of "hot cognitions" (Greenberger & Padesky, 1995) in the situation in which they are occurring.

Feasibility and Acceptability

The Medical Research Council (MRC; 2000) guidelines for developing and evaluating complex interventions recommend that the feasibility and acceptability of an intervention should be undertaken before the efficiency is investigated. Piloting an intervention is important in terms of ensuring the testing procedures are appropriate, estimating recruitment and retention rates as well as an estimation of sample size that will be required to determine efficiency. A mixture of qualitative and quantitative methods is recommended to fully understand any barriers to participation and to estimate response rates in terms of acceptability and feasibility.

Ben-Zeev et al. (2014) assessed the feasibility and acceptability of a mobile phone intervention for people with schizophrenia. They found that 90% of their sample rated the phone and intervention as acceptable and feasible to use. They found that participants used the program 38% of the time when prompted to do so and 62% of the time they initiated its use independently. Acceptability and feasibility was measured using a questionnaire devised by the researchers. Preliminary results indicated a significant decrease in depression, symptoms of psychosis and general psychopathology after one month of intervention use.

In terms of defining feasibility, completion rates for participants of one third (33%) are considered to be sufficient for inclusion in the research and are used as a measure of feasibility (Kimhy et al., 2012; Myin-Germeys et al., 2003) In addition, The Mixed Methods Appraisal Tool (MMAT; Pace et al., 2012) quality checklist for research considers dropout rates in research below 20% as acceptable; this is considered a measure of feasibility for the current diary and intervention. It is important to determine whether an

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

online diary and intervention can be used to prevent deaths by suicide, reduce distress and increase psychological wellbeing. People spend more time with their phones than with a therapist and it can assist with tapping into everyday situations. Its benefits include its anonymity, accessibility and availability at any time during the day or night. Additionally, increasing people's access to psychological therapy may decrease participant's difficulties and may increase participant's ability to engage in employment that has been found to be cost effective (Mukuria et al., 2013).

Aims of research and hypothesis

This study aims to assess the feasibility and acceptability of a diary and intervention delivered through the internet via a mobile phone for people with suicidal thoughts. The primary hypotheses are:

- a) Feasibility of adherence; completion of more than 33% of diary entries
- b) Feasibility of retention; dropout rates less than 20%
- c) The intervention will be given acceptable ratings in terms of practicality, ease-of-use, satisfaction and perceived impact (mean rating six out of ten or higher)

The secondary hypothesis is that:

- d) Interventions in the moment will result in a statistically significant reduction in state (transitional difficulties in the moment that can fluctuate) and trait (pervasive difficulties) measures for suicidality, depression, hopelessness, defeat and entrapment.

3. Method

Ethical Approval

The NRES Committee North West- Greater Manchester Central and the NHS research department and an NHS Foundation Trust granted ethical approval for the project (Appendix B).

Design

The study was an open trial with each participant acting as their own control. The design consisted of two phases where the participant was prompted eight times a day by text message:

- Baseline phase, 3 days completing online diary.
- Intervention phase, 3 days of the diary plus intervention.

The intervention aspect began on day four if the participants scored low in mood.

Interventions consisted of relaxation (deep breathing), a mindful check in, telephoning someone, safe place imagery, a hope box or watching a short funny clip, these will be explored further presently.

Sampling & Recruitment

Participants were included in recruitment if they were over 18, had self-reported thoughts of suicide in the last two months and had a care coordinator.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

The researcher excluded participants:

- At imminent risk of a suicide attempt, as it would be unethical for them to take part and potentially dangerous as increasing demands could have increased the risk of a suicide attempt.
- Currently receiving psychological therapy as this may have confounded results due to obtaining more than one intervention at one time.
- Who were unsafe to be visited at home in terms of risk of harm to others.
- Unable to read or write (due to the text based nature of the research).
- Who did not speak English, translation into other languages was not feasible due to practical and financial reasons.
- Without capacity to consent to participate in the research; this was assessed via a screening question with the participant's care coordinator (Appendix N).

Twenty participants were recruited through secondary care adult services from twelve community mental health teams (CMHTs) and three early intervention services across five boroughs within a trust in the northwest of England. Care coordinators were approached at team meetings and through advertisements (Appendix D). All care coordinators were given a participant information sheet to give to their clients (Appendix E). The names of 65 care coordinators were collected; all of whom informed the researcher that they worked with a client who had suicidal thoughts in the last two months. The 65 care coordinators agreed to ask clients if they wished to take part in the research. These care coordinators were further followed up by the researcher leading to 32 clients that were interested in taking part in the research (potential participants). Of these 32 potential participants, seven subsequently declined to participate. Reasons for declining to participate at this stage

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

included: reported difficulty using technology (2), feeling unwell (2), reported being unable to complete the number of diary entries required (1), declined due to bereavement (1) and declined without wishing to give a reason (1). Twenty-five participants initially met with the researcher and five declined to take part in the research at this stage. Reasons for declining to take part in the research included reported difficulty using technology (1) and active plans of suicide which were discovered on the initial meeting with the researcher (4). Twenty participants were recruited and completed the research in terms of the diary and exit interview. See figure one for recruitment and retention numbers.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

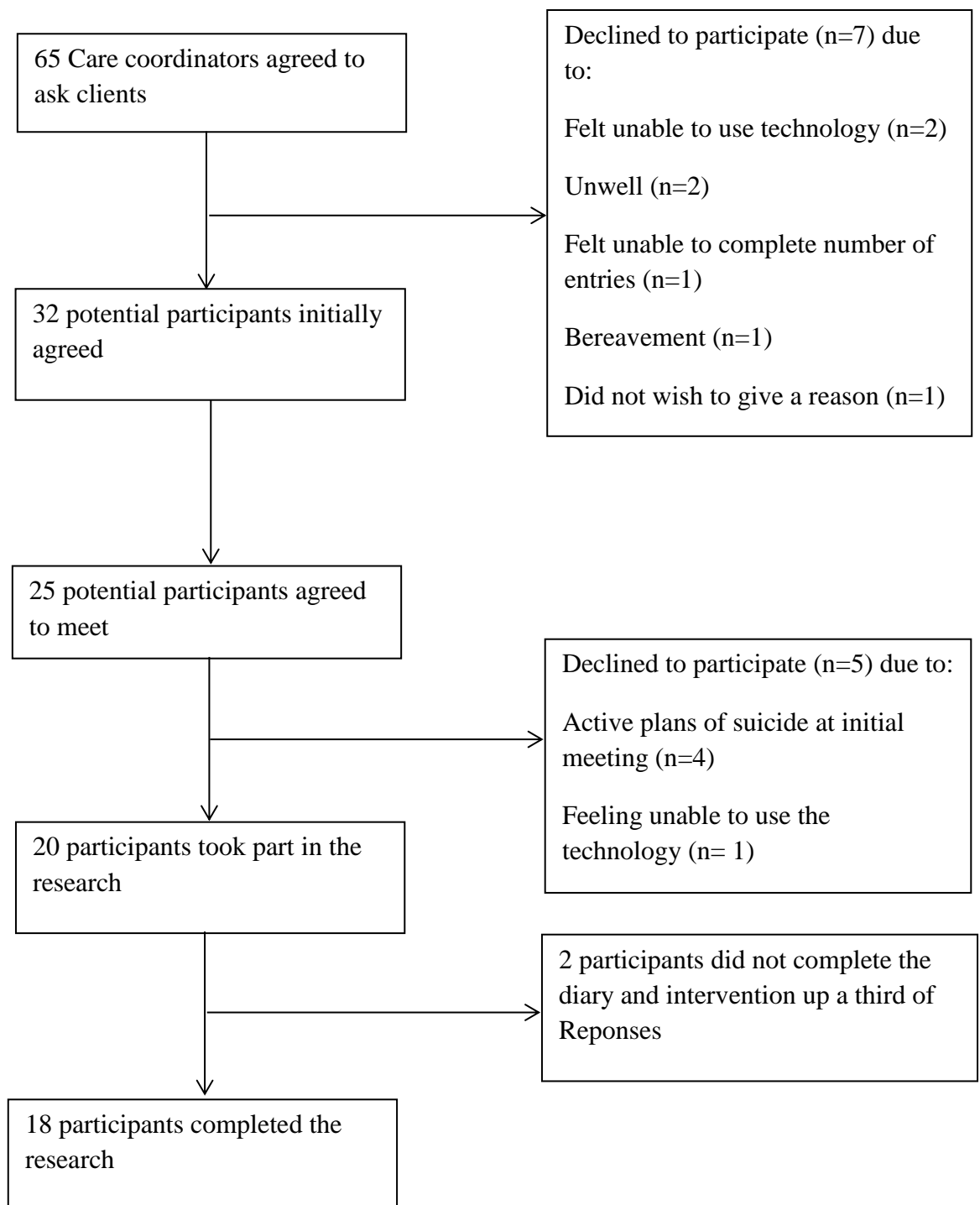


Figure 1, Recruitment flow chart

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Risk Management

A risk management protocol was employed if participants indicated that they may have an active plan to take their own life. The questionnaires were checked at the initial meeting for responses that may indicate this. This included question nine on the Beck Depression Inventory (BDI), “I would like to kill myself” and question four and five on the Beck Suicidal Scale (BSS), “I have a weak or moderate to strong desire to kill myself” or “I would take a chance on life or death if I found myself in a life threatening situation”.

The risk protocol (Appendix B) consisted of finding out if participants’ had a plan to take their own life, how intent they were on doing this (0-100), reasons for not attempting suicide (protective factors, religion, disability and/or family). If the person had a plan, was intent on completing it and did not have protective factors, the research was ceased and their care coordinator and/or the crisis team was informed. For participants who took part in the research, the researcher downloaded diary information of participants every day to check for any changes in risk status. If a risk issue was indicated through the diary, during the meetings or on the telephone the researcher employed the risk protocol as outlined above.

Materials

Feasibility

Feasibility was measured through completion rates of the online diary, dropout rates and a twelve item questionnaire measuring practicality, ease-of-use, satisfaction and perceived impact. This scale demonstrated good internal consistency, with a Cronbach’s Alpha coefficient of .877. Participants were asked to rate questions such as “do you think it has

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

helped you to cope better with your problems?” and “I would use this online diary again” (Appendix G). These were measured on a scale of one to ten from “not at all” to “very much”. These measures were devised from the MRC guidelines (2000) for feasibility studies and previous studies investigating feasibility using experience sampling methodology (Husky et al., 2014; Palmier-Claus et al., 2012).

Acceptability

Acceptability was measured through exit interviews at the end of the study. Thirteen open-ended questions were asked to elicit information on how acceptable the participant found using the diary and intervention. These questions included “what parts did you find helpful, if any?”, “did anything put you off completing the diary? if so, what?” and “do you have any suggestions on how to improve the use of the program?” (Appendix F). The researcher transcribed the answers and the data was summarised to elicit the content.

Pre and post-measures

A demographics questionnaire was compiled by the researcher and administered at the initial point of contact with participants (Appendix H). Participants were asked their age, gender, mental health diagnosis and current medication. Participants were asked if they had previously received therapy, previously self-harmed and/or if they had any previous suicide attempts (“have you had any previous suicide attempts?”). If the participants had self-harmed or attempted suicide they were asked how many times and when was the last time this had occurred. Participants were asked for their email address to send an information sheet if required and to inform them of the outcome of the study when it was completed. This information was separated from the completed questionnaires to maintain anonymity.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

The Beck Depression Inventory

The Beck Depression Inventory, 2nd edition (BDI-II; Beck, Steer & Brown, 1996) is a 21-item self report measure which measures depression (Appendix I). Beck, Steer and Brown (1996) quoted a reliability coefficient alphas as .92 in an outpatient sample for the BDI-II. In the current sample, internal consistency was good with a Cronbach's Alpha coefficient of .78 at pre intervention (time one) and .94 post-intervention (time two).

The Beck Scale for Suicidal Ideation

The Beck Scale for Suicidal Ideation (BSS; Beck & Steer, 1991) is a 21 item measure of current suicidal thoughts and behaviour (Appendix I). Beck, Brown & Steer, (1997) quotes reliability coefficient alphas as .84 with a psychiatric sample. It includes a measure of historical suicidal risk. Internal consistency was good with a Cronbach's alpha coefficient of .85 at time one and .88 at time two.

The Beck Hopelessness Scale

The Beck Hopelessness Scale (BHS; Beck & Steer, 1988) is a 20 item measure of hopelessness which is a well-established risk factor for suicidal thoughts and behaviour (Appendix I). Beck & Weisman, (1974) found a high degree of internal consistency in this scale with a reliability coefficient of .93 with an inter-rater reliability of .86. Internal consistency in the present sample was good with a Cronbach's Alpha coefficient of .92 at time one and .90 at time two.

Diary measures

The diary items were compiled by the researcher guided by existing current measures (BDI, BHS, BSS, defeat & entrapment scales), current research (Harrison, 2013) and

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

questions were adapted for use in the moment. These items were delivered via text message to a mobile phone containing a link to the internet. The questions measured five constructs depression, suicidal ideation, hopelessness, defeat, and entrapment and are consistent with the models of suicide previously discussed (Johnson, Gooding & Tarrier, 2008; Beck et al., 1990; Williams, 2014). A pilot study of the diary intervention was undertaken with three colleagues, which included a service user representative.

Participants were asked to complete the diary and intervention (which was available to participants for this day) ten times a day for one day. Feedback was obtained through opened ended questions; the number of prompts per day was reduced from ten to eight based on feedback. Items that demonstrated the most variability in responses were included in the final diary as outlined by Kimhy et al. (2012). Initially 30 questions (Appendix J) were included on the diary; following analysis and based on feedback these were reduced to 16 (figure three). The first question asked what participants were thinking about before they received the text message and the response was an unlimited text box. The remaining 15 questions include three questions for each construct (depression, suicidality, hopelessness, defeat, and entrapment). Question two to question 16 were rated on a seven point Likert scale from one indicating “not at all” to seven which indicated “very much”. Items three, five, nine, ten and thirteen were reverse scored; a higher score indicated higher levels of depression, suicidal ideation, hopelessness, defeat, and entrapment. Internal consistency of the scale was good, with a Cronbach’s alpha coefficient of .949. The Flesch reading ease for the questions was 99%. This indicated the questions were easy to read by an average eleven year old. Figure two, displays how the questions were presented on the screen and Figure three indicates the final questions and the corresponding constructs.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

The figure displays two screenshots of a mobile application interface for an online diary. Both screenshots show the URL 'psych-sci.manchester.ac.uk' in the browser bar and a 69% battery level.

Left Screenshot (16:00): The screen is titled 'Online Diary (6%)'. It displays question 1: '1. What were you thinking about before you received the text message?'. Below the question is a large white text input field. At the bottom of the input area is a blue button labeled 'Continue'.

Right Screenshot (16:01): The screen is titled 'Online Diary (31%)'. It displays question 5: '5. Right now, life feels worth living'. Below the question is a vertical list of seven blue buttons representing a Likert scale: '1 Not at all', '2', '3', '4', '5', '6', and '7 Very much'.

Figure 2, Online diary questions, screen shots

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Questions	Constructs
1. What were you thinking about before you received the text message?	
2. Right now, I feel low	Depression
3. Right now, I feel content	
4. Right now, I'm a failure	
5. Right now, life feels worth living	Suicidality
6. Right now, I feel like taking my own life	
7. Right now, I wish I was dead	
8. Right now, I feel hopeless	Hopelessness
9. Right now, I feel optimistic	
10. Right now, I feel hopeful about my future	
11. Right now, I feel stuck	Defeat
12. Right now, I feel trapped	
13. Right now, I am free to do what I want	
14. Right now, I feel successful	Entrapment
15. Right now, I feel restricted	
16. Right now, I feel like giving up	

Figure 3, online diary questions

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Interventions

The threshold was set low for the interventions to ensure that participants could try and access the interventions. A score of two or above on any diary item prompted the intervention at the end of the diary. Once the intervention phase started on day four, participants were asked if they would like to try an activity which included relaxation (deep breathing), mindful check in, telephoning someone, safe place imagery, hope box or watching a short funny clip. There was also an option to do no activity. The interventions were provided on screen in text form and given as a paper booklet. Additionally, audio clips were available at the end of the diary on the interventions screen. These were transferred via the internet and interventions available included relaxation, mindfulness, hope box and safe place technique for participants to listen to. These files are included in audio format on a CD in the back cover of the hard copy of the thesis. When the participant logged in the next time after completing an intervention, a screen appeared which stated “the last time you completed the diary, you chose [intervention inserted], did this help? Participants were given the option to rate the helpfulness of the intervention from one to seven (one= very helpful & seven = not helpful at all) or “I didn’t do this activity”.

All the interventions were approximately two to three minutes to ensure they were brief interventions that were quick to use and easy to learn. Relaxation is an important skill to assist with emotional regulation for people with depression and suicidal thoughts (Jorm, Morgan, & Hetrick, 2008). A deep breathing technique was used in the current study for emotional regulation. Mindfulness has been increasing in evidence base for depression and suicidality (Hofmann, Sawyer, Witt, & Oh, 2010; Williams et al., 2008). A mindful check

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

in was used in the current study. This exercise focuses on “bringing awareness to your experience of the here and now”. A hope box is a CBT technique for people with suicidal thoughts and has been applied to increase feelings of hope and thus lower risk of suicide (Ghahrarnanlou-Holloway, & Tucker 2014). It is a real or imagined box that a person can fill with achievements or reminders of happier times in their lives, for example photos of family, holidays or certificates. Falkenberg et al., (2011) explored the use of humour in depression and found it increased mood in the short term and clients found they were better able to use humour as a coping strategy. Increasing mood through humour could reduce negative bias and subsequently decrease suicidal thoughts. Telephoning someone including the Samaritans increases social support and callers find it useful (Coveney et al., 2015). Safe place technique is traditionally used with people who have experienced Trauma (Williams, 2009). It involves imagining a place in your mind where you can be psychologically safe, “this can be a place you’ve been to before or somewhere you dream of going”. This is a grounding technique for flashbacks and is important given the relationship of PTSD and suicidal thoughts (Panagioti et al., 2012). See Appendix K for the written booklet of interventions or for audio format, see the CD in the back cover of the thesis hard copy.

Procedure

Team managers were approached and the researcher requested to attend team meetings. Care coordinators were informed at team meetings about the research and asked to ask clients if they were interested in taking part. Care coordinators’ names were recorded and they were given an information sheet. Care coordinators obtained verbal consent from

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

their clients prior to the researcher receiving any client details. The researcher asked the care coordinator screening questions (Appendix N) pertaining to risk and to determine that the client met the inclusion criteria before receiving client details. The participants were contacted via telephone, asked screening questions (Appendix M), provided with an information sheet via email or post and allowed at least 24 hours to decide. The researcher obtained verbal consent and arranged to meet with the client at a convenient place. Written consent was obtained from participants to take part in the study (Appendix N). Verbal consent was obtained to inform participants' GPs in writing that they were taking part in the study (Appendix P). If any new risk issues arose the GP was also informed (Appendix Q). Participants completed questionnaires, demographics (Appendix H), BDI, BSS and BHS (Appendix I). A mobile phone with credit and internet access was provided by the researcher where necessary. The participant was trained to use the Internet diary and intervention and given the opportunity to ask questions. The Internet diary took approximately three minutes to complete. They were given a unique password and asked to save it on their phone to access the online diary. The interventions were described and the rationale behind these interventions were explained, participants were given a booklet with the written instructions for the interventions (Appendix J). The researcher described this to participants and personalised the booklet where appropriate, for example, under "telephone someone" the researcher wrote down the names of friends or family they could call and/or the helpline numbers such as the Samaritans. All participants were informed that they were only required to complete the diary as many times as they were able to and if they missed one to leave it and wait for the next text message. This was to reduce burden and feelings of guilt if they had not completed the assessment; additionally it reduces bias in responses. All participants were given telephone numbers for helplines if they felt affected by any of the issues in the study (Appendix O).

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Text messages were sent using a secure provider which the University uses (MeerCat Communication, 2004). To ensure confidentiality, the researcher had a unique account so that telephone numbers of participants were only visible to the researcher. Text messages were sent to participants eight times a day for six days between the hours of 10am to 10pm. A random number generator was used to select the times that the text messages would be sent within a two hour time frame period (i.e one text between 10am and 12pm). This was pseudo random in that an algorithm was used to determine the numbers selected. The researcher telephoned participants on the first and third day of the study to assist with problem solving any technical issues and to answer any questions. The researcher met with the participants after one week and completed questionnaires on feasibility, BDI, BHS, BSS and an exit interview on acceptability. The participants were reimbursed £10 for Internet usage costs and £20 in vouchers for the time taken to complete the research. Data collected was stored on a secure server managed by IT services at the University of Manchester. The data was fully anonymised using ID numbers and access was restricted to the researcher and IT staff. The researcher was able to match the ID numbers to the participants. No information was stored on the mobile phone. The answers to the diary were transferred through the internet and the data was downloaded on a secure computer by the researcher daily.

Data analysis

Data analysis for pre-and post-measures (demographics, BDI, BSS and BHS) was undertaken using SPSS, version 22 statistical program (IBM 2013). Missing data was not included in the analysis to avoid any misinterpretation of the data. The data was checked for violation of assumptions. Previous studies on feasibility have used similar participant

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

numbers (Palmer-Claus et al., 2012; Ben-Zeev et al., 2014). A power calculation was undertaken and based on 20 participants an effect size of .7 or more would be necessary based on a paired samples t-test with 80% power. It is important to note that the results in terms of efficiency are preliminary and do not have sufficient power. The mean scores for day one to three and day four to six were calculated. A Wilcoxon signed ranks test was undertaken for the pre and post data.

The ESM data was analysed using multi-level modelling (MLM) with the statistical program STATA, version 14 (StataCorp, 2015). MLM accounts for the data being from the same participants at different time points. The diary data was checked for responses within 15 minutes of when the text messages were sent. Data that was outside this time frame was excluded as advised by Kimhy et al. (2012). A MLM regression analysis was undertaken to determine if intervention predicted scores on the constructs (suicidality, depression, hopelessness, defeat and entrapment). Another MLM regression analysis was undertaken to determine if intervention predicted construct scores at the next text.

Acceptability was analysed through exit interviews, the data was transcribed and the content was drawn out and summarised. A formal content analysis (Hsieh & Shannon, 2005) is beyond the scope of this paper as a considerable amount of data analysis was generated in the study, it is considered as a future separate paper.

Aversive events results

Aversive events were defined as attempted suicide or self-harm during the research time frame (one week). Aversive events were identified by the researcher through care coordinators and self-report from participants through meetings and telephone contact. Any aversive events were to be recorded by the researcher on history sheets.

4. Results

Aversive events

No aversive events were reported during the research. No participants attempted suicide or reported to self-harm through the duration of their time in the research study.

Descriptive statistics

Twenty participants were recruited, four male (20%) and 16 female (80%). Eighteen of the participants (90%) were white British and two were Asian British (20%). Participants' ages ranged from 19 to 60 with a mean age of 41.7 years and a standard deviation of 13.46 years. Fourteen participants (70%) reported receiving more than one mental health diagnosis, the following percentages overlap. Thirteen participants (65%) stated they had received a diagnosis of depression and five (25%) had received a diagnosis of BPD. Seven participants (35%) indicated they had received a diagnosis of anxiety. Two participants (10%) received a diagnosis of emotionally unstable personality disorder and one (5%) of PTSD.

Nineteen participants (95%) were prescribed and were taking psychotropic medication. Eighteen participants (90%) were unemployed. Eighteen participants (90%) stated that they had received psychological therapy in the past. Of the 18 receiving therapy, four (22%) had received counselling, eight (44%) had received input from psychology and not specified which type of therapy. Two participants (11%) reported to receive CBT and two (11%) reported Cognitive Analytical Therapy (CAT). One (6%) reported undertaking Dialectical Behavioural Therapy (DBT) and one (6%) had been involved in a Demographic Therapeutic Community (DTC). Nineteen participants (95%) reported a previous suicide attempt, with the number of attempts ranging from one to 15 times. Time of last attempt ranged from one month to 32 years ago. Fifteen participants (75%) stated

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

they had previously self-harmed which ranged from one week to 15 years ago. The number of times participants had self-harmed was difficult for participants to quantify due to reported high numbers.

Feasibility

Adherence to the diary measures was considered a measure of feasibility. Fifteen participants (75%) used their own phone, two (10%) used a computer and three (15%) used a phone supplied by the researcher. Eighteen participants (90%) completed over 33% of responses for the diary measure and two did not. Each participant had the potential to complete eight time points a day over six days, 48 time points in total. Two participants out of twenty did not complete the diary and intervention. Using intention to treat analysis for feasibility demonstrates that adherence to the diary and intervention ranged from 0% to 98%. The mean percentage completed was 52% with a standard deviation of 21%. It is not possible to analyse feasibility and acceptability questionnaires and exit interviews in the case of non-completers as no information was generated for these variables from non-completers, they were administered but no information was obtained.

Percentages of completion of the online diary for the 20 participants ranged from 0% to 98%. The mean percentage completed was 52% with a standard deviation of 21%. This demonstrates that the majority of participants were able to complete the diary measures. Overall, 432 diary entries were completed out of a possible 960 potential time points (45%). Two participants (10%) did not complete the diary to the recommended one third of the time (33%; Kimhy et al., 2012) and were excluded from the analysis. Completion percentages for these participants were 0% and 16% of the prompted time points.

Additionally, two participants were excluded for non-completion of the intervention

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

aspect of the study. Kimhy et al. (2012) recommends that only time points which are completed within 15 minutes when prompted should be included in analysis to reduce bias in responses. When the data was checked for this, it was found that 47% of responses were outside of 15 minutes. Revised data based on this generated completion rates ranging from 13% to 54%. Ten participants (50%) responded to over one third (33%) of the prompted time points. Six participants were excluded from the efficiency analysis due to not completing a third of the prompted time points. Data from entries at the training stage (initial contact) with participants were excluded as these were not pseudo random.

Feasibility data was collected using a questionnaire on feasibility (Appendix G). The items had three questions each and were rated on a ten point scale with zero indicating not at all and ten indicating very much. The participants perceived the diary and interventions as easy to use (Mean score=9.00, SD=1.97), practical (Mean score=9.33, SD=1.37) and overall they were highly satisfied (Mean score=8.48, SD=2.18). The perceived impact was rated moderately (Mean score=6.81, SD=2.12), see table one.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Feasibility	Mean score	Standard Deviation	Interpretation
Perceived ease of use	9.00	1.97	High
Practicality	9.33	1.37	High
Perceived impact	6.81	2.18	Moderate
Overall satisfaction	8.48	2.12	High

Table 1, Feasibility questionnaire results

Acceptability

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Acceptability was measured using exit interviews (Appendix F) that focused on how acceptable the participants found the diary and intervention to use. Although 20 interviews were collected 18 are reported here as two did not complete the diary or intervention and did not generate information on the reasons why. Ten of these 18 participants (56%) reported that they found the diary and intervention helpful. It was reported that thinking about how they were feeling was useful, relating their feelings to the situation they were in and as a form of relief. Three participants (17%) reported that noticing how their mood fluctuated was useful and it helped them to acquire skills in remaining calm and reflecting on how they felt. One participant noted that it gave them a sense of control “I had more control over what I was feeling and why I was feeling that way”.

Four participants (22%) reported that it was unhelpful to complete the diary and intervention. They found it difficult to complete due to being busy at the time or other people being in the room. Two participants (11%) reported that they tried to cope with their difficult feelings by keeping busy and the diary reminded them about their difficulties. One participant (6%) felt the diary led them to dwell more on the fact that they were feeling suicidal and reported that there were too many text messages. Four participants (22%) reported being unsure about the helpfulness of the intervention.

Eight participants (44%) reported they found the interventions helpful and used the mindfulness exercises, relaxation, hope box and funny videos. For example, “did the breathing one, could do it any time”. Ten participants (55%) stated that the diary and interventions were quick and easy to use. Undertaking interventions whilst working was difficult for two participants, “At work, couldn’t [use] the interventions either”. Two participants (11%) reported that the diary intervention gave them an outlet for their feelings and they felt heard in relation to this “everyday there was someone out there listening to you” and “[I] felt heard”. Another participant stated that: “because you’re not

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

talking to someone it's easier to be truthful about it because you don't feel like you're being judged by what you say".

Concern was expressed from two participants in relation to the repercussion of saying what they were thinking about for fear being admitted to hospital "[I was] concerned about being perceived as high-risk and been sent to hospital which is the last thing I would want". The second participant feared social services might be informed in relation to a caring role they had. Two participants' (11%) wanted to be able to access the diary when they needed it, "sometimes, I didn't wait for the ping [text] I just went and did it". An app intervention was mentioned as being useful as opposed to the intervention delivered on an online platform, this would allow it to be accessed on a mobile phone as needed, even when the internet was unavailable. Participants reported feeling positive about taking part in the research and the sense of giving back, for example "[It] gave me a sense of purpose like I knew I was going to be asked about it".

Online diary data

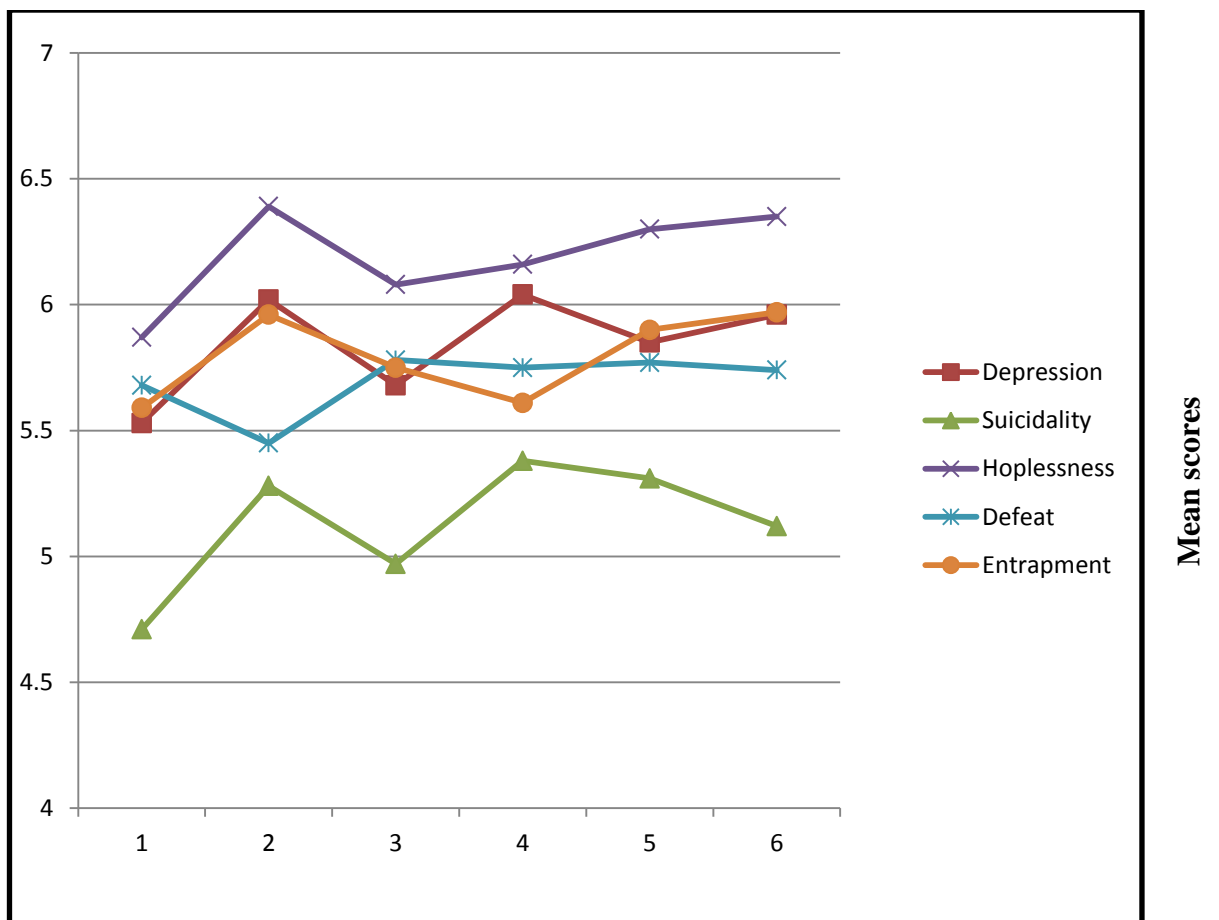
The data collected on the online diary included a question that asked what the participant was thinking about before they received the text message. Answers ranged from one word (work, food, sleep) to 216 words, an account that described the person's current situation. The aim of this question was to orientate people to the time and place. These responses were checked daily for any responses that may have indicated a change in risk status.

The ESM diary data was checked for violation of assumptions (Pallant, 2005). The data met the assumption of level of measurement, homogeneity of variance and independence of observations. The data violated the assumption of being from a random sample. The data was reviewed for skewness and kurtosis that identified that it was skewed. This was statistically significant according to the Kolmogorov-Smirnov statistic for all variables ($p=$

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

<.001) apart from suicidality ($p=.200$). This indicates that the data violated the assumption of normality and the data was bootstrapped to account for this. Bootstrapping allows for the estimation of the sampling distribution for all statistics (Varian, 2005). Two participants (10%) were excluded from analysis due to non-completion of the diary, 18 (90%) were included in the analysis ($n=18$).

Figure four displays the distribution of the means scores from days one to six for each construct out of a possible mean score of seven. An increase in suicidality is seen on days two and four which reduces on days three and six. The intervention started on day three and the research ended on day six. All constructs apart from defeat showed an initial increase on day two that reduced by day three.



Day number

Figure 4, Means scores for each construct by day

The mean scores on the constructs from days one to three were compared with days four to six using the nonparametric equivalent to the t-test, the Wilcoxon signed ranks test as the data violated the assumption of normality. The higher the score indicates the more the person identifies with the construct. The Wilcoxon signed rank tests demonstrated significant differences between scores on depression, suicidality and hopelessness. There was no statistically significant difference for defeat and entrapment. It can be seen from the mean scores that scores on all items increased from pre to post testing which was the opposite of what was hypothesised, these results must be treated with caution due to the small sample size, see Table 2.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Constructs	Mean Values	Mean Difference at Time 2	Standard Error Mean	Wilcoxon signed ranks Test significance	95% confidence Interval
Depression					
Time 1	5.59	-.61	.25	p=.019*	-1.10 to -.13
Time 2	6.21				
Suicidality					
Time 1	4.74	-1.00	.34	p=.022*	-1.7 to -.34
Time 2	5.74				
Hopelessness					
Time 1	5.93	-.57	.22	p=.034*	-.99 to -.14
Time 2	6.50				
Defeat					
Time 1	5.64	-.46	.26	p=.080	-1.02 to .11
Time 2	6.10				
Entrapment					
Time 1	5.70	-.52	.27	p=.095	-1.05 to .03
Time 2	6.21				

Table 2, Diary data, Wilcoxon signed rank test

*=significant result, $p < .05$

Multi- Level Modelling

Ten participants (50%) were excluded from the following analysis, two (10%) due to non-completion of the diary, two (10%) due to non-completion of the intervention and six (30%) due to completion rates of prompted diary entries below a third of prompted time points. The subsequent analysis was undertaken with ten participants (n=10).

A Multi-level Model regression analysis was undertaken in STATA (StataCorp, 2015) statistical program to determine if the intervention predicted construct scores. The assumptions of the data have been described previously in relation to the ESM diary data. An additional assumption of regression relates to multicollinearity, that all constructs do not correlate with each other. A Pearson correlation test indicated that all constructs were significantly correlated with each other and ranged from .638 to .779, this does not indicate a high correlation ($r = .9$) as described by Pallent (2005) but the assumption of multicollinearity was violated. No outliers were detected. The scores were standardised to allow for a distribution of scores around the mean and to compensate for violating the assumption of normality.

The effect of the presence of the intervention on constructs was explored. A statistically significant effect was found for suicidality, depression, hopelessness and entrapment. No statistically significant difference was found for defeat. This means that when the pre diary phase is compared with the post diary phase, the scores on suicidality went up by .15 when the intervention was used (coef .15, SE=.06, $p = .008$, 95% confidence interval of .04 to .25), see Table 3.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Effect of Intervention on:	Coefficient Score	Standard Error	95% confidence interval from:	95% confidence interval to:	P value
Depression	.15	.06	.03	.27	p=.013*
Suicidality	.15	.06	.04	.25	p=.008*
Hopelessness	.15	.06	.02	.29	p=.027*
Defeat	.16	.54	.05	.27	P=.003*
Entrapment	.12	.07	-.02	.25	p=.099

Table 3, MLM regression analysis (effect of intervention on constructs)

*=significant result, $p < .05$

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

A further analysis was undertaken to determine if the intervention predicted scores at the next text message (i.e. if there was a reduction in scores two hours after intervention). No statistically significant predictions were found for any of the constructs:

- Depression (coef .11, SE=.07, $p=.108$, 95% confidence interval of -.03 to .25)
- Suicidality (coef -.10, SE=.06, $p=.108$, 95% confidence interval of -.02 to .21)
- Hopelessness (coef .13, SE=.08, $p=.11$, 95% confidence interval of .03 to .30)
- Defeat (coef .14, SE=.08, $p=.079$, 95% confidence interval of -.02 to .30)
- Entrapment (coef .05, SE=.09, $p=.571$, 95% confidence interval of -.12 to .22)

Pre and post measures

The pre-and post-measures data (BDI, BHS and BSS) were checked for violation of assumptions. The data met the assumption of level of measurement, independence of observations, homogeneity of variance and violated the assumption of random sampling.

The pre-and post-data violated the assumption of normality. Therefore, the Wilcoxon signed ranks test was used (the non-parametric equivalent to the t-test). This test showed a significant difference between scores on the BDI from time one to time two, the scores reduced. There were no statistically significant differences found on the BSS or BHS from time two to time one. An effect size was calculated for BDI scores using an online calculator (AI therapy, 2015) on the pre and post data and a Cohen's d was found to be .66 indicating a moderate effect size. The mean scores can be seen in Table 4.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Measures	Mean score	Mean Difference	Standard deviation	Standard Error Mean	95% Confidence Interval Upper	P value
BDI						
Time 1	43.19	5.06	8.35	2.09	.610 to 9.51	p=.016*
Time 2	38.13					
BHS						
Time 1	24.86	.429	3.29	.882	-1.48 to 2.33	p=.261
Time 2	23.93					
BSS						
Time 1	15.14	.929	2.76	.737	-664 to 2.52	p=.165
Time 2	14.71					

Table 4, pre and post measures, Wilcoxon signed ranks test for depression, suicidality and hopelessness

*=significant result, $p < .05$

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Intervention data

864 potential time points were available for the diary, the intervention was offered 432 times (50%). All 18 participants met the low threshold. The intervention was completed 138 times (32%). The most selected intervention was relaxation (23%). This was followed by watching a short funny clip (19%), and mindfulness (18%). Further interventions used included telephone (15%) safe place imagery (14%) and a hope box (11%). At the next text message, participants were asked how helpful they found the intervention on a scale of one to seven. Seven indicated that they found it very helpful and one indicated that they did not find it helpful, zero indicated that they did not complete the activity. Mean score for the interventions overall was 4.35 with a standard deviation of 1.748. The hope box intervention was evaluated the highest in terms of helpfulness (Mean=5.18, SD=1.55). Next watching a funny clip (Mean=4.64, SD=1.89) and then telephoning someone (Mean=4.42, SD=2.12). All interventions were rated modestly in terms of relaxation (Mean=4.03, SD=1.64) mindfulness (Mean=3.92, SD=1.65) and safe place technique performing the lowest (Mean=3.75, SD=2.15) but still over 50% (3.5 out of 7). Figure five shows mean scores for helpfulness and the percentages that the interventions were used.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

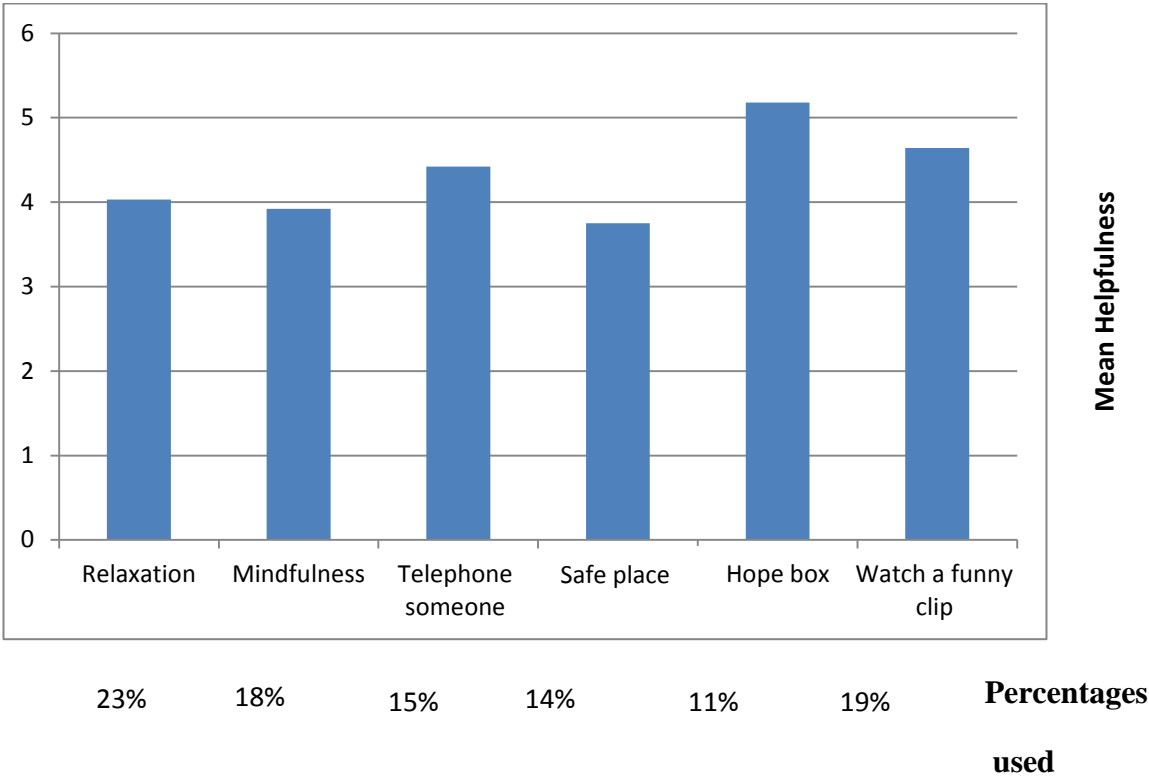


Figure 5, mean scores of helpfulness by intervention and percentages intervention used

5. Discussion

The results demonstrated that feasibility of adherence was achieved in that 18 participants (90%) completed over one third of responses (33%) at a time convenient to them. The researcher considers this a valid measure of feasibility as although participants did not complete the diary when prompted they did access it over a third of the time. It is important to note that participant's symptoms increased following the intervention which is a concern for people with a risk of suicide. This must be considered in future research and any implementation of an intervention for suicidal thoughts delivered through ESM. The BDI was administered over a week period and it covers a two week period therefore the results of this may not be reliable and therefore must be treated with caution.

The interventions were delivered through the ESM diary. These were chosen by the researcher based on the previous literature. On reflection, following the systematic review, ICBT interventions were found to have more evidence for their effectiveness. Ideally, models of suicidal thoughts and depression would have been considered more thoroughly prior to the development of the following interventions. For example, Wells (2009) meta cognitive model for depression could have been utilised and considered in the development of the interventions. The Cognitive Attentional Syndrome (CAS) consists of worry rumination, fixed attention and unhelpful coping styles (Wells, 2009) and based on this interventions could have included attention training, for example.

Rates were lower when entries outside of 15 minutes were excluded, ten participants (50%) completed over a third (33%) of responses. Feasibility of retention was high with a 10% dropout rate much less than the 20% that was hypothesised. The mean score for the twenty participants was 52% with a standard deviation of 21% indicating that the diary

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

and intervention were considered feasible in terms of completion rates. Participants completed it approximately half the time when prompted and half when was convenient for them. This is consistent with rates found in other feasibility and acceptability studies (Ben-Zeev et al., 2014; Husky et al., 2014).

The intervention was given acceptable ratings in terms of practicality, ease-of-use, satisfaction and perceived impact (with mean ratings of six out of ten and above).

Contrary to what was hypothesised, a statistically significant increase was found in state measures for suicidality, hopelessness, depression and defeat. A reduction was seen in trait (overall) measures for depression as measured on the BDI. The diary and intervention were rated highly in terms of practicality, ease-of-use and perceived impact, overall satisfaction was rated moderately. Two participants completed the intervention on a computer and not a mobile phone due to difficulties with mobile technology. This indicates that some people may struggle with the mobile phone-based aspect and may need a computer based alternative to mobile technology. Exit interviews confirmed that the majority of participants found the diary and intervention helpful. The mean score for the helpfulness of the interventions indicated that the majority of the sample found the interventions helpful. Humour was popular in the present study and was the second most used intervention (18.6%), consistent with that described by Falkenberg et al., (2011) who explored the use of humour in relation to suicidality. This may increase mood which increases positive thoughts. Consistent with literature in mindfulness (Hofmann, Sawyer, Witt, & Oh, 2010), participants reported the mindfulness intervention as moderately helpful. This gives participants a way to manage difficult feelings which is particularly important for people with suicidal thoughts. To become overwhelmed with emotion and to struggle to manage this can lead to acting on these thoughts. Targeting efforts on

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

emotional regulation has been found to reduce suicidal behaviour in older adults (Lynch, Cheavens, Morse, & Rosenthal, 2004).

The intervention was not found to reduce levels of state measures of depression, suicidal thoughts, defeat, entrapment and hopelessness and actually found an increase in all constructs apart from defeat. A reason for this may be due to reactivity of the measures, possibly completing the diary had a negative impact on symptoms that should be considered and monitored in future studies. The evidence for this came from exit interviews where participants commented that they felt the diary led them to dwell more on the fact that they were feeling suicidal. This is in contrast to results found by Ben-Zeev et al. (2014) who found no reactivity in their ESM study that focused on suicide risk. This is in contrast to Hayes's (1977) research that found self-monitoring decreased the behaviour being investigated. Thoughts of suicide may have increased in the moment, however, the behaviour (acting on these thoughts) may have been reduced as no suicide attempts or self-harm occurred during the research. The management of these thoughts may have improved even if their presence had not. An increase in the moment scores may relate to the tendency for people to avoid their difficulties. Hayes (1996) reviewed the literature and found that many forms of pathology can be considered as attempts to avoid thoughts, feelings, memories and other experiences. Participants reported in the acceptability interviews that they attempted to cope with their difficulties by keeping busy. The text messages disrupts this process and asks them to attend to their difficulties. The intervention may have induced a low mood state and then given people the skills to manage those difficult feelings. Decreasing avoidance is a necessary part of therapy and although it can be difficult and distressing in the short term, it is necessary in the long term to reduce symptoms (Hayes, 1996). The construct with the lowest mean score in the diary was suicidality. Participants may have reduced endorsing this item due to fear of

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

repercussions; two participants informed the researcher they were concerned about this. Fear of social stigma of suicidal thoughts may also be a reason why people reduce endorsing suicidal thoughts or do not engage in help seeking behaviour (Deane & Todd, 1996). A reduction in scores was found on the BDI and is an encouraging result in terms of reducing trait depression, this may be due to decreasing avoidance which leads to positive gains in the long term, an increased sense of hopefulness, normalisation of their symptoms and finding alternative ways to manage difficult feelings. Taking part in research could have improved their mood. No changes were seen however for the BSS and BHS but may reflect the small sample size or again the reluctance for participants to endorse suicidal feelings.

Interestingly, the majority of participants were female (80%) which is in contrast to literature that indicate completed suicide rates are three times higher in males than females (Office of National Statistics, 2015). This may in part be due to the methods tended to be used by males such as firearms and hanging (Stefanello, Cais, Mauro, Freitas, & Botega, 2008). Additionally, differences in help seeking behaviour and/or stereotypical gender role differences may play a part such as it may be more socially acceptable for females to seek help for their difficulties but less so for men which was observed in the current research.

Implications

This study demonstrated that technological interventions were acceptable and feasible for people with suicidal thoughts and could potentially be used as an adjunct to therapy. Participants in this study completed the diary and intervention half of the time when prompted and half of the time when convenient (47% of diary entries were unprompted). Therefore, people with suicidal thoughts may prefer a combination of prompts and available resources to use when they wish to. Care must be taken in terms of possible

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

reactivity to ESM methodology, i.e. asking people about their experiences may impact negatively on their symptoms. The number of questions could be reduced or the duration of the study decreased.

It is possible that the text messages and the diary may have inadvertently increased rumination as suggested by Wells's (2009) meta cognitive model for depression and Morrison and O'Connor's (2008) systematic review that found an association between rumination and suicidality. Prompting people via text message may have increased thoughts of their difficulties that may have led to rumination which further impacted on mood. This could be assessed in a further paper to determine the impact of what the person was thinking about before the text message and how this impacted on mood.

The current study implied some differences between depression, suicidality, hopelessness, defeat and entrapment and the relationship is unclear as results for constructs differed. In contrast, Beck (1986) found hopelessness was a strong risk factor for suicidal behaviour and Williams' (2014) reported the role of hopelessness and entrapment in his cry of pain model.

The researcher considered that problem solving difficulties may have impacted the research. Pollock & Williams, (2004) suggested that people with suicidal thoughts have difficulties with problem solving abilities. The intervention may have been difficult to access for reasons such as the internet not working; problem solving skills are necessary to remedy this. In contrast, the intervention aspect could also have increased problem solving strategies in terms of providing options at a point where people may struggle to find other ways out. The current study increased rescue factors (by providing helpline

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

numbers and alternative strategies) that may have positively impacted mood and reduced acting on suicidal thoughts.

This research suggests that it is important for participants to have access to the diary and interventions when they feel they need it as participants completed the diary and intervention when it was convenient to them. For participants who may already have feelings of being restricted, open access would be useful to increase feelings of control over their environment and feelings.

It can be implemented in a variety of ways for people on waiting lists, clients in therapy (Kelly et al., 2012), clients in a stepped care model (prior to therapy for example) and for skill development in a group setting. Therapeutic alliance has a moderate association with therapy outcome (Martin, Ganske, & Davis, 2000) therefore it is important that an alliance is also built up as part of a technology intervention. This may increase a person's sense of connectedness to another person through the technology aspect which could be explored further in future research. The importance of meeting people face to face to manage risk was identified as of paramount importance in the research study, particularly given that four potential participants had a plan of suicide. This again highlights the importance of the therapeutic relationship and to ensure that face to face contact is part of the technology implementation and monitoring process.

It is possible that clients may have inadvertently increased distress throughout the research in an attempt to increase social contact with the researcher and care coordinator (secondary gains). Kapur et al. (2013) found an increase in self-harm following a contact based intervention. Future research could explore this further by having a group with and without follow up telephone calls. This contact was important for assisting with problem solving in relation to the technology and to ensure that risk was managed appropriately

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

therefore this issue will need to be carefully balanced in future studies. An RCT trial on efficacy would further add to the literature in this area with different groups for each condition (diary only, intervention only, diary and intervention).

Limitations

The research generated a large amount of data including qualitative and quantitative. Exploring people's thoughts before completing the diary (question one of the online diary) is beyond the scope of this research paper. The researcher recognises a future content analysis of this may be a useful addition to the literature in terms of thoughts, feelings and situations that precipitate suicidal thoughts and if there were rumination or avoidance prior to completing the diary and if this impacted on symptoms.

The questions on the online diary were in order in terms of constructs and may have benefited from being placed in a different order. However, in terms of analysing the information this order allowed for the constructs to be generated accurately and precisely in SPSS.

The technology allowed for audio clips to be uploaded for the interventions (relaxation, hope box, mindful check in and safe place imagery). Unfortunately, the mobile phones obtained by the researcher within budget were unable to utilise these audio clips due to the phones representing an older form of technology. Participants using their own phones that were newer technology were able to access the audio clips. All participants were able to access the interventions either in written format through the booklet or on their mobile phone. The current research would have benefited from phones that represented newer technology; two participants completed the diary and intervention on a computer for this reason. Therefore, sufficient money in the budget is necessary to achieve this in future

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

research. On reflection, giving the participants CD's of the interventions may have improved access to the audio aspect of the interventions.

The small sample size and lack of a different control group limits generalisability of the findings of this research paper as participants acted as their own controls. It is difficult to attribute the cause of any changes to the diary or intervention. It is possible that the input from the research may have impacted the results, the follow up calls, the intervention or behavioural activation through taking part in research (increasing people's daily activities increases mood). These limitations could be overcome with a control group or with a number of groups including different elements of the diary or intervention.

A limitation of the BDI is that it assesses for symptoms over a two week period. As the intervention took place over one week, this may have led to an overlapping of symptoms being included following the intervention. The participants received momentary incentives (£20 in vouchers and £10 internet reimbursement) for taking part in the research that may have biased the results. Participants may have been motivated to complete the diary for monetary gains rather than completing the diary and intervention to assist them with any difficulties they may have been having in relation to suicidal thoughts.

The interventions were relatively short (two to three minutes) to make this quick and easy for participants. It is possible that longer interventions may have been more useful, however this may lead to increased demands placed on participants in terms of time taken to engage in the intervention. Additionally, attention training or detached mindfulness could have been used as an intervention (Wells, 2009) to assist with managing rumination and avoidance.

A limitation of ESM research is may be perceived as hard work and/or burdensome for participants to complete. However, the same could be said for therapy therefore the more

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

effort people put in the more they stand to gain. The number of texts sent per day could have been reduced in order to decrease burden on participants. It may also be as useful to complete the ESM diary items for one day pre intervention and one day post intervention to reduce reactivity to the method. Prompting participants to undertake an intervention may have more of an impact without the diary items. The text messages were sent between 10am and 10pm, tailoring the messages to the person's daily schedule may have increased response rates (Kimhy et al., 2012).

Participants may have completed the intervention when they received the text message rather than when it was sent i.e. if their phone was switched off and they received the text when they turned it on again. This could not be assessed for in this study however future research could include a question that asks when the person received the text message. Alternatively, the diary can be completed at certain times of the day when they wish (one in the morning, afternoon or evening) or if they are having thoughts of suicide or low mood.

The data in this research relied on self-report by participants that may have led to a bias or over reporting of symptoms. Future research could use more objective measures such as clinical notes, self-harm or suicide attempts.

The sample was obtained from a trust in the Northwest of England which may limit the generalisability of its results and it was not from a random sample. However, participants were recruited from seven sites across the trust.

Conclusions

This study demonstrated that a mobile phone diary and intervention for suicidality was feasible and acceptable to participants. These results and ESM methodology must be treated with caution for people with suicidal thoughts due to the increase in symptoms found following the intervention. The majority of participants rated the technology and intervention high in terms of practicality, ease of use and overall satisfaction with the programme. Perceived impact of the diary and intervention was rated moderately.

Acceptability data demonstrated that participants found it useful to become aware of their thoughts, feelings and fluctuations in mood. In addition, having someone to listen and finding the interventions useful was reported.

Further research is needed into the effectiveness of this intervention, preliminary data suggests it may increase state (in the moment) measures of depression, suicidality, hopelessness and entrapment.

6. References

- AI therapy, (2015) sourced online at <https://www.ai-therapy.com/psychology-statistics/effect-size-calculator> on 02/07 /2015
- American Psychiatric Association. (APA; 2003). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. ManMag. American Psychiatric Association.
- Barzilay, S., & Apter, A. (2014). Psychological models of suicide. *Archives of suicide research*, 18(4), 295-312. doi: 10.1080/13811118.2013.824825
- Beck, A. T., Weissman, A., Lester, D., & Trexler, L. (1974). The measurement of pessimism: the hopelessness scale. *Journal of consulting and clinical psychology*, 42(6), 861. <http://dx.doi.org/10.1037/0022-006X.56.6.893>
- Beck, A. T. (1986). Hopelessness as a predictor of eventual suicide. *Ann N Y Acad Sci*, 487, 90-96. Retrieved from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.1986.tb27888.x/pdf>
- Beck, A. T., & Steer, R. A. (1988). Beck hopelessness scale. The Psychological Corporation, San Antonio.
- Beck, A. T., Brown, G., Berchick, R. J., Stewart, B.L., & Steer, R. A. (1990). Relationship between hopelessness and ultimate suicide: A replication with psychiatric outpatients. *The American Journal of Psychiatry*, 147, 190–195. doi:10.1016/S0005-7967(97)00073-9
- Beck, A. T., Brown, G., Berchick, R. J., Stewart, B.L., & Steer, R. A. (1990). Relationship between hopelessness and ultimate suicide: A replication with psychiatric outpatients. *The American Journal of Psychiatry*, 147, 190–195 In: Barzilay, S., & Apter, A. (2014). Psychological models of suicide. *Archives of suicide research*, 18(4), 295-312. doi: 10.1080/13811118.2013.824825
- Beck, A. T., & Steer, R. A. (1991). *Manual for the Beck scale for suicide ideation*. San Antonio, TX: Psychological Corporation.
- Beck, A. T., Steer, R. A., Beck, J. S., & Newman, C. F. (1993). Hopelessness, depression, suicidal ideation, and clinical diagnosis of depression. *Suicide and Life-Threatening Behavior*, 23(2), 139-145. doi: 10.1111/j.1943-278X.1993.tb00378.x
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the beck depression inventory-II*. Pearson, psychCorp.
- Beck, A. T., Brown, G. K., & Steer, R. A. (1997). Psychometric characteristics of the Scale for Suicide Ideation with psychiatric outpatients. *Behaviour research and therapy*, 35(11), 1039-1046. doi:10.1016/S0005-7967(97)00073-9
- Ben-Zeev, D., Brenner, C. J., Begale, M., Duffecy, J., Mohr, D. C., & Mueser, K. T. (2014). Feasibility, acceptability, and preliminary efficacy of a smartphone intervention for schizophrenia. *Schizophrenia bulletin*, sbu033. doi: 10.1093/schbul/sbu033

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual review of psychology*, 54(1), 579-616.
doi: 10.1146/annurev.psych.54.101601.145030

Bolton, C., Gooding, P., Kapur, N., Barrowclough, C., & Tarrier, N. (2007). Developing psychological perspectives of suicidal behaviour and risk in people with a diagnosis of schizophrenia: We know they kill themselves but do we understand why? *Clinical Psychology Review*, 27(4), 511-536. doi:10.1016/j.cpr.2006.12.001

Brown, G. K., Beck, A. T., Steer, R. A., & Grisham, J. R. (2000). Risk factors for suicide in psychiatric outpatients: a 20-year prospective study. *Journal of consulting and clinical psychology*, 68(3), 371. <http://dx.doi.org/10.1037/0022-006X.68.3.371>

Buchanan, L. M., & Khazanchi, D. (2010). A PDA intervention to sustain smoking cessation in clients with socioeconomic vulnerability. *Western journal of nursing research*, 32(3), 281-304. doi: 10.1177/0193945909352664

Carroll, R., Metcalfe, C., & Gunnell, D. (2014). Hospital presenting self-harm and risk of fatal and non-fatal repetition: systematic review and meta-analysis. *PloS one*, 9(2), e89944.

Christensen, H., & Hickie, I. B. (2010). E-mental health: a new era in delivery of mental health services. *Medical Journal of Australia*, 192(11), S2. Retrieved from: https://www.mja.com.au/system/files/issues/192_11_070610/chr11183_fm.pdf

Cotgrove, A., J., Zirinsky, L., Black, D., Weston, D. Secondary prevention of attempted suicide in adolescence. *J Adolescence* 1995; 18:569–577 In: Hawton, K., Salkovskis, P., Kirk, J., Clark, D., M., (1989) eds. *Cognitive behaviour therapy for psychiatric problems: a practical guide*. Oxford: Oxford University Press, 1989:406–426. doi: <http://dx.doi.org/10.1136/bmj.317.7156.441>

Coveney, C. M., Pollock, K., Armstrong, S., & Moore, J. (2015). Callers' experiences of contacting a national suicide prevention helpline. *Crisis*. Volume 33, Issue 6 DOI: 10.1027/0227-5910/a000151

Deane, F. P., & Todd, D. M. (1996). Attitudes and intentions to seek professional psychological help for personal problems or suicidal thinking. *Journal of College Student Psychotherapy*, 10(4), 45-59. doi: 10.1300/J035v10n04_06

Donker, T., Petrie, K., Proudfoot, J., Clarke, J., Birch, M. R., & Christensen, H. (2013). Smartphones for smarter delivery of mental health programs: a systematic review. *Journal of medical Internet research*, 15(11). doi: 10.2196/jmir.2791

Falkenberg, I., Buchkremer, G., Bartels, M., & Wild, B. (2011). Implementation of a manual-based training of humour abilities in patients with depression: A pilot study. *Psychiatry research*, 186(2), 454-457. doi:10.1016/j.psychres.2010.10.009

Forman, E. M., Herbert, J. D., Moitra, E., Yeomans, P. D., & Geller, P. A. (2007). A randomized controlled effectiveness trial of acceptance and commitment therapy and cognitive therapy for anxiety and depression. *Behavior modification*, 31(6), 772-799. doi: 10.1177/0145445507302202

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Ghahrarnanlou-Holloway, M., & Tucker, J. (2014). A Cognitive-Behavioral strategy for Preventing Suicide: Consider a 3-Phase Course of CBT to Put Distance between a Patient and Repeat Suicide Attempts, in Outpatient and Inpatient Settings. *Current Psychiatry*, 13(8), 19. Retrieved from: <https://www.questia.com/library/journal/1G1-379838377/a-cognitive-behavioral-strategy-for-preventing-suicide>

Greenberger, D., & Padesky, C. A. (1995). *Mind over mood: Change how you feel by changing the way you think*. Guilford press.

Hare, D. J., Wood, C., Wastell, S., & Skirrow, P. (2014). Anxiety in Asperger's syndrome: Assessment in real time. *Autism*, doi: 10.1177/1362361314531340

Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders. A meta-analysis. *The British Journal of Psychiatry*, 170(3), 205-228. doi: 10.1192/bjp.170.3.205

Harrison, K. (2013) *Behind closed doors: Towards developing a greater understanding of suicidality in restricted areas*. The University of Manchester: Manchester (Unpublished doctoral thesis)

Hartley, S., Barrowclough, C., & Haddock, G. (2013). Anxiety and depression in psychosis: a systematic review of associations with positive psychotic symptoms. *Acta Psychiatrica Scandinavica*, 128(5), 327-346. doi: 10.1111/acps.12080

Hawton, K., Salkovskis, P., Kirk, J., Clark, D.M., (1989) eds. *Cognitive behaviour therapy for psychiatric problems: a practical guide*. Oxford: Oxford University Press, 1989:406–42 doi: <http://dx.doi.org/10.1136/bmj.317.7156.441>

Hawton, K., Arensman, E., Townsend, E., Bremner, S., Feldman, E., Goldney, R., ... & Träskman-Bendz, L. (1998). Deliberate self harm: systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition. *Bmj*, 317(7156), 441-447. In: Hawton, K., Salkovskis, P., Kirk, J., Clark, D., M., (1989) eds. *Cognitive behaviour therapy for psychiatric problems: a practical guide*. Oxford: Oxford University Press, 1989:406–426. doi: <http://dx.doi.org/10.1136/bmj.317.7156.441>

Hawton, K., Townsend, E., Deeks, J., Appleby, L., Gunnell, D., Bennewith, O., & Cooper, J. (2001). Effects of legislation restricting pack sizes of paracetamol and salicylate on self poisoning in the United Kingdom: before and after study. *Bmj*, 322(7296), 1203. doi: <http://dx.doi.org/10.1136/bmj.322.7296.1203>

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. *Journal of consulting and clinical psychology*, 64(6), 1152. <http://dx.doi.org/10.1037/0022-006X.64.6.1152>

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of consulting and clinical psychology*, 78(2), 169. doi: 10.1037/a0018555

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Hor, K., & Taylor, M. (2010). Review: Suicide and schizophrenia: a systematic review of rates and risk factors. *Journal of psychopharmacology*, 24(4 suppl), 81-90. doi: 10.1177/1359786810385490

Husky, M., Olié, E., Guillaume, S., Genty, C., Swendsen, J., & Courtet, P. (2014). Feasibility and validity of ecological momentary assessment in the investigation of suicide risk. *Psychiatry research*, 220(1), 564-570. doi:10.1016/j.psychres.2014.08.019

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, 15(9), 1277-1288. doi: 10.1177/1049732305276687

IBM (2013) SPSS, version 22 statistical program [Computer Programme].

Johnson, J., Gooding, P., & Tarrier, N. (2008). Suicide risk in schizophrenia: Explanatory models and clinical implications, The Schematic Appraisal Model of Suicide (SAMS). *Psychology and Psychotherapy: Theory, Research and Practice*, 81(1), 55-77. doi: 10.1348/147608307X244996

Jorm, A. F., Morgan, A. J., & Hetrick, S. E. (2008). Relaxation for depression. *Cochrane Database Syst Rev*, 4. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007142.pub2/epdf/standard>

Kapur, N., Gunnell, D., Hawton, K., Nadeem, S., Khalil, S., Longson, D., ... & Cooper, J. (2013). Messages from Manchester: pilot randomised controlled trial following self-harm. *The British Journal of Psychiatry*, 203(1), 73-74. doi: 10.1192/bjp.bp.113.126425

Kelly, J., Gooding, P., Pratt, D., Ainsworth, J., Welford, M., & Tarrier, N. (2012). Intelligent real-time therapy: harnessing the power of machine learning to optimise the delivery of momentary cognitive-behavioural interventions. *Journal of Mental Health*, 21(4), 404-414. doi:10.3109/09638237.2011.638001

Kimhy, D., Myin-Germeys, I., Palmier-Claus, J., & Swendsen, J. (2012). Mobile assessment guide for research in schizophrenia and severe mental disorders. *Schizophrenia bulletin*, sbr186. doi: 10.1093/schbul/sbr186

Kunz, R., & Oxman, A. D. (1998). The unpredictability paradox: review of empirical comparisons of randomised and non-randomised clinical trials. *Bmj*, 317(7167), 1185-1190.

Linehan, M., M., Armstrong, H.E, Suarez, A., Allmari, D., Heard, H.L. (1991) Cognitive-behavioral treatment of chronically parasuicidal borderline patients. *Arch Gen Psychiatry*; 48:1060–1064 In: Hawton, K., Salkovskis, P., Kirk, J., Clark, D., M., (1989) eds. *Cognitive behaviour therapy for psychiatric problems: a practical guide*. Oxford: Oxford University Press, 1989:406–426 *Bmj*, 322(7296), 1203. doi: <http://dx.doi.org/10.1136/bmj.322.7296.1203>

Lai, M. H., Maniam, T., Chan, L. F., & Ravindran, A. V. (2014). Caught in the web: a review of web-based suicide prevention. *Journal of medical Internet research*, 16(1). doi: 10.2196/jmir.2973

Luxton, D. D., June, J. D., & Kinn, J. T. (2011). Technology-based suicide prevention: current applications and future directions. *Telemedicine and e-Health*, 17(1), 50-54. doi:10.1089/tmj.2010.0091

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Lynch, T. R., Cheavens, J. S., Morse, J. Q., & Rosenthal, M. Z. (2004). A model predicting suicidal ideation and hopelessness in depressed older adults: The impact of emotion inhibition and affect intensity. *Aging & Mental Health*, 8(6), 486-497. doi:10.1080/13607860412331303775

MeerCat communications (2004) website: MeerCom.co.uk

Medical Research Council (MRC). Guidelines for developing and evaluating complex interventions. London: MRC, 2000. doi: <http://dx.doi.org/10.1136/bmj.a1655>

Mukuria, C., Brazier, J., Barkham, M., Connell, J., Hardy, G., Hutten, R., ... & Parry, G. (2013). Cost-effectiveness of an Improving Access to Psychological Therapies service. *The British Journal of Psychiatry*, 202(3), 220-227. doi: 10.1192/bjp.bp.111.107888

Morgan H., G., Jones E., M., Owen J. (1989) Secondary prevention of non-fatal deliberate self-harm. The green card study. *Br J Psychiatry* 1993; 163:111–112 In: Hawton, K., Salkovskis, P., Kirk, J., Clark, D., M., eds. *Cognitive behaviour therapy for psychiatric problems: a practical guide*. Oxford: Oxford University Press, 1989:406–426. doi: 10.1192/bjp.bp.113.126425

Morris, R. M. (2014). Assessing vulnerability to psychotic illness amongst cannabis users: correlates, discriminating factors and scale development. Manchester Metropolitan University: Manchester (Unpublished doctoral thesis).

Morrison, R., & O'Connor, R.C. (2008). A systematic review of the relationship between rumination and suicidality. *Suicide and Life-Threatening Behavior*, 38, 523-538. doi: 10.1521/suli.2008.38.5.523

Myin-Germeys, I., Peeters, F. P. M. L., Havermans, R., Nicolson, N. A., DeVries, M. W., Delespaul, P. A. E. G., & Van Os, J. (2003). Emotional reactivity to daily life stress in psychosis and affective disorder: an experience sampling study. *Acta Psychiatrica Scandinavica*, 107(2), 124-131. doi: 10.1007/s00127-003-0633-4

Myin-Germeys, I., Oorschot, M., Collip, D., Lataster, J., Delespaul, P., & van Os, J. (2009). Experience sampling research in psychopathology: opening the black box of daily life. *Psychological medicine*, 39(09), 1533-1547. doi: <http://dx.doi.org/10.1017/S0033291708004947>

National Health Service (NHS; 2013) Self Harm, sourced from on 24/05/2015 from: [<http://www.nhs.uk/conditions/Self-injury/Pages/Introduction.aspx>]

Office of national Statistics (2015) Suicides in the United Kingdom, 2013 registrations retrieved from: [http://www.ons.gov.uk/ons/dcp171778_395145.pdf]

Oliver, M. I., Pearson, N., Coe, N., & Gunnell, D. (2005). Help-seeking behaviour in men and women with common mental health problems: cross-sectional study. *The British Journal of Psychiatry*, 186(4), 297-301. doi: 10.1192/bjp.186.4.297

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Owens, D., Horrocks, J., & House, A. (2002). Fatal and non-fatal repetition of self-harm Systematic review. *The British Journal of Psychiatry*, 181(3), 193-199.
doi: 10.1192/bjp.181.3.193

Pace, R., Pluye, P., Bartlett, G., Macaulay, A. C., Salsberg, J., Jagosh, J., & Seller, R. (2012). Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *International Journal of Nursing Studies*, 49(1), 47-53. doi:10.1016/j.ijnurstu.2011.07.002

Pallant, J. (2005). *SPSS survival guide*. Open University Press, Maidenhead.

Palmier-Claus, J., Ainsworth, J., Machin, M., Barrowclough, C., Dunn, G., Barkus, E., ... & Lewis, S. (2012). The feasibility and validity of ambulatory self-report of psychotic symptoms using a smartphone software application. *BMC psychiatry*, 12(1), 172.
doi:10.1016/j.jad.2013.06.032

Panagioti, M., Gooding, P. A., & Tarrier, N. (2012). A meta-analysis of the association between posttraumatic stress disorder and suicidality: the role of comorbid depression. *Comprehensive psychiatry*, 53(7), 915-930.
doi:10.1016/j.comppsy.2012.02.009

Papageorgiou, C., & Wells, A. (Eds.). (2004). *Depressive rumination: Nature, theory and treatment*. John Wiley & Sons. DOI: 10.1002/9780470713853.ch1

Pollock, L. R., & Williams, J. M. G. (2004). Problem-solving in suicide attempters. *Psychological medicine*, 34(01), 163-167.
doi: <http://dx.doi.org/10.1017/S0033291703008092>

Rudd, M. D. (2006). Fluid vulnerability theory: A cognitive approach to understanding the process of acute and chronic suicide risk. *Cognition and suicide: Theory, research, and therapy* (pp. 355–368). Washington, DC: American Psychological Association.
doi.org/10.1037/11377-016

Samaritans (2014) *Suicide Statistics Report* accessed from
[<http://www.samaritans.org/sites/default/files/kcfinder/files/research/Samaritans%20Suicide%20Statistics%20Report%202014.pdf>] on the 17/05/2015

Shneidman, E.S. (1993) Suicide as psychache. *Journal of Nervous and Mental Disease*, 181(3), 145–147. Retrieved from Ovid.

Shneidman, E.S. (1998) Perspectives on suicidology – Further reflections on suicide and psychache. *Suicide and Life-Threatening Behavior*, 28(3), 245–250. doi: 10.1111/j.1943-278X

Smith, P., Poindexter, E., & Cukrowicz, K. (2010). The effect of participating in suicide research: does participating in a research protocol on suicide and psychiatric symptoms increase suicide ideation and attempts? *Suicide and life-threatening behavior*, 40(6), 535-543. doi/10.1521/suli.2010.40.6.535

StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Stefanello, S., Cais, C. F. D. S., Mauro, M. L. F., Freitas, G. V. S. D., & Botega, N. J. (2008). Gender differences in suicide attempts: preliminary results of the multisite intervention study on suicidal behavior (SUPRE-MISS) from Campinas, Brazil. *Revista brasileira de psiquiatria*, 30(2), 139-143.

Swendsen, J. D. (1997). Anxiety, depression, and their comorbidity: An experience sampling test of the helplessness-hopelessness theory. *Cognitive Therapy and Research*, 21(1), 97-114. doi: 10.1177/1362361314531340

Tarrier, N., Taylor, K., & Gooding, P. (2008). Cognitive-behavioral interventions to reduce suicide behavior a systematic review and meta-analysis. *Behavior modification*, 32(1), 77-108. doi: 10.1177/0145445507304728

Tarrier, N., Gooding, P., Pratt, D., Kelly, J., Awenat, Y., & Maxwell, J. (2013). *Cognitive Behavioural Prevention of Suicide in Psychosis: A Treatment Manual*. London, UK: Routledge.

Taylor, P. J., Awenat, Y., Gooding, P., Johnson, J., Pratt, D., Wood, A., & Tarrier, N. (2010). The subjective experience of participation in schizophrenia research: A practical and ethical issue. *The Journal of nervous and mental disease*, 198(5), 343-348. doi: 10.1097/NMD.0b013e3181da8545

Taylor, P. J., Gooding, P., Wood, A. M., & Tarrier, N. (2011). The role of defeat and entrapment in depression, anxiety, and suicide. *Psychological bulletin*, 137 (3), 391. <http://dx.doi.org/10.1037/a0022935>

Townsend, E., Hawton, K., Altman, D. G., Arensman, E., Gunnell, D., Hazell, P., ... & Van Heeringen, K. (2001). The efficacy of problem-solving treatments after deliberate self-harm: meta-analysis of randomized controlled trials with respect to depression, hopelessness and improvement in problems. *Psychological medicine*, 31 (06), 979-988. doi: <http://dx.doi.org/10.1017/S0033291701004238>

Varian, H. (2005). "Bootstrap Tutorial". *Mathematica Journal*, 9, 768-775. Retrieved from <http://www.mathematica-journal.com>

Wells, A., Fisher, P., Myers, S., Wheatley, J., Patel, T., & Brewin, C. R. (2009). Metacognitive therapy in recurrent and persistent depression: A multiple-baseline study of a new treatment. *Cognitive Therapy and Research*, 33 (3), 291-300. doi: 10.1007/s10608-007-9178-2

Williams, A. D., & Andrews, G. (2013). The effectiveness of Internet cognitive behavioural therapy (iCBT) for depression in primary care: a quality assurance study. *PLoS One*, 8(2), e57447. doi: 10.1371/journal.pone.0057447

Williams, J. M. G., & Williams, M. (1997). *Cry of pain: Understanding suicide and self-harm*. Penguin Group USA.

Williams, J.M.G (2014). *Cry of Pain: Understanding Suicide and the Suicidal Mind*. Hachette UK.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Williams, M., B. (2009). The PTSD workbook: Simple effective techniques for overcoming traumatic stress symptoms. Retrieved from: ReadHowYouWant. com.

Williams, J. M. G., Alatiq, Y., Crane, C., Barnhofer, T., Fennell, M. J., Duggan, D. S., ... & Goodwin, G. M. (2008). Mindfulness-based cognitive therapy (MBCT) in bipolar disorder: Preliminary evaluation of immediate effects on between-episode functioning. *Journal of affective disorders*, 107(1), 275-279.
doi:10.1016/j.jad.2007.08.022

Appendix A

The Journal of Cognitive Therapy and Research instructions for authors

MANUSCRIPT SUBMISSION

Manuscripts in English, should be submitted to the Editor via the journals web-based online manuscript submission and peer-review system – Editorial Manager. Click on Submit Online

- <https://www.editorialmanager.com/cotr/>

ORIGINALITY OF WORK AND COPYRIGHT

Submission of a manuscript assumes that the paper is original to the authors; that it has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

A statement transferring copyright from the authors (or their employers, if they hold the copyright) to Springer Science & Business Media, LLC will be required before the manuscript can be accepted for publication. This written transfer of copyright is necessary under U.S. Copyright Law in order for the publisher to carry through the dissemination of research results and reviews as widely and effectively as possible. Upon acceptance of your article you will receive a link to the special Author Query Application at Springer's web page where you can sign the Copyright Transfer Statement online. Once the Author Query Application has been completed, your article will be processed and you will receive the proofs.

Authors wishing to include figures, tables, or text passages that have already been published elsewhere are required to obtain permission to use such material from the copyright holder.

MANUSCRIPT STYLE AND FORMAT

Manuscripts should be prepared in APA style according to the 6th Edition of the APA Publication manual. Please note, that Springer will use a slightly modified version of APA style which conforms to Springer House Style. [no italics in references].

All pages should be typed double-spaced and numbered (including pages containing the title, authors names and affiliation footnotes, abstract, acknowledgments, references, tables, and figure caption list).

A title page is to be provided and should include the title of the article, authors' names (no degrees), authors' affiliations, and suggested running head. The affiliation should comprise the department, institution (usually university or company), city, and state (or nation) and should be typed as a footnote to the authors name. The suggested running head should be less than 80 characters (including spaces) and should comprise the article title or an abbreviated version thereof. For office purposes, the title page should include the complete mailing address, telephone number, fax number and e-mail address of the one author designated to review proofs.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

An abstract following APA guidelines is to be provided, preferably no longer than 75–150 words.

BLIND REVIEW

CTR does only blind reviews (see the APA Publication Manual). Every effort will be made to expedite feedback to the author and to effect rapid publication of accepted manuscripts.

ETHICAL RESPONSIBILITIES OF AUTHORS

This journal is committed to upholding the integrity of the scientific record. As a member of the Committee on Publication Ethics (COPE) the journal will follow the COPE guidelines on how to deal with potential acts of misconduct.

Authors should refrain from misrepresenting research results which could damage the trust in the journal, the professionalism of scientific authorship, and ultimately the entire scientific endeavour. Maintaining integrity of the research and its presentation can be achieved by following the rules of good scientific practice, which include:

- The manuscript has not been submitted to more than one journal for simultaneous consideration.
- The manuscript has not been published previously (partly or in full), unless the new work concerns an expansion of previous work (please provide transparency on the re-use of material to avoid the hint of text-recycling (“self-plagiarism”)).
- A single study is not split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time (e.g. “salami-publishing”).
- No data have been fabricated or manipulated (including images) to support your conclusions
- No data, text, or theories by others are presented as if they were the author’s own (“plagiarism”). Proper acknowledgements to other works must be given (this includes material that is closely copied (near verbatim), summarized and/or paraphrased), quotation marks are used for verbatim copying of material, and permissions are secured for material that is copyrighted.

Important note: the journal may use software to screen for plagiarism.

- Consent to submit has been received explicitly from all co-authors, as well as from the responsible authorities - tacitly or explicitly - at the institute/organization where the work has been carried out, **before** the work is submitted.
- Authors whose names appear on the submission have contributed sufficiently to the scientific work and therefore share collective responsibility and accountability for the results.

In addition:

- Changes of authorship or in the order of authors are not accepted **after** acceptance of a manuscript.
- Requesting to add or delete authors at revision stage, proof stage, or after publication is a serious matter and may be considered when justifiably warranted. Justification for changes in authorship must be compelling and may be considered only after receipt of written approval from all authors and a convincing, detailed explanation about the role/deletion of the new/deleted author. In case of changes at

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

revision stage, a letter must accompany the revised manuscript. In case of changes after acceptance or publication, the request and documentation must be sent via the Publisher to the Editor-in-Chief. In all cases, further documentation may be required to support your request. The decision on accepting the change rests with the Editor-in-Chief of the journal and may be turned down. Therefore authors are strongly advised to ensure the correct author group, corresponding author, and order of authors at submission.

- Upon request authors should be prepared to send relevant documentation or data in order to verify the validity of the results. This could be in the form of raw data, samples, records, etc.

If there is a suspicion of misconduct, the journal will carry out an investigation following the COPE guidelines. If, after investigation, the allegation seems to raise valid concerns, the accused author will be contacted and given an opportunity to address the issue. If misconduct has been established beyond reasonable doubt, this may result in the Editor-in-Chief's implementation of the following measures, including, but not limited to:

- If the article is still under consideration, it may be rejected and returned to the author.
- If the article has already been published online, depending on the nature and severity of the infraction, either an erratum will be placed with the article or in severe cases complete retraction of the article will occur. The reason must be given in the published erratum or retraction note.
- The author's institution may be informed.
-

COMPLIANCE WITH ETHICAL STANDARDS

To ensure objectivity and transparency in research and to ensure that accepted principles of ethical and professional conduct have been followed, authors should include information regarding sources of funding, potential conflicts of interest (financial or non-financial), informed consent if the research involved human participants, and a statement on welfare of animals if the research involved animals.

Authors should include the following statements (if applicable) in a separate section entitled "Compliance with Ethical Standards" on the title page when submitting a paper:

- Disclosure of potential conflicts of interest
- Research involving Human Participants and/or Animals
- Informed consent

Please note that standards could vary slightly per journal dependent on their peer review policies (i.e. double blind peer review) as well as per journal subject discipline. Before submitting your article check the Instructions for Authors carefully.

The corresponding author should be prepared to collect documentation of compliance with ethical standards and send if requested during peer review or after publication.

The Editors reserve the right to reject manuscripts that do not comply with the above-mentioned guidelines. The author will be held responsible for false statements or failure to fulfil the above-mentioned guidelines.

DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

Authors must disclose all relationships or interests that could influence or bias the work. Although an author may not feel there are conflicts, disclosure of relationships and

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

interests affords a more transparent process, leading to an accurate and objective assessment of the work. Awareness of real or perceived conflicts of interests is a perspective to which the readers are entitled and is not meant to imply that a financial relationship with an organization that sponsored the research or compensation for consultancy work is inappropriate. Examples of potential conflicts of interests **that are directly or indirectly related to the research** may include but are not limited to the following:

- Research grants from funding agencies (please give the research funder and the grant number)
- Honoraria for speaking at symposia
- Financial support for attending symposia
- Financial support for educational programs
- Employment or consultation
- Support from a project sponsor
- Position on advisory board or board of directors or other type of management relationships
- Multiple affiliations
- Financial relationships, for example equity ownership or investment interest
- Intellectual property rights (e.g. patents, copyrights and royalties from such rights)
- Holdings of spouse and/or children that may have financial interest in the work

In addition, interests that go beyond financial interests and compensation (non-financial interests) that may be important to readers should be disclosed. These may include but are not limited to personal relationships or competing interests directly or indirectly tied to this research, or professional interests or personal beliefs that may influence your research. The corresponding author collects the conflict of interest disclosure forms from all authors. **(Please note that each author should complete a disclosure form.)** Examples of forms can be found

- here:

The corresponding author will include a summary statement **on the title page that is separate from their manuscript**, that reflects what is recorded in the potential conflict of interest disclosure form(s).

Please make sure to submit all Conflict of Interest disclosure forms together with the manuscript.

See below examples of disclosures:

Funding: This study was funded by X (grant number X).

Conflict of Interest: Author A has received research grants from Company A. Author B has received a speaker honorarium from Company X and owns stock in Company Y. Author C is a member of committee Z.

If no conflict exists, the authors should state:

Conflict of Interest: Author A, Author B, and Author C declare that they have no conflict of interest.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

RESEARCH INVOLVING HUMAN PARTICIPANTS AND/OR ANIMALS

1) Statement of human rights

When reporting studies that involve human participants, authors should include a statement that the studies have been approved by the appropriate institutional and/or national research ethics committee and have been performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

If doubt exists whether the research was conducted in accordance with the 1964 Helsinki Declaration or comparable standards, the authors must explain the reasons for their approach, and demonstrate that the independent ethics committee or institutional review board explicitly approved the doubtful aspects of the study.

The following statements should be included in a special section on the title page:

Ethical approval: “All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.”

For retrospective studies, please add the following sentence:

“For this type of study formal consent is not required.”

2) Statement on the welfare of animals

The welfare of animals used for research must be respected. When reporting experiments on animals, authors should indicate whether the international, national, and/or institutional guidelines for the care and use of animals have been followed, and that the studies have been approved by a research ethics committee at the institution or practice at which the studies were conducted (where such a committee exists).

For studies with animals, the following statement should be included in a special section on the title page:

Ethical approval: “All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.”

If applicable (where such a committee exists): “All procedures performed in studies involving animals were in accordance with the ethical standards of the institution or practice at which the studies were conducted.”

If articles do not contain studies with human participants or animals by any of the authors, please select one of the following statements:

“This article does not contain any studies with human participants performed by any of the authors.”

“This article does not contain any studies with animals performed by any of the authors.”

“This article does not contain any studies with human participants or animals performed by any of the authors.”

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

INFORMED CONSENT

All individuals have individual rights that are not to be infringed. Individual participants in studies have, for example, the right to decide what happens to the (identifiable) personal data gathered, to what they have said during a study or an interview, as well as to any photograph that was taken. Hence it is important that all participants gave their informed consent in writing prior to inclusion in the study. Identifying details (names, dates of birth, identity numbers and other information) of the participants that were studied should not be published in written descriptions, photographs, and genetic profiles unless the information is essential for scientific purposes and the participant (or parent or guardian if the participant is incapable) gave written informed consent for publication. Complete anonymity is difficult to achieve in some cases, and informed consent should be obtained if there is any doubt. For example, masking the eye region in photographs of participants is inadequate protection of anonymity. If identifying characteristics are altered to protect anonymity, such as in genetic profiles, authors should provide assurance that alterations do not distort scientific meaning.

The following statement should be included:

Informed consent: “Informed consent was obtained from all individual participants included in the study.”

If identifying information about participants is available in the article, the following statement should be included:

“Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.”

EXTRA SUPPLEMENTARY MATERIAL

Springer accepts electronic multimedia files (animations, movies, audio, etc.) and other supplementary files to be published online along with an article or a book chapter. This feature can add dimension to the author's article, as certain information cannot be printed or is more convenient in electronic form.

Submission

- Supply all supplementary material in standard file formats.
- Please include in each file the following information: article title, journal name, author names; affiliation and e-mail address of the corresponding author.
- To accommodate user downloads, please keep in mind that larger-sized files may require very long download times and that some users may experience other problems during downloading.

Audio, Video, and Animations

Always use MPEG-1 (.mpg) format.

Text and Presentations

- Submit your material in PDF format; .doc or .ppt files are not suitable for long-term viability.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

- A collection of figures may also be combined in a PDF file.

Spreadsheets

- Spreadsheets should be converted to PDF if no interaction with the data is intended.
- If the readers should be encouraged to make their own calculations, spreadsheets should be submitted as .xls files (MS Excel).

Specialized Formats

Specialized format such as .pdb (chemical), .wrl (VRML), .nb (Mathematica notebook), and .tex can also be supplied.

Collecting Multiple Files

It is possible to collect multiple files in a .zip or .gz file.

Numbering

- If supplying any supplementary material, the text must make specific mention of the material as a citation, similar to that of figures and tables.
- Refer to the supplementary files as “Online Resource”, e.g., "... as shown in the animation (Online Resource 3)", "... additional data are given in Online Resource 4”.
- Name the files consecutively, e.g. “ESM_3.mpg”, “ESM_4.pdf”.

Captions

For each supplementary material, please supply a concise caption describing the content of the file.

Processing of supplementary files

Electronic supplementary material will be published as received from the author without any conversion, editing, or reformatting.

Accessibility

In order to give people of all abilities and disabilities access to the content of your supplementary files, please make sure that

- The manuscript contains a descriptive caption for each supplementary material
- Video files do not contain anything that flashes more than three times per second (so that users prone to seizures caused by such effects are not put at risk)

PAGE CHARGES

The journal makes no page charges. Reprints are available to authors, and order forms are sent with proofs.

SPRINGER OPEN CHOICE

In addition to the normal publication process (whereby an article is submitted to the journal and access to that article is granted to customers who have purchased a

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

subscription), Springer now provides an alternative publishing option: Springer Open Choice. A Springer Open Choice article receives all the benefits of a regular subscription-based article, but in addition is made available publicly through Springer's online platform SpringerLink. To publish via Springer Open Choice, upon acceptance please visit the link below to complete the relevant order form and provide the required payment information. Payment must be received in full before publication or articles will publish as regular subscription-model articles. We regret that Springer Open Choice cannot be ordered for published articles.

- www.springeronline.com/openchoice

DOES SPRINGER PROVIDE ENGLISH LANGUAGE SUPPORT?

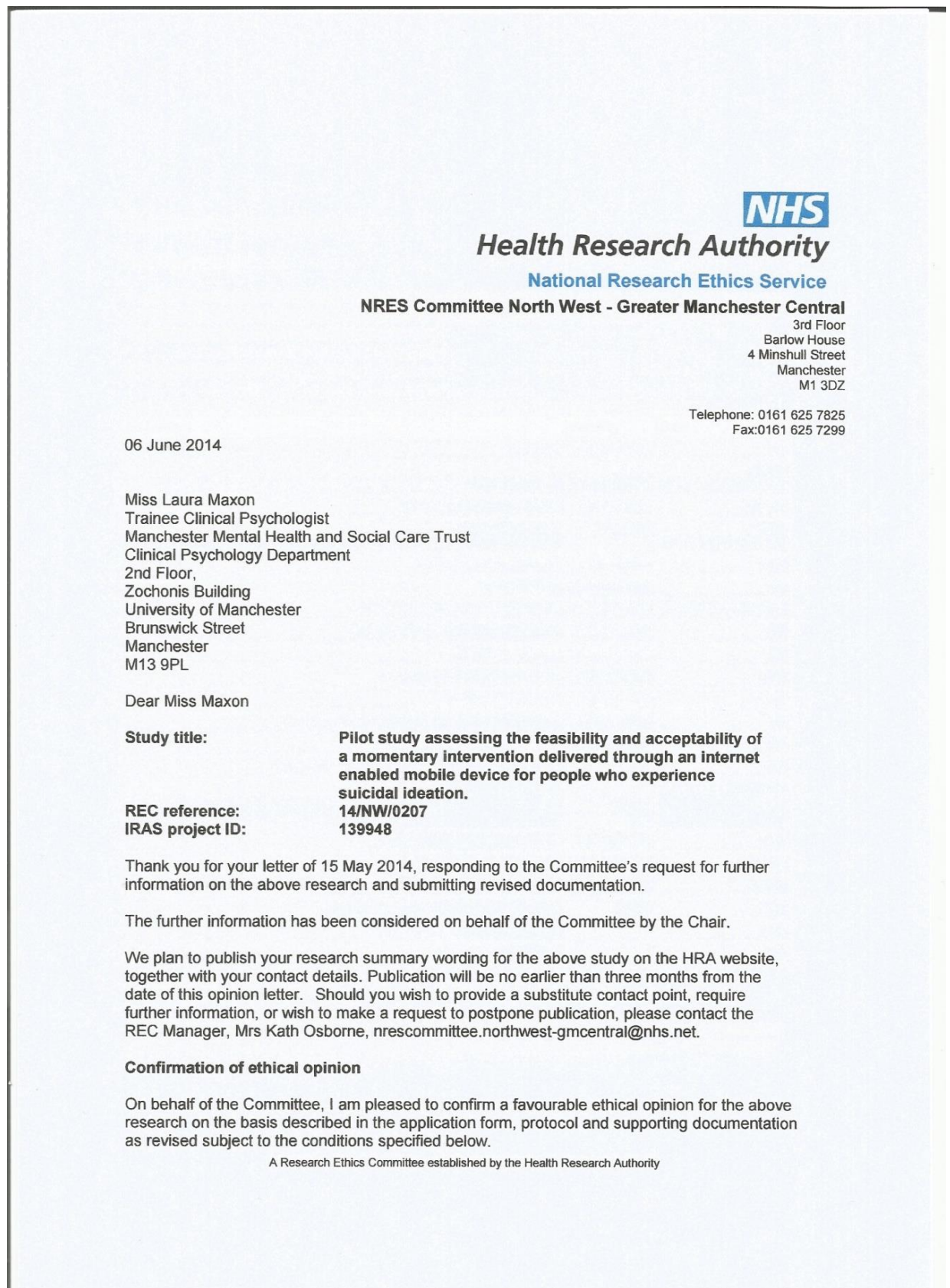
Manuscripts that are accepted for publication will be checked by our copyeditors for spelling and formal style. This may not be sufficient if English is not your native language and substantial editing would be required. In that case, you may want to have your manuscript edited by a native speaker prior to submission. A clear and concise language will help editors and reviewers concentrate on the scientific content of your paper and thus smooth the peer review process.

The following editing service provides language editing for scientific articles in all areas Springer

publishes in:

- [Edanz English editing for scientists](#)

Appendix B, Ethical approval letters



TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Copies of advertisement materials for research participants	1	14 January 2014
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only)	Marsh	30 May 2013
GP/consultant information sheets or letters	2	15 May 2014
Interview schedules or topic guides for participants	Exit - Acceptability	30 March 2014
Non-validated questionnaire [Demographics]	1	30 March 2014
Non-validated questionnaire [End of Study - Feasibility]		14 January 2014
Non-validated questionnaire [BHS]		
Other [Risk Management Protocol]		26 March 2014
Other [Pan Manchester R & D Notification Form]		15 January 2014
Other [Telephone screening questions]	1	30 March 2014
Other [Care co-ordinator Screening Questions]	1	30 March 2014
Participant consent form	1	14 January 2014
Participant information sheet (PIS)	3	23 April 2014
REC Application Form	139948	26 March 2014
Referee's report or other scientific critique report	Dr Hare and David Robinson	
Research protocol or project proposal	2	02 March 2014
Response to Request for Further Information		15 May 2014
Response to Request for Further Information		29 May 2014
Sample diary card/patient card	Online	30 March 2014
Summary CV for Chief Investigator (CI)	Laura Maxon	30 March 2014
Summary CV for Chief Investigator (CI)	Daniel Pratt	30 March 2014

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

A Research Ethics Committee established by the Health Research Authority

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

After ethical review

Reporting requirements

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:

<http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/>

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at <http://www.hra.nhs.uk/hra-training/>

14/NW/0207

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project.

Yours sincerely

K. Osborne .

**Signed on behalf of
Professor S J Mitchell
Chair**

Email: nrescommittee.northwest-gmcentral@nhs.net

Enclosures: "After ethical review – guidance for researchers"

Copy to: Ms L Macrae, University of Manchester

Ms R Blyth, Pennine Care NHS Foundation Trust

A Research Ethics Committee established by the Health Research Authority

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. The REC will acknowledge receipt and provide a final list of the approved documentation for the study, which can be made available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

Sponsors are not required to notify the Committee of approvals from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to contest the need for registration they should contact Catherine Blewett (catherineblewett@nhs.net), the HRA does not, however, expect exceptions to be made. Guidance on where to register is provided within IRAS.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Research and Development Department

Pennine Care 
NHS Foundation Trust

Research & Development Department
Trust Headquarters
225 Old Street
Ashton-under-Lyne
OL6 7SR
Tel: 0161 716 3086

Email: researchdevelopment.penninecare@nhs.net

Date: 25th July 2014

Miss Laura Maxon, Trainee Clinical Psychologist
Manchester Mental Health and Social Care Trust
Clinical Psychology Department
2nd Floor, Zochonis Building
University of Manchester
Brunswick Street
Manchester M13 9PL

Dear Laura

Research and Development Full approval letter:

Re: Study title: Pilot study assessing the feasibility and acceptability of a momentary intervention delivered through an internet enabled mobile device for people who experience suicidal ideation

Pennine Care reference: 100251 REC reference: 14/NW/0207 IRAS reference: 139948

Thank you for submitting your research project for consideration by the Research and Development (R&D) Department. The project was reviewed by the R&D Panel in line with the 'Research Governance Framework for Health and Social Care' and in regards to its impact on resources for the Trust and its suitability within our research portfolio.

We have also verified the relevant documentation and approvals from all necessary regulatory agencies. These may include, but are not limited to, the National Research Ethics Service (NRES), the Medicines and Healthcare products Regulatory Agency (MHRA), and the Administration of Radioactive Substances Advisory Committee (ARSAC).


On this basis, we are now able to grant approval for your project at Pennine Care NHS Foundation Trust, subject to the following terms and conditions:

- The currently approved protocol is **Version 2 dated 2nd March 2014** and the approved documents, including the Participant Information Sheet and Informed Consent Form, are those listed in the Research Ethics Committee's favourable opinion letter for this project dated **6th June 2014**. **These must be the only versions in use.**
- In the event of any amendment (substantial or minor) to the protocol or documentation, approval must be sought from the necessary regulatory agencies. Approval for the amendment must also be obtained from the Research and Development Department before implementation.
- Any significant deviation from the approved protocol or documentation must be notified to the R&D Department as soon as the issue is discovered.
- The Chief Investigator, local Principal Investigator and all other researchers working on the project must abide by and adhere to their specific responsibilities as detailed in the 'Research Governance Framework for Health and Social Care'. They must also meet all UK statutory requirements, with particular significance, where applicable, to: the 'Data Protection Act 1998', 'The Medicines for Human Use (Clinical Trials) Regulations 2004', the 'Mental Health Act 2007', the 'Human Tissue Act 2004' and all subsequent amendments to these.
- The only researchers approved to perform the research activities for this project at any Pennine Care site or involving any staff, service users or other persons under our duty of care are those listed on the SSI form and/or delegation log for Pennine Care.

continued on page 2

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Research and Development Department

Pennine Care 
NHS Foundation Trust

continued from page 1...

- Recruitment figures for Pennine Care participants in relation to this project must be sent to the R&D Department on a minimum of a six monthly basis.
- If applicable, the Sponsor or Chief Investigator must notify the R&D Department of any Serious Adverse Events (SAEs) that occur during the conduct of the trial.
- The R&D Department must be notified about any suspension and upon completion of the project, and must be sent a copy of any final report and/or findings.
- Pennine Care reserves the right to suspend or terminate approval for this project with immediate effect if any of these conditions are breached or in any other circumstances it deems necessary.
- Any further project specific conditions as detailed below:


The Sponsor's Representative, Chief Investigator and Principal Investigator or Local Collaborator as proof of their agreement to the terms and conditions described above must countersign this letter.

Thank you again for submitting your project to Pennine Care. We wish you good luck with recruitment and w progress of your project. If you need any further assistance, then please feel free to contact the R&D Departm the contact details at the top of this letter.

Research Approval Granted:

Pilot study assessing the feasibility and acceptability of a momentary intervention delivered through an ir enabled mobile device for people who experience suicidal ideation

Pennine Care reference: 100251 REC reference: 14/NW/0207 IRAS reference: 139948

Name: Reagan Blyth Signature: 
Role: Associate Director of Quality Assurance and Research, Pennine Care NHS Foundation Trust

We, the undersigned, hereby agree to all of the terms and conditions as specified by the approval letter above.

Name: <u>Dr. Dan Pratt</u>	Signature: <u>Signature sent to pennine care</u>
Date: <u>25/07/14</u>	Role: Sponsor's Representative
Name: <u>LAURA MAXON</u>	Signature: <u>Laura Maxon</u>
Date: <u>25/07/14</u>	Role: Chief Investigator
Name: <u>Dr. David Robinson</u>	Signature: <u>Signature sent to pennine care</u>
Date: <u>25/07/14</u>	Role: Principal Investigator/Local Collaborator
	*delete as appl

Please return one original signed copy of this letter to the R&D Department immediately and retain the oth



Risk indicators

The scales will be checked to ensure that the participants have no active plans of suicide. Indicators of imminent risk include:

BDI (Q9, “I would like to kill myself”)

BSS (Q 4, “I have a weak or moderate to strong desire to kill myself”)

(Q 5, I would take a chance on life or death if I found myself in a life threatening situation)

If these questions are answered as above or if participants disclose/appear to have an active plan of suicide the following will be undertaken.

Researcher will ask the participant

Have you any plans to end your life?

If yes, what are those plans?

If yes, how intent are you on doing this 0-100?

What reasons have you got to not do this?

Prompts include:

- Leaving family behind
- Potential disability
- Religions reasons
- Consequences of this
- Thoughts about the future

The researcher will stay with participant until the suicide risk is managed. If the previous methods are unsuccessful in deterring the participant, the researcher will contact the responsible clinician/referrer to research who knows the client and take advice from them on how best to manage the situation.

If unable to do this contact the field supervisor or staff member on duty at the CMHT. If unable to contact them or if advised to do so, contact the local crisis team. Ask the participant if there is anyone who can stay with them to manage the risk of harm to themselves until the crisis team arrives. If no one is available the researcher will stay with the participant until the crisis team arrive. Inform project supervisor as soon as possible of any potential risk issues.

Expiry Stamp:

Project No:

Calling all Care Coordinators

Research into Suicide Prevention

Using Mobile Phones



Do you know someone who might like to take part?
It will involve completing some questionnaires and filling in a diary on a mobile phone for 6 days.

Please contact:

Laura Maxon on: 0161 7162700 or 0161 3060400 or at:

Laura.Maxon@postgrad.manchester.ac.uk

Alternatively you can contact:

David Robinson: David.Robinson10@nhs.net

Dr Daniel Pratt: Daniel.Pratt@manchester.ac.uk

/2014



Appendix E, Participant information Sheet.

Version 3: 23/04/2014

Title of project: Momentary interventions for people with suicidal thoughts.

Invitation

This study is to find out if people with suicidal thoughts find it helpful to use an internet diary and intervention on a mobile phone. We would like to invite you to take part in our research. Before you decide if you want to take part, we would like you to understand what the research is about and why you have been asked to take part.

What is the purpose of this study?

This study aims to find out new ways to help people who have suicidal thoughts and if people find it helpful to use an internet diary. It is also an educational piece of work towards a doctorate in Clinical Psychology.

Do I have to take part?

You do not have to take part in the study. If you decide to take part and then later change your mind, you can withdraw and your data collected up until that point will be destroyed. However, once you have completed the study your data cannot be destroyed.

What will I be asked to do if I take part?

If you decide to take part, this will involve meeting with the researcher twice. This can be at your home or a place suitable to you. These meetings will last from an hour to an hour and a half. We will ask you to complete some questionnaires about how you are feeling and you will be briefed on how to complete the internet diary using a mobile phone.

You can use your own mobile phone or the researcher can lend you one. You will be reimbursed for internet costs (£10) and given £20 in “love to shop” vouchers if you complete the study.

You will be asked to complete an internet diary up to 10 times a day for 6 days; this will only take 2 minutes each time. Each time you are expected to fill in the internet diary, you will be sent a text message containing a link to the diary. If you miss a time, you do not have to go back and complete it. Just fill it the next time you get a text message.

We will call you at the end of the first day and the third day to see how it is going for you and answer any questions you may have.



After the third day, if you report feeling very low in mood, the internet diary will prompt you to do something that might help you feel better. The kinds of techniques you may be advised to use include mindfulness, relaxation and phoning a friend.

It is ok if you cannot complete the internet diary. We would still like to talk to you at the end of the six days about your experience of completing the diary or any problems you may have had. You will also be asked to complete some questionnaires again.

Will my data be confidential?

All data recorded will be kept completely confidential. All information about your identity will be kept separate from information gathered during the study. The information gathered will be given a number instead. All information collected will be stored securely.

What support will be available to me?

If you have any concerns or are at all distressed during the study please contact either the project researcher, supervisor or a member of your care team. The researchers contact details are listed below. You will also be given a page containing a list of voluntary and professional support organisations.

Who else will be notified?

Your GP will be informed that you are taking part in this study. They will be given a copy of this information sheet. They may be contacted again if a risk of harm to yourself or others is identified.

What are the risks to taking part in the research?

It may be that you feel worse. In our experience we would not expect this to happen however it is a possibility. If this does happen, we are very interested in finding out more about this.

What are the benefits of taking part in the research?

You may find that taking part in the research helps improve your symptoms although this does not always happen for everyone. People have previously said they found it beneficial to complete a diary and to take part in research. Taking part in the research may help people in the future receive more helpful care.

Who has reviewed the study?

A research subcommittee at the University of Manchester has reviewed this research. In addition, all research in the NHS is looked at by an independent group of people called a Research Ethics committee. This is to protect your interests. The study has been reviewed by the North West Manchester NHS committee and been given a favorable opinion.

What if there is a problem?

If you have a concern about any aspect of this study, you can speak to the researchers who will do their best to answer your questions. If they are unable to resolve your concern or you wish to make a complaint regarding the study, please contact a University Research Practice and Governance Co-coordinator on 0161 2757583 or 0161 2758093 or by email to research.complaints@manchester.ac.uk

If you are feel like you need to speak to someone about how you are feeling, you can call the Samaritans on 08457909090 or Mental Health helpline on 0500 639000

Where can I obtain further information if I need it?

Who do I contact if I want to take part in the study?

Please contact:

Laura Maxon on: 0161 7162700 or 0161 3060400

David Robinson on: 0161 7162700

Or email: Laura Maxon: Laura.Maxon-2@postgrad.manchester.ac.uk,

Dr Daniel Pratt: Daniel.Pratt@manchester.ac.uk

You can also tell your care coordinator to pass on your details if you wish to take part.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Appendix F, Exit Interview– Acceptability.

Version 1: 30/03/2014

1	How did you find using the program?
2	How practical was it to complete the diary online?
3	How did you find accessing the online diary when you needed it?
4	What parts did you find helpful, if any?
5	What parts did you find unhelpful, if any?
6	Would you use this again?
7	Do you have any suggestions on how to improve the use of the program?
8	How did you find using the online diary?
9	Did anything put you off completing the diary? If so, what?
10	How did completing the diary make you feel?
11	What if anything do you feel you have learnt from using the online diary?
12	Is there anything you would like to say about the using the program?
13	Do you have any questions you would like to ask?

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Appendix G, End of study Questionnaire – Feasibility. Version 1: 14/01/2014

<u>Perceived Ease of Use (PEOU)</u>	Not at all									Very much
Using my phone to complete the questions was easy	1	2	3	4	5	6	7	8	9	10
It was easy access the questions on my phone	1	2	3	4	5	6	7	8	9	10

<u>Practicality</u>	Not at all									Very much
How practical was it to use your phone?	1	2	3	4	5	6	7	8	9	10
Was your phone easy to carry around?	1	2	3	4	5	6	7	8	9	10
Was your phone always available when you needed it for the diary?	1	2	3	4	5	6	7	8	9	10

<u>Perceived Impact</u>	Not at all									Very much
How much do you feel the diary has impacted on your life?	1	2	3	4	5	6	7	8	9	10

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Do you think it has helped you to cope better with your problems?	1	2	3	4	5	6	7	8	9	10
It felt comforting to have the diary intervention?	1	2	3	4	5	6	7	8	9	10
I found the Interventions useful	1	2	3	4	5	6	7	8	9	10

<u>Satisfaction</u>	Not at all									Very much
Overall satisfaction with Programme	1	2	3	4	5	6	7	8	9	10
I would recommend the online diary for people who are having thoughts of suicide	1	2	3	4	5	6	7	8	9	10
I would use this online diary again	1	2	3	4	5	6	7	8	9	10

Appendix H, Demographics Questionnaire.

Version 1: 30/03/2014

Age:

Gender:

Email address:

Do you have any know mental health diagnosis?

Do you own a mobile phone?

Any previous diagnoses?

Do you take any medication?

Do you have a history of any Psychological Therapies?

How many years have you experienced a mental health problem?

Have you had any previous suicide attempts?

If so, how many times and when was the last attempt?

Number of previous episodes of suicidal ideation?

Any self harm?

If so, how many times and when was the last time this was attempted?

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Appendix I – Measures, BDI, BHS and BSS

<div style="display: flex; justify-content: space-between; align-items: center;"><div style="font-size: 2em; font-weight: bold; letter-spacing: 0.5em;">BDI-II</div><div style="border: 1px solid white; padding: 5px; background-color: white; color: black;">Date: _____</div></div>	
<div style="display: flex; justify-content: space-between;"><div>Name: _____</div><div>Marital Status: _____</div><div>Age: _____</div><div>Sex: _____</div></div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"><div>Occupation: _____</div><div>Education: _____</div></div>	
<p>Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).</p>	
<div>1. Sadness<ul style="list-style-type: none">0 I do not feel sad.1 I feel sad much of the time.2 I am sad all the time.3 I am so sad or unhappy that I can't stand it.</div> <div>2. Pessimism<ul style="list-style-type: none">0 I am not discouraged about my future.1 I feel more discouraged about my future than I used to be.2 I do not expect things to work out for me.3 I feel my future is hopeless and will only get worse.</div> <div>3. Past Failure<ul style="list-style-type: none">0 I do not feel like a failure.1 I have failed more than I should have.2 As I look back, I see a lot of failures.3 I feel I am a total failure as a person.</div> <div>4. Loss of Pleasure<ul style="list-style-type: none">0 I get as much pleasure as I ever did from the things I enjoy.1 I don't enjoy things as much as I used to.2 I get very little pleasure from the things I used to enjoy.3 I can't get any pleasure from the things I used to enjoy.</div> <div>5. Guilty Feelings<ul style="list-style-type: none">0 I don't feel particularly guilty.1 I feel guilty over many things I have done or should have done.2 I feel quite guilty most of the time.3 I feel guilty all of the time.</div>	<div>6. Punishment Feelings<ul style="list-style-type: none">0 I don't feel I am being punished.1 I feel I may be punished.2 I expect to be punished.3 I feel I am being punished.</div> <div>7. Self-Dislike<ul style="list-style-type: none">0 I feel the same about myself as ever.1 I have lost confidence in myself.2 I am disappointed in myself.3 I dislike myself.</div> <div>8. Self-Criticalness<ul style="list-style-type: none">0 I don't criticize or blame myself more than usual.1 I am more critical of myself than I used to be.2 I criticize myself for all of my faults.3 I blame myself for everything bad that happens.</div> <div>9. Suicidal Thoughts or Wishes<ul style="list-style-type: none">0 I don't have any thoughts of killing myself.1 I have thoughts of killing myself, but I would not carry them out.2 I would like to kill myself.3 I would kill myself if I had the chance.</div> <div>10. Crying<ul style="list-style-type: none">0 I don't cry any more than I used to.1 I cry more than I used to.2 I cry over every little thing.3 I feel like crying, but I can't.</div>
<div style="display: flex; justify-content: space-between;"><div>Subtotal Page 1</div><div style="background-color: #0056b3; color: white; padding: 5px 20px; border-radius: 5px;">Continued on Back</div></div>	

PEARSON

29 30 B C D E

Copyright © 1996 Aaron T. Beck. All rights reserved.

Pearson Executive Office 5601 Green Valley Drive Bloomington, MN 55437
800.627.7271 www.PsychCorp.com

Ψ

PsychCorp

Product Number 0154018392

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions.

14. Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.
- 3a I sleep most of the day.
- 3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

18. Changes in Appetite

- 0 I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.
- 2a My appetite is much less than before.
- 2b My appetite is much greater than usual.
- 3a I have no appetite at all.
- 3b I crave food all the time.

19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.

NOTICE: This form is printed with blue and black ink. If your copy does not appear this way, it has been photocopied in violation of copyright laws.

Subtotal Page 2

Subtotal Page 1

Total Score

261283-2 32

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION



Date: _____

Name: _____ Marital Status: _____ Age: _____ Sex: _____
Occupation: _____ Education: _____

Directions: Please carefully read each group of statements below. Circle the one statement in each group that **best** describes how you have been feeling for the **past week, including today**. Be sure to read all of the statements in each group before making a choice.

Part 1

- 1** 0 I have a moderate to strong wish to live.
1 I have a weak wish to live.
2 I have no wish to live.

- 2** 0 I have no wish to die.
1 I have a weak wish to die.
2 I have a moderate to strong wish to die.

- 3** 0 My reasons for living outweigh my reasons for dying.
1 My reasons for living or dying are about equal.
2 My reasons for dying outweigh my reasons for living.

- 4** 0 I have no desire to kill myself.
1 I have a weak desire to kill myself.
2 I have a moderate to strong desire to kill myself.

- 5** 0 I would try to save my life if I found myself in a life-threatening situation.
1 I would take a chance on life or death if I found myself in a life-threatening situation.
2 I would not take the steps necessary to avoid death if I found myself in a life-threatening situation.

If you have circled the zero statements in both Groups 4 and 5 above, then skip down to Group 20. If you have marked a 1 or 2 in either Group 4 or 5, then open here and go to Group 6.

_____ Subtotal Part 1

- 20** 0 I have never attempted suicide.
1 I have attempted suicide once.
2 I have attempted suicide two or more times.

If you have previously attempted suicide, please continue with the next statement group.

- 21** 0 My wish to die during the last suicide attempt was low.
1 My wish to die during the last suicide attempt was moderate.
2 My wish to die during the last suicide attempt was high.

_____ Subtotal Part 2

_____ Total Score

PEARSON

PsychCorp

Pearson Executive Office 5601 Green Valley Drive Bloomington, MN 55437
800.627.7271 www.PsychCorp.com
Copyright © 1991 by Aaron T. Beck. All rights reserved.

Warning: No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

Pearson, the PSI logo, PsychCorp, and BSS are trademarks in the U.S. and/or other countries of Pearson Education, Inc., or its affiliate(s).
Printed in the United States of America.

37 38 39 40 41 42 43 44 45 46 47 48 A B C D E

Product Number 0154018465

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Part 1

- 6 0** I have brief periods of thinking about killing myself which pass quickly.
 1 I have periods of thinking about killing myself which last for moderate amounts of time.
 2 I have long periods of thinking about killing myself.
- 7 0** I rarely or only occasionally think about killing myself.
 1 I have frequent thoughts about killing myself.
 2 I continuously think about killing myself.
- 8 0** I do not accept the idea of killing myself.
 1 I neither accept nor reject the idea of killing myself.
 2 I accept the idea of killing myself.
- 9 0** I can keep myself from committing suicide.
 1 I am unsure that I can keep myself from committing suicide.
 2 I cannot keep myself from committing suicide.
- 10 0** I would not kill myself because of my family, friends, religion, possible injury from an unsuccessful attempt, etc.
 1 I am somewhat concerned about killing myself because of my family, friends, religion, possible injury from an unsuccessful attempt, etc.
 2 I am not or only a little concerned about killing myself because of my family, friends, religion, possible injury from an unsuccessful attempt, etc.
- 11 0** My reasons for wanting to commit suicide are primarily aimed at influencing other people, such as getting even with people, making people happier, making people pay attention to me, etc.
 1 My reasons for wanting to commit suicide are not only aimed at influencing other people, but also represent a way of solving my problems.
 2 My reasons for wanting to commit suicide are primarily based upon escaping from my problems.
- 12 0** I have no specific plan about how to kill myself.
 1 I have considered ways of killing myself, but have not worked out the details.
 2 I have a specific plan for killing myself.

- 13 0** I do not have access to a method or an opportunity to kill myself.
 1 The method that I would use for committing suicide takes time, and I really do not have a good opportunity to use this method.
 2 I have access or anticipate having access to the method that I would choose for killing myself and also have or shall have the opportunity to use it.
- 14 0** I do not have the courage or the ability to commit suicide.
 1 I am unsure that I have the courage or the ability to commit suicide.
 2 I have the courage and the ability to commit suicide.
- 15 0** I do not expect to make a suicide attempt.
 1 I am unsure that I shall make a suicide attempt.
 2 I am sure that I shall make a suicide attempt.
- 16 0** I have made no preparations for committing suicide.
 1 I have made some preparations for committing suicide.
 2 I have almost finished or completed my preparations for committing suicide.
- 17 0** I have not written a suicide note.
 1 I have thought about writing a suicide note or have started to write one, but have not completed it.
 2 I have completed a suicide note.
- 18 0** I have made no arrangements for what will happen after I have committed suicide.
 1 I have thought about making some arrangements for what will happen after I have committed suicide.
 2 I have made definite arrangements for what will happen after I have committed suicide.
- 19 0** I have not hidden my desire to kill myself from people.
 1 I have held back telling people about wanting to kill myself.
 2 I have attempted to hide, conceal, or lie about wanting to commit suicide.

Go to Group 20.

- 20 0** I have never attempted suicide.
 1 I have attempted suicide once.
 2 I have attempted suicide two or more times.

If you have previously attempted suicide, please continue with the next statement group.

- 21 0** My wish to die during the last suicide attempt was low.
 1 My wish to die during the last suicide attempt

Subtotal Part 2

Total Score

PEARSON

PsychCorp

Pearson Executive Office 5601 Green Valley Drive Bloomington, MN 55437
 800.627.7271 www.PsychCorp.com

Copyright © 1991 by Aaron T. Beck. All rights reserved.

Warning: No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION



Date: _____

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

This questionnaire consists of 20 statements. Please read the statements carefully one by one. If the statement describes your attitude for the **past week including today**, darken the circle with a 'T' indicating TRUE in the column next to the statement. If the statement does not describe your attitude, darken the circle with an 'F' indicating FALSE in the column next to this statement. **Please be sure to read each statement carefully.**

- | | |
|--|---|
| 1. I look forward to the future with hope and enthusiasm. | <input type="radio"/> T <input type="radio"/> F |
| 2. I might as well give up because there is nothing I can do about making things better for myself. | <input type="radio"/> T <input type="radio"/> F |
| 3. When things are going badly, I am helped by knowing that they cannot stay that way forever. | <input type="radio"/> T <input type="radio"/> F |
| 4. I can't imagine what my life would be like in ten years. | <input type="radio"/> T <input type="radio"/> F |
| 5. I have enough time to accomplish the things I want to do. | <input type="radio"/> T <input type="radio"/> F |
| 6. In the future, I expect to succeed in what concerns me most. | <input type="radio"/> T <input type="radio"/> F |
| 7. My future seems dark to me. | <input type="radio"/> T <input type="radio"/> F |
| 8. I happen to be particularly lucky, and I expect to get more of the good things in life than the average person. | <input type="radio"/> T <input type="radio"/> F |
| 9. I just can't get the breaks, and there's no reason I will in the future. | <input type="radio"/> T <input type="radio"/> F |
| 10. My past experiences have prepared me well for the future. | <input type="radio"/> T <input type="radio"/> F |
| 11. All I can see ahead of me is unpleasantness rather than pleasantness. | <input type="radio"/> T <input type="radio"/> F |
| 12. I don't expect to get what I really want. | <input type="radio"/> T <input type="radio"/> F |
| 13. When I look ahead to the future, I expect that I will be happier than I am now. | <input type="radio"/> T <input type="radio"/> F |
| 14. Things just won't work out the way I want them to. | <input type="radio"/> T <input type="radio"/> F |
| 15. I have great faith in the future. | <input type="radio"/> T <input type="radio"/> F |
| 16. I never get what I want, so it's foolish to want anything. | <input type="radio"/> T <input type="radio"/> F |
| 17. It's very unlikely that I will get any real satisfaction in the future. | <input type="radio"/> T <input type="radio"/> F |
| 18. The future seems vague and uncertain to me. | <input type="radio"/> T <input type="radio"/> F |
| 19. I can look forward to more good times than bad times. | <input type="radio"/> T <input type="radio"/> F |
| 20. There's no use in really trying to get anything I want because I probably won't get it. | <input type="radio"/> T <input type="radio"/> F |

PEARSON

Copyright © 1978 by Aaron T. Beck. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner: Pearson, PsychCorp, the PSI logo, and BHS are trademarks, in the U.S. and/or other countries, of Pearson Education, Inc. or its affiliate(s). Printed in the United States of America.

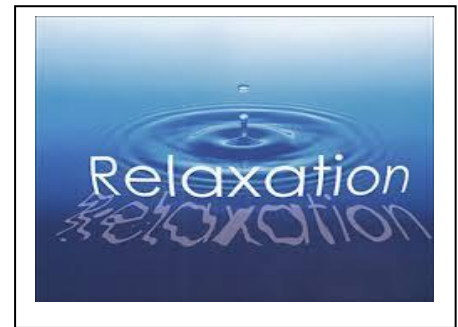


PsychCorp

39 40 41 42 A B C D E 277613-2 65

015-413362-0

Appendix J, Booklet – Intervention



1. Relaxation

Do you want to try deep breathing?

We can learn how to change our breathing to help our mind and body relax.

Take a slow, deep breath, in through your nose for 4 seconds.

Inhale as fully as you can. One....two....three....four....

Now exhale slowly and fully through your mouth, for a count of 4 seconds.

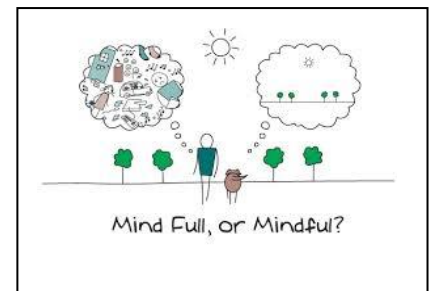
As you exhale, feel the tension and stress leave your body.

Keep breathing in and out slowly and deeply.

Repeat this rhythm for one minute.

If thoughts or feelings come to mind, just notice them and refocus on your breathing.

This will become easier with practice. Well done.



2. Mindful check-in

Take about 3 minutes to do this exercise. Begin by taking a few moments to be still, to settle in, bringing awareness to your experience of the here and now, feeling into your body and mind and simply allowing any waves of thought, emotion and physical sensation to just be.

As you begin to mindfully check-in, you enter the world of being rather than doing. In being, you may begin to notice the multitude of feelings and thoughts you carry within you in your busy day. Just acknowledging whatever arises within you, whatever is being felt and letting it be.

In practising the mindful check-in you are learning to be with the waves of thoughts, feelings and physical sensations, the waves moving, like waves on a beach, coming in and out, changing in focus and intensity.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

There is no need to judge, analyse or work things out. To be in the here and now, amidst everything that is present in this moment.

As you come to the end of this practice, acknowledging the steps you are taking in directly contributing to caring for your health and wellbeing. In learning to take better care of yourself and how you are in any moment, no matter how that is, pleasant, unpleasant or neutral. Riding the waves of present moment experience. This will become easier with practice. Well done.



3. Telephone someone

Have you got a list of phone numbers you can look at?

Who do think would offer you the help you need?

What would be helpful to talk about with that person?

How could they would help you?

Can you phone them?

If no answer, do you want to phone someone else on your list?

Put the names and telephone numbers of people you may want to phone in the box below (researcher to assist)



4. Relaxing 'Safe Place' Imagery

Spend about 3 minutes doing the following. Imagine a place where you can feel calm, peaceful and safe. It may be a place you've been to before, somewhere you've dreamt about going to, or maybe somewhere you've seen a picture of.

Focus on the colours in your peaceful safe place.

Now notice the sounds that are around you, or perhaps the silence.

Think about any smells you notice there.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Then focus on any skin sensations - the earth beneath you, the temperature, any movement of air, anything else you can touch.

Now whilst you're in your peaceful and safe place, you might choose to give it a name, whether one word or a phrase that you can use to bring that image back, anytime you need to.

You can choose to linger there a while, just enjoying the peacefulness and serenity. You can leave whenever you want to, just by opening your eyes and being aware of where you are now.



5. Hope box

Spend about 3 minutes doing the following. A hope box can be an actual box or an imagined collection in your mind.

Think about or find times that remind you of a time in your life when something good happened. (this can be a holiday, achievement, event or anything that you felt good about).

Ask yourself what happened and how did you feel?

What are the good things in your life right now? (this could be relationships with family or friends, pets or something you do)

How does it feel?

When you feel down, this “hope box” can help to provide evidence of the all the good things in your life. Continue to add to it with different things that are good in your life. This may help improve your mood.



6. Watch a short funny clip (distraction)

This should last about 3 minutes.

Do you have an idea of a funny clip that may help you to feel better?

Warning: Playing videos may cost you extra intranet charges. Please make sure you are using Wi-Fi to watch videos.

If not, can you think of something that happened that was really funny?

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Appendix K, Online Diary.

Version 1: 30/03/2014

Instructions

Thank you for taking part in the study. It will last six days, it is try to develop new techniques to help people feel better. I will try and contact you at the end of the first day and the third to see how you are getting on with the research.

Please try to make 10 entries per day. You will receive a text message with a link to the questions. Please fill it out as close as possible to the actual time.

Diary

What were you thinking about just before the alarm sounded?

What were you doing before the alarm sounded?

	Not at all									Very much
<u>Depression</u>										
Right now, I feel....										
Low?	1	2	3	4	5	6	7	8	9	10
Depressed?	1	2	3	4	5	6	7	8	9	10
Content?	1	2	3	4	5	6	7	8	9	10
Right now, I'm thinking.....										
I feel like a failure	1	2	3	4	5	6	7	8	9	10
I do not get as much pleasure from things that I used to	1	2	3	4	5	6	7	8	9	10
I am alone	1	2	3	4	5	6	7	8	9	10

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

<u>Suicidal thoughts/intent</u>										
Right now, I feel.....	Not at all									Very much
Life is worth Living	1	2	3	4	5	6	7	8	9	10
Suicidal	1	2	3	4	5	6	7	8	9	10
like taking my own Life	1	2	3	4	5	6	7	8	9	10
Right now, I'm thinking.....										
There's no point in carrying on	1	2	3	4	5	6	7	8	9	10
I wish to die	1	2	3	4	5	6	7	8	9	10
I have a strong desire to live	1	2	3	4	5	6	7	8	9	10

<u>Hopelessness</u>										
Right now, I feel.....	Not at all									Very much
Hopeless	1	2	3	4	5	6	7	8	9	10
Optimistic	1	2	3	4	5	6	7	8	9	10
My future is dark	1	2	3	4	5	6	7	8	9	10
Right now, I'm thinking.....										
I can achieve what I have set out to do	1	2	3	4	5	6	7	8	9	10
There is no point to life	1	2	3	4	5	6	7	8	9	10
I am hopeful about my future										

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

<u>Entrapment</u>										
Right now, I feel.....	Not at all									Very much
Stuck	1	2	3	4	5	6	7	8	9	10
Trapped	1	2	3	4	5	6	7	8	9	10
Powerless	1	2	3	4	5	6	7	8	9	10
Right now, I'm thinking.....										
I would like to get out of this situation	1	2	3	4	5	6	7	8	9	10
I cannot see a way out of my current situation	1	2	3	4	5	6	7	8	9	10
I am free to do what I want	1	2	3	4	5	6	7	8	9	10

<u>Defeat</u>										
Right now, I feel.....	Not at all									Very much
Listened to	1	2	3	4	5	6	7	8	9	10
Beaten	1	2	3	4	5	6	7	8	9	10
Restricted	1	2	3	4	5	6	7	8	9	10
Right now, I'm thinking.....										
I am a successful	1	2	3	4	5	6	7	8	9	10

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

person										
I feel that I have given up	1	2	3	4	5	6	7	8	9	10
I feel I have power over my current situation	1	2	3	4	5	6	7	8	9	10

Please note that this is a full list of all potential items for inclusion in the diary. Following the pilot phase, up to 50% of the above will be removed prior to the final version of the diary being confirmed. Therefore the results of the pilot phase will determine the diary items that people prefer to respond to. Furthermore the number of times the participants will be asked to complete the diary a day will be determined from this.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Appendix L, Care coordinator Screening Questions. Version 1: 30/03/2014

Recruitment will occur at Oldham Community Mental Health Team through word of mouth, telephone or email.

Has the client expressed that they have had thoughts of suicide in the last 2 months?

Is it likely they have had some thoughts and not expressed them?

Are there any known risks?

If so, what are the risks?

Is there a risk assessment for this client?

Can the client be visited at home?

Does the client have capacity to give informed consent?

Are they over 18 years old?

Can they read and write English?

Are they currently receiving Psychological therapy?

Appendix M, Telephone screening questions.

Version 1: 30/03/2014

Hello my name is Laura Maxon, I am a Trainee Clinical Psychologist. I am calling as I have received your details from X. They said you were interested in taking part in some research into suicide using mobile phones and gave me your details. Are you interested in taking part in some research?

It will involve myself meeting with you on two occasions for up to an hour and an hour and a half to complete some questionnaires. I will also ask you to complete a short diary on a mobile phone 10 times a day for six days.

You do not have to take part if you do not want to, you can stop at any times and your answers are completely confidential.

Would you like to take part in the research?

If no, say: thank you for your time.

If yes, I have some screening questions to ask you to decide if you are eligible.

Have you had any thoughts of suicide in the last two months?

Are you over 18?

Is English your first language?

If the person fits the inclusion criteria:

Where and when would be most convenient for you to meet?

Appendix N, Consent form

Version 1:14/01/2014

Title of project: Momentary interventions for people with suicidal thoughts.

The participant should complete the following part of this sheet him/herself

please delete
as necessary
and initial

1. I confirm that I have read and understood the attached information sheet and have had the opportunity to ask questions.	YES/NO Initials:...
OR I confirm that I have had the attached information sheet explained to me and have had the opportunity to ask questions.	...
2. I understand that I can withdraw from the study at any time without having to give any reasons.	YES/NO Initials:...
	...
3. I agree to the use of anonymous direct quotations from my interview in reporting the results from this study.	YES/NO Initials:...
	...
4. I hereby give consent to be involved in this research project. I understand that there will be no negative impact if I decide not to participate.	YES/NO Initials:...
	...
5. I understand that relevant sections of my medical notes and data collected during the study may be looked at by individuals from the University of Manchester, from the regulatory authorities or from the NHS trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	YES/NO Initials:...
	...
6. I understand that my information will remain confidential but if there are concerns that myself and/or others are at risk of harm this will be shared with other professionals such as your care coordinator and GP.	YES/NO Initials:...
	...

Name of participant: **Signed:** **Date:**

Research ID Number (please leave blank):

Name of researcher: **Signed:** **Date:**

This project has been approved by the _____ **(Ethics committee)**

Appendix O, Helpline numbers



Local services

Local services will be provided on the participant information sheet. Participants will be reminded of these which will include the

Samaritans helpline	24 hours	08457909090
Mental Health helpline	Mon-Fri 7pm- 11pm, Sat, Sun 12am-12pm	0500 639000
Saneline helpline	6pm to 11pm	084577678000
Crisis Resolution Team	24 hours	01706 676164
Swift Assessment For the Immediate Resolution of Emergencies (SAFIRE)	24 hours	0161 720 4816
Crises Resolution Home Treatment (CRH)	24 hours	0161 276 5368

Appendix P, Letter to GP

The University
of Manchester



Manchester Mental Health
and Social Care Trust



Version 2: 15/05/2014

Psychology Department
Address:

Tel:
Fax:
Date:

Dear GP,

Re: X

This letter is to inform you that the above client is taking part in research looking into interventions to prevent suicide delivered using mobile phones. This study aims to find out if people find it helpful to use an internet diary. This will add to the literature to find out ways to help people who have suicidal thoughts. The title is "Momentary interventions for people with suicidal thoughts".

Please find included the information sheet for more information on exactly what the research entails.

If you have any further queries please do not hesitate to contact me.

Yours Sincerely,

Laura Maxon, Trainee Clinical Psychologist

Under the supervision of Dr. Dan Pratt, Clinical Psychologist and Dr. David Robinson, Clinical Psychologist

Appendix Q, Letter to GP re: risk

Version 2: 15/05/2014

The University
of Manchester



Manchester Mental Health
and Social Care Trust



Psychology Department
Address:

Tel:
Fax:
Date:

Dear GP,

Re: X

Research title: momentary interventions for people with suicidal thoughts.

Following on from my previous letter dated X, informing you that the above client is taking part in research into interventions to prevent suicide using mobile phones. I am now writing to inform you that X has disclosed new information important in relation to the level of risk they pose to their own safety and wellbeing.

The details of this risk information are as follows:

...

...

...

If you have any further queries please do not hesitate to contact me.

Yours Sincerely,

Laura Maxon, Trainee Clinical Psychologist

Under the supervision of Dr. Dan Pratt, Clinical Psychologist and Dr. David Robinson, Clinical Psychologist

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Paper three, Title: Critical Reflections paper

A thesis submitted to the University of Manchester in part towards a Clinical Psychology Doctorate (ClinPsyD) in the Faculty of Medical and Human Sciences, 2015.

Laura Maxon

Section for Clinical and Health Psychology

School of Psychological Sciences

The University of Manchester, Section for Clinical and Health Psychology, 2nd Floor, Zochonis Building, Brunswick Street, Manchester, M13 9PL

laura.maxon@nhs.net

Tel: +44 (0)161 306 0401

Fax: +44 (0)161 306 0406

Copyright: Laura Maxon and the University of Manchester

Introduction to paper three

Paper three is a critical reflection paper which appraises, reflects and explores papers one and two in terms of the literature as well as personal and professional reflections.

1. Reflections on paper one

Introduction

Paper three aims to critically reflect on paper one and paper two. Firstly it will provide an overview of paper one and then critique it in terms of: rationale of topic, choice of search terms, the appraisal tool used, choice of synthesis, implications, strengths, limitations and conclusions. The present paper will then focus on paper two, provide an overview and then critique it in terms of: methodology, recruitment, implications, strengths and limitations.

The researcher chose this topic as it was an area of personal interest. The researcher previously undertook research in depression at undergraduate level which looked at depressive realism, the theory that depressed people are more accurate in their world views. The researcher found no support for this theory. The researcher undertook research in CBT for depression at Master's level which explored outcomes of a CBT intervention delivered at Mind organisation; the data indicated that therapeutic gains were maintained at 6 month follow-up post therapy. The researcher had previously volunteered at the Samaritans in Ireland and had frequent contact with suicidal people. The researcher originates from Ireland where suicide is a major problem and the researcher felt passionate about contributing to the literature in suicide prevention. Although the researcher had previous experience of conducting research in depression, the area of suicidality was

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

relatively new. The researcher found this area very interesting and appreciated learning more about how to prevent suicide, it was also a challenge to become familiar with the literature in this area.

Overview

Paper one reviewed the literature for technology-based psychological interventions for suicide prevention. Papers were accepted that included a measure of suicidality and a psychological or psychosocial intervention through technology. Nineteen studies were found to meet criteria; they were evaluated using a quality assessment tool, the Mixed Methods Appraisal Tool (MMAT; Pace et al., 2012). The good quality evidence favoured internet delivered CBT. Telephone-based and CD-ROMs were found to lack good quality evidence for their support. According to this review, the only well evidenced technology-based intervention for suicide prevention was Internet delivered CBT.

Rationale of topic

Previous reviews on technology-based interventions for suicidality focused on screening and social media interventions rather than evidence based psychological interventions to reduce suicidal thoughts and increase psychological wellbeing. Paper one focused on evidence-based psychological interventions for suicide prevention, which to the author's knowledge had not been undertaken before. The author intended to undertake a research project in the area of suicidality therefore it was of paramount importance to become familiar with the literature and undertake a systematic review prior to conducting research in this area.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

On reflection, the author wondered whether considering suicide as a distinct entity was the most helpful way to approach the literature. Suicidality is a symptom of depression and Borderline Personality Disorder and related to other disorders, therefore interventions focusing on these difficulties may also have been informative. However, in contrast to this, in clinical practice clients present with comorbid diagnoses and complex difficulties with interventions depending on their goals (Kelly et al., 2012). Suicidality can occur for a variety of different reasons which is in part the rationale for the systematic review focusing on suicidality independent of client group and diagnosis.

Process

The researcher found the process of undertaking the systematic review laborious and time-consuming as searching through 4,204 titles, 496 abstracts and 134 full text papers was cognitively demanding and draining. It took a lot longer than the researcher had anticipated. While reviewing the titles, abstracts and full texts, it was necessary for large amounts of written information to be processed which led to the researcher losing sight of the research questions. The researcher had developed a research protocol that was extremely helpful at this point to revisit the inclusion and exclusion criteria.

Choice of search terms

A large amount of search terms were used (30) to ensure that the relevant literature was captured. This is a strength of this review, as it means that the searches will have captured the majority of the literature, accounting for alternative words used to describe the same concept, for example, computer or technology. The author wondered at the end of the review if self-harm had been adequately covered as only two papers looking at this topic had been included in the review (Kapur et al., 2014; Saulsberry et al., 2013). Self-harm is

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

associated with suicide attempts (Owens, Horrocks, & House, 2002). The author could have included more measures of self-harm as the paper that was included looked at rates of self-harm and perhaps there are more measures that the researcher was not aware of. The researcher found that other papers focusing on self-harm did not meet inclusion criteria, due to a lack of measure of self-harm/suicidality or lack of interventions delivered through technology. In a previous review, Lai et al. (2014) excluded studies that focused on interventions for depression rather than suicidality, even if a measure of suicidality had been used. Paper one of this study included interventions for depression that measured and reported the impact on suicidality. This is a strength as it determines the impact of these interventions in suicidality. However, this may have affected the specificity of the intervention for suicidality. Furthermore, other technological interventions were reviewed in paper one such as telephone and CD-ROM which were not explored by Lai et al. (2014) whose research focused on web based interventions only.

Quality assessment tool

The quality assessment tool was chosen because it allowed for the inclusion of studies reporting on both quantitative and qualitative data. On initial searches a large amount of qualitative and quantitative papers were found which led to the decision to use this tool. Further refinement of the papers led to only one qualitative paper being included in the final analysis for review (Glatt, 1987). This was due to a lack of suicidality measures in quantitative papers on further reading. The author then questioned the use of the MMAT (Pace et al., 2012) as a main reason for using this tool was that it allowed for the quality assessment of qualitative and quantitative data. This tool is still in development and therefore should be used with caution. The author wondered if exclusion of Glatt's (1987) paper could have allowed for the use of another quality assessment tool that focused

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

entirely on quantitative data. On reflection the author decided, in collaboration with the research supervisor, that this paper met criteria and it was important to include it and therefore maintain the current quality assessment tool. The reasons for this included high ecological validity and the measurement of rates of suicide. The MMAT tool asked four questions including the dropout rate and specified that it must be below 20%. The author wondered if in suicide research the dropout rates may be higher due to associated depression which may affect motivation to complete research. If this is the case, it affects the quality ratings that were given to the papers. Therefore, a different dropout rate may be required for research in suicide prevention. A further strength is that the quality assessment tool was checked by an independent researcher for consistency. Any discrepancies were resolved through discussion which reduces researcher bias when assessing for quality. The author found this process particularly useful, it allowed for further reflection and discussion on the quality ratings given to papers and provided an alternative point of view that strengthened the review.

Choice of synthesis

A systematic review was undertaken as recommended by Higgins (2008) in the Cochrane handbook for systematic reviews. It is important to use an evidence-base when making decisions in the clinical care for clients. Undertaking a systematic review with a quality assessment measure provides a structured framework for reviewing evidence and reduces bias in the process.

A meta-analysis was not undertaken for a number of reasons, including that this was an initial review and it was not clear what literature would be found. It was useful at this point to determine evidence-based practice and ascertain what good quality literature was

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

available. Although a meta-analysis has been undertaken for Internet-based and computerised psychological treatments for adult depression (Andersson & Cuijpers, 2009), to the researcher's knowledge a meta-analysis has not been undertaken for ICBT in suicidality. Therefore a meta-analysis may have been a useful addition and allowed for statistical analysis. The researcher expected a larger mix of qualitative and quantitative papers for which a meta-analysis would not have been appropriate.

Implications

This review has implications for the wider literature in terms of technology-based psychological interventions. ICBT is the most evidence based approach that was found for suicide prevention. The only evidence-based psychological approach found was ICBT, this implies cognitive models may understand the processes of suicidality as this approach is most effective. This paper has clinical implications in the treatment of suicidality. CD-ROMs lack evidence, as do telephone helpline interventions. This must be considered when implementing technological interventions in suicidality. The researcher reflected that telephone based interventions may not be as evidence based as previously thought. The researcher wondered if perhaps these could exacerbate a person's difficulty by reinforcing the idea that they cannot cope with their emotions on their own and require assistance in order to manage their emotions. This may in part explain the increase in self harm and suicidal behaviour found in studies by Kapur et al. (2013) and Hassanzadeh et al. (2010).

Strengths

The strengths of this review are that it uses a quality assessment tool (MMAT) to assess the quality of papers. Conclusions take into account the methodological weaknesses in the

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

literature and it explored several psychological technology-based interventions for suicide prevention, allowing the different options to be compared. Furthermore, it focused on measurable outcomes such as psychological measures for suicidality and suicide rates. Another strength of paper one is that the table of papers was concise and informative. Krysinska & De Leo (2007) had not included a table in their review, a table allows for the comparison and synthesis of the research papers which is useful and informative.

Limitations

Seven papers used one question to measure suicidality that reduces the impact of the studies as arguably more than one question is required to measure such a complex phenomenon. Reliable and validated scales are necessary to measure this accurately such as the Beck Scale for Suicidal Ideation (BSS) which was used in research by Marasinghe, Edirippulige, Kavanagh, Smith & Jiffry (2012) and Wagner, Horn & Maercker (2013). Additionally, these interventions were targeting depression not suicidality and it was a secondary outcome; it therefore may not have been as effective as interventions that specifically target suicidality. This may be due to different processes and theories underlying depression and suicidality.

It is important to note that it is possible that some papers may have been missed in the searches, however all reasonable efforts were employed to reduce this happening. If papers were missed this may have affected the results as papers may not have been found which provided support for or against an intervention therefore changing the results.

Conclusions

In conclusion, paper one explored the evidence base and systematically reviewed this. There are areas where it could have been improved, including the use of a meta-analysis to

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

synthesise information, however it has strengths in terms of using a quality assessment measure and synthesising the information in a table.

2. Reflections on paper 2

Overview

Previous studies have investigated the acceptability and feasibility of mobile phone technology in the assessment of psychological therapy for people with psychosis (Palmier-Claus et al., 2012; Hartley et al., 2013). Paper two aimed to explore this assessment and intervention in a sample of people with suicidal thoughts. This study aimed to assess the acceptability and feasibility of a psychological based diary and intervention delivered through mobile phones for people with suicidal thoughts. Twenty participants were recruited through secondary care. Participants in the research completed over 33% of prompted diary points which is considered an acceptable number according to previous research (Kimhy et al., 2012). Dropout rates were also low, less than 10% and is less than expected given that the systematic review found high dropout rates. The current dropout rate may have been low through careful screening of participants prior to taking part in the research through screening questions for the care coordinators and participants.

Additionally, monetary gains of remaining in the study may have been a motivator for continued participation. Participants rated the technology and intervention high in terms of practicality, ease of use and overall satisfaction of the programme. Acceptability data demonstrated that participants found it useful to express their thoughts and feelings through the online diary and it helped them to notice fluctuations in mood. They appreciated the usefulness of the interventions and the sense of having someone to listen to them. Overall, the diary and intervention delivered through technology were found to be feasible and acceptable for people with suicidal thoughts.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Rationale

Technology has gained popularity in the past few years in mental health treatment (Donker et al., 2013; Lai et al., 2014). The researcher had obtained a smart phone recently and was impressed by what can be achieved using this such as easy access to emails, as well as navigation of the internet allowing for quick access to knowledge. Technology is increasingly being used in physical health treatments such as increasing behavioural change (Campbell et al., 1994) and text message reminders for appointments in primary care settings (Leong et al., 2006). The researcher wondered how technology and psychology could be combined to assist people with suicidal thoughts for building skills and provide tools for managing their difficulties. Mobile technology had previously been applied to the assessment of psychotic symptoms using Experience Sampling Methodology (ESM; Palmier-Claus et al., 2012 & Hartley et al., 2013). It was therefore important to apply this to people with suicidal thoughts for assessment and intervention to prevent deaths by suicide and increase psychological wellbeing.

Methodology

The researcher was part of an ESM group that met regularly to discuss developments in the field that assisted with the development of the method and highlighted current literature in the area (Kimhy et al., 2012). The researcher chose the methodology based on previous research in this area. Morris (2014) focused on vulnerability to psychotic symptoms in substance misuse problems using ESM sampling and mobile phones and utilised a similar methodology. A randomised control trial (RCT) was considered as the gold standard research design. MRC guidelines (2000) recommend an acceptability and feasibility study prior to any trials.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

The researcher was familiar with psychological interventions but less familiar with the technology aspects, which was more challenging. Close liaison was required with an IT specialist about updating and modifying the diary as required (i.e. when revising the questions from 30 to 16). As an independent researcher, this could at times be frustrating in terms of being unable to make any changes to the online diary independently.

Additionally, the technology had limitations in terms of what the researcher were able to achieve; video of imagery was considered but was not possible due to technological limitations at the time. Following the end of the research, the researcher was left wondering about the progress of the participants, had they improved or worsened, had they undertaken any suicide attempts or had their skills in managing these thoughts and feelings improved following the research. On reflection, a useful addition to the research may have been to follow up the participants at 3 and 6 months to assess their current mood states and if there was any long term impact of the intervention. This was not possible to undertake retrospectively due to ethical constraints, and permission having not been obtained at the start of the research. However, this was beyond the scope and time constraints of the current research focusing on acceptability and feasibility.

No previously established measures for suicidality in the moment (state measures) existed; therefore one was devised by the researcher based on previous literature in the area. This was a significant undertaking and challenge for the researcher in the development stage. It is envisaged that this will help with the development of an ESM diary for future research. Traditional psychological measures focus on retrospective measures which rely on memory of symptoms over the last week or two weeks to determine depression and suicidality, such as the BDI (Beck, Steer & Brown, 1996), the BSS (Beck & Steer, 1991) and the BHS (Beck & Steer, 1988). Perhaps psychology will move towards measures that are in the moment. It is recognised that a fairly large number of questions (16) were asked

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

in the ESM diary (even after this was reduced from 30) and there may have been reactivity to the method as preliminary results suggest. Therefore the researcher wonders whether future research could focus on intervention only and assess this through pre-and post-measures. This may reduce reactivity to the diary questions if people are prompted to undertake just an intervention rather than a diary and intervention.

Ethical approval process

The ethical approval process for the NHS was a long and arduous process requiring repeating significant amounts of information in different formats. The author wondered whether this was time and cost effective for the NHS and it may be a barrier to clinicians undertaking research. The author wondered if accepting information in different formats whilst ensuring key information is covered may improve the researcher's experience of the process and increase efficiency which may increase clinicians undertaking research. The researcher appreciates that client safety is paramount particularly in suicide research due to risk of harm and even death however the process and systems have the potential to be more user-friendly, efficient, cost-effective whilst maintaining client and participant safety.

Recruitment

Recruitment was challenging for this client group for the researcher and care coordinators. It was important that clients were recruited at a point where they were not actively suicidal but had thoughts of suicide in the past 2 months. This was to ensure that the research was not harmful to participants. It was also important that participants were motivated to help themselves with their difficulties, due to the methodology of the research (completing diary and interventions up to 8 times a day for 6 days). Participants were required to have their own internal motivation to complete the measures and interventions.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

Conducting the research had an emotional impact on the researcher. The extent of this was not truly realised until recruitment had ceased. While recruiting the researcher checked responses on the diary every morning for risk issues, which felt like a large responsibility in terms of assisting with managing risk of harm to self for these clients. Additionally, for participants that had active plans of suicide, managing the risk was stressful for the researcher. Due to pressures on the researcher while recruiting, some participants were seen in the evening. This left limited services available if any risk issues arose. This led to the researcher prioritising all visits within office hours. The researcher had previous experience working with people who were suicidal in terms of providing non-judgemental emotional support in the Samaritans and from a psychological perspective as a Trainee Clinical Psychologist. This was a definite strength in terms of undertaking research in this area. Supervision was particularly important when managing any risk issues that arose to ensure that the risk protocol had been followed correctly and all measures had been taken to ensure that participants were kept safe from harm to themselves.

Additionally, recruiting through care coordinators added an extra layer of complexity to recruitment. Care coordinators were the gatekeepers to participants being able to decide to take part in the research. The researcher therefore had to request care coordinators to ask their clients and subsequently remind them to do so and follow this up. Care coordinators carry large caseloads and are extremely busy, which made this quite difficult. The researcher was quite persistent in following up these leads with care coordinators. Some care coordinators could refer more than one client, for example, one care coordinator referred three clients for the research who all reached the completion stage. Other care coordinator's clients declined to take part or did not refer any clients for the research. On reflection, it would have been useful if any named professional (i.e. a psychologist, psychiatrist, occupational therapist, support worker or nurse) who was not a care

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

coordinator but was involved in the clients care could have asked clients if they wished to take part in the research. This may have improved recruitment rates. There were some restrictions in terms of ethical approval that participants could not be approached by the researcher directly to protect vulnerable clients which is why participants were recruited through a named professional.

Another barrier to recruitment was the technological aspect of the study. One care coordinator expressed concern about the use of technology as opposed to face to face interventions, that they may have been perceived as impersonal and potentially cold. They were informed that the intervention was envisaged to be an addition to traditional interventions however the care coordinator did not wish to ask her clients to take part. One potential participant who declined to take part in the research expressed similar concerns, stating that it “took away from the human experience”. Conversely, other participants appreciated the anonymity of the diary. There may be a learning barrier for some people and traditional therapies or systemic may be more helpful.

A relative strength of the research’s methodology is that it reduced sampling bias by providing participants with mobile phones if they did not have one. This reduced excluding people on this basis. However, it is recognised that participants with their own mobile phones may have felt more comfortable in taking part in the research as less new learning was required. One mobile phone went missing throughout the duration of the research. This may be a problem with providing people with technology. The budget allowed for purchase of cost-effective smart phones that were not as user-friendly as more expensive smartphones. A strength of the method is that it was easy to use via the Internet and participants reported that it was quick. With an increasingly technologically-aware population, these barriers may be reduced.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

The methodology allowed for an in-depth look into participants' thoughts, feelings and mood throughout the day that was informative, for the research and it helped participants become aware of this fluctuation. Participants reported that they valued this, this may have led to a response bias, people liked it so completed it because they wanted to rather than when prompted.

An ethical dilemma occurred when a participant reported that the diary was making them feel worse in terms of symptoms. The researcher advised the participant to stop completing the diary and offered to cancel any remaining text messages as soon as possible. However, the participant wished to continue taking part in the research. The author liaised with the participant's care coordinator and the field supervisor and it was collectively decided that withdrawing the participant from the study at this time may increase the participant's risk of harm to self due to potentially feeling rejected. Additionally, the intervention phase was due to start that may have given the participant some tools to help her manage these difficult feelings.

Implications

It is possible that asking people repeatedly about suicide may increase their thoughts about it due to reactivity to the method, evidenced by preliminary data in the paper two. This was not the researcher's intention and the author wondered if further research could focus on the intervention only in order to reduce the likelihood of this happening. An avoidance model may also explain this, for example, by decreasing the participants' avoidance of the difficulties it may lead to an increase in distress. However, in therapy it is necessary to face the difficulties in order to achieve positive and meaningful change. Following undertaking the systematic review, it was discovered that CBT based interventions were the only evidence-based technology approaches in relation to suicide prevention. The

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

researcher wonders if focusing on a more CBT approach in terms of the intervention may have been useful. Phoning a friend and distraction may not have been as strictly CBT focused as psychoeducation on thoughts, feelings and behaviours. However, the relaxation, mindfulness, safe place and the hope box were consistent with a CBT approach.

The researcher wondered if it was possible that providing strategies for intervention when participants were experiencing suicidal thoughts may have led to the idea that suicidal thoughts are something that needs to be “dealt with”. It may be just as important to teach participants to learn to sit with those emotions and discover that they will pass over time. A mindfulness intervention was offered which did offer skills in learning to “just be” with those difficult feelings and that may address this issue.

The researcher noticed that clients who disclosed sexual abuse reported to find it harder to complete the diary and intervention. It is important to note that this was not explicitly asked but three participants disclosed previous sexual abuse in the initial meeting. With consent this was discussed with care coordinators who were aware of the past abuse in all cases. There was insufficient data to assess this statistically. However, the researcher became aware that people who disclosed an abuse history found completing the diary more difficult. This may be due to intrusive thoughts of their trauma such as flashbacks which may represent a PTSD type presentation (DSM-V, APA, 2003). A participant who took part reported this phenomenon that focusing on her current feelings led to flashbacks or intrusive memories and images and she had a diagnosis of PTSD. It may be useful to explore this in future research as ESM methodology may cause reactivity to the method in people who have a history of sexual abuse or trauma. It is important to be mindful of this when undertaking ESM research and when asking people to complete assessments and interventions without the presence of the therapist or researcher. Research could explore if

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

ESM studies increase intrusive thoughts or rumination. The author wondered if the diary or intervention may trigger flashbacks, reduce avoidance that may increase distress. The researcher did offer these participants the opportunity to withdraw if they felt affected by the diary; however the participants chose to continue. This may be a further reason why state measures were found to increase in the research paper. It was deemed by the researcher and supervisor that in order to manage risk it was important to allow these participants to continue in the research as ceasing involvement may have led to feelings of rejection and increased risk. Additionally, two clients noted that they struggled with control and felt when they received a text message that they lacked control. Therefore, it was important for these participants to feel in control of when they did and did not respond to the diary and intervention. This may in part explain why participants completed the intervention when it was convenient to them approximately half of the time (47%). This may have increased their sense of control to complete the diary. This however led to less usable data in the analysis (according to Kimhy et al., 2012) who recommend only using data completed within 15 minutes of prompt) as completing the diary and intervention when the participant was feeling low may have led to a bias in the results. For example, if participants only completed it when they were feeling down this would lead to negatively skewed data. Participants reported that when they were busy or out with friends they found it more difficult to complete the diary. It is possible that participant's mood was higher when they were busy.

The author was working on placement in a secondary care adult mental health service whilst undertaking the research, which had links with the CMHT where participants were being recruited. This was a strength in that the researcher had contact with care coordinators on a weekly basis which allowed for follow up in terms of recruitment. Working with complex clients with severe and enduring mental health problems was a

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

new area for the researcher and to switch from work to research with a similar client group was intellectually and emotionally demanding in terms of learning current theories and interventions and building skills in assisting clients to manage difficult feelings.

Transference may pose significant difficulties if a client is hopeless and through transference the care coordinator also becomes hopeless about the client improving.

Transference is the unconscious directions of one's feelings from one person to another and may occur when client's anxieties and mood difficulties are placed on to researcher or care coordinator. It is important to be aware of this when working with this client group in a research capacity. The researcher became familiar with participants' presenting difficulties and any risk issues current and historical. Interpersonal dynamics between client and researcher complicated the process of undertaking the research. Additionally, difficult interpersonal processes between clients and care coordinators may have decreased the likelihood of care coordinators asking clients to take part. Care coordinators may have been concerned about potential risk issues if their clients took part in the research.

Ensuring clear boundaries between researcher and participants was particularly important as well as liaising with care coordinators who knew the participants well. The author was mindful of how these interpersonal processes may impact the research. For example, the researcher wondered if some participants who contacted the researcher through the research time were having technical difficulties or if they wished to increase their social contact. It was not possible to determine which was the case. The author had two roles in the NHS that was challenging and potentially confusing for some participants and care coordinators. This is part of the reality of undertaking research work in the NHS and highlights the importance of having protected time to research to maintain boundaries in terms of time management.

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

The researcher particularly appreciated meeting participants from all walks of life and seeing their strengths and difficulties. The researcher found it interesting how open and keen participants were to take part in research to help others. This was similar to that found by Taylor et al., (2010) who found that the majority of people with Schizophrenia and suicidal thoughts benefitted from taking part in research in terms of altruism, value of being involved and therapeutic effect. The researcher found it humbling and inspiring that people who reported that they were struggling (and evidenced by the measures) were able to take part in the research despite being in difficult situations themselves that included thoughts of ending their own life. The author wondered if taking part in the research may have normalised participants experience of suicidal thoughts which challenged their appraisals system (questioning the ability to cope) and reduced distress. This is outlined in the schematic appraisal model of suicide (SAMS; Johnson, Gooding & Tarrier, 2008) that it is the appraisal of the thoughts rather than the thoughts themselves that can cause distress.

The present research has important implications in clinical practice as technology was found to be a feasible and acceptable method of recording mood and delivering interventions. It could be used as an adjunct to therapy and a way of teaching skills (Kelly et al., 2012).

Strengths

The strengths of this research lie in its novel application of technology based interventions to suicidality. As far as the researcher is aware, no other research has been undertaken which looked at a mobile phone intervention in suicidality. Additionally, a clinical sample was used, which allows for a representative client group with the complexities and

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

comorbidities that would be expected in adult secondary care. It is particularly important that the client group is representative when assessing for feasibility and acceptability.

Limitations

This study did not have a different control group, participants acted as their own controls. It does not have sufficient participants in order to have power in terms of demonstrating a statistically significant difference in symptoms. This was not particularly important in terms of feasibility and acceptability but it does limit the findings of the secondary outcome data. Further research in this area assessing outcomes would be advised to consider these issues.

Conclusion

Paper two explored the acceptability and feasibility of a technology-based intervention of suicidality and found that it was an acceptable and feasible intervention. Strengths of this paper include the use of participants from a clinical sample and limitations include the lack of control group and small sample size.

Overall Conclusion

This paper critically reflected on paper one and two in terms of strengths and limitations in all aspects of the papers. It assisted the researcher in reflecting on each element of the research and provided a balanced view of the strengths and limitations.

3. References

- American Psychiatric Association. (APA; 2003). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. ManMag. American Psychiatric Association.
- Andersson, G., & Cuijpers, P. (2009). Internet-based and other computerized psychological treatments for adult depression: a meta-analysis. *Cognitive Behaviour Therapy*, 38(4), 196-205. doi: 10.1080/16506070903318960
- Beck, A. T., & Steer, R. A. (1988). *Beck hopelessness scale*. The Psychological Corporation, San Antonio.
- Beck, A. T., & Steer, R. A. (1991). *Manual for the Beck scale for suicide ideation*. San Antonio, TX: Psychological Corporation.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory-II*. San Antonio.
- Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R. F., & Sandler, R. S. (1994). Improving dietary behavior: the effectiveness of tailored messages in primary care settings. *American journal of public health*, 84(5), 783-787. doi: 10.2105/AJPH.84.5.783
- Donker, T., Petrie, K., Proudfoot, J., Clarke, J., Birch, M. R., & Christensen, H. (2013). Smartphones for smarter delivery of mental health programs: a systematic review. *Journal of medical Internet research*, 15(11). doi: 10.2196/jmir.2791
- Glatt, K. M. (1987). Helpline: suicide prevention at a suicide site. *Suicide and Life-Threatening Behaviour*, 17(4), 299-309. doi:10.1111/j.1943-278X
- Hartley, S., Barrowclough, C., & Haddock, G. (2013). Anxiety and depression in psychosis: a systematic review of associations with positive psychotic symptoms. *Acta Psychiatrica Scandinavica*, 128(5), 327-346. DOI: 10.1111/acps.12080
- Higgins, J. P. (Ed.). (2008). *Cochrane handbook for systematic reviews of interventions* (Vol. 5). Chichester, England: Wiley-Blackwell.
- Husky, M., Olié, E., Guillaume, S., Genty, C., Swendsen, J., & Courtet, P. (2014). Feasibility and validity of ecological momentary assessment in the investigation of suicide risk. *Psychiatry research*, 220(1), 564-570. doi:10.1016/j.psychres.2014.08.019
- Johnson, J., Gooding, P., & Tarrier, N. (2008). Suicide risk in schizophrenia: Explanatory models and clinical implications, The Schematic Appraisal Model of Suicide (SAMS). *Psychology and Psychotherapy: Theory, Research and Practice*, 81(1), 55-77. doi: 10.1348/147608307X244996
- Kelly, J., Gooding, P., Pratt, D., Ainsworth, J., Welford, M., & Tarrier, N. (2012). Intelligent real-time therapy: harnessing the power of machine learning to optimise the delivery of momentary cognitive-behavioural interventions. *Journal of Mental Health*, 21(4), 404-414. doi:10.3109/09638237.2011.638001)

TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR SUICIDE PREVENTION

- Kimhy, D., Myin-Germeys, I., Palmier-Claus, J., & Swendsen, J. (2012). Mobile assessment guide for research in schizophrenia and severe mental disorders. *Schizophrenia bulletin*, sbr186. doi: 10.1093/schbul/sbr186
- Krysinska, K. E., & De Leo, D. (2007). Telecommunication and suicide prevention: hopes and challenges for the new century. *OMEGA--Journal of Death and Dying*, 55(3), 237-253. doi: 10.2190/OM.55.3.e
- Lai, M. H., Maniam, T., Chan, L. F., & Ravindran, A. V. (2014). Caught in the web: a review of web-based suicide prevention. *Journal of Medical Internet Research*, 16(1). doi: 10.2196/jmir.2973
- Leong, K. C., Chen, W. S., Leong, K. W., Mastura, I., Mimi, O., Sheikh, M. A., ... & Teng, C. L. (2006). The use of text messaging to improve attendance in primary care: a randomized controlled trial. *Family practice*, 23(6), 699-705. doi: 10.1093/fampra/cml044
- Marasinghe, R. B., Edirippulige, S., Kavanagh, D., Smith, A., & Jiffry, M. T. (2012). Effect of mobile phone-based psychotherapy in suicide prevention: a randomized controlled trial in Sri Lanka. *Journal of telemedicine and telecare*, 18(3), 151-155. Retrieved from: <http://www.researchgate.net>
- Morris, R. J., 2014, and experiencing sampling this methodology using mobile phones for cannabis users (Dissertation, Manchester Metropolitan University). doi: 10.1348/147608307X244996
- Owens, D., Horrocks, J., & House, A. (2002). Fatal and non-fatal repetition of self-harm Systematic review. *The British Journal of Psychiatry*, 181(3), 193-199. doi: 10.1192/bjp.181.3.193
- Pace, R., Pluye, P., Bartlett, G., Macaulay, A. C., Salsberg, J., Jagosh, J., & Seller, R. (2012). Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *International Journal of Nursing Studies*, 49(1), 47-53. doi:10.1016/j.ijnurstu.2011.07.002
- Palmier-Claus, J., Ainsworth, J., Machin, M., Barrowclough, C., Dunn, G., Barkus, E., ... & Lewis, S. (2012). The feasibility and validity of ambulatory self-report of psychotic symptoms using a smartphone software application. *BMC psychiatry*, 12(1), 172. doi:10.1186/1471-244X-12-172
- Taylor, P. J., Awenat, Y., Gooding, P., Johnson, J., Pratt, D., Wood, A., & Tarrier, N. (2010). The subjective experience of participation in schizophrenia research: A practical and ethical issue. *The Journal of nervous and mental disease*, 198(5), 343-348. doi: 10.1097/NMD.0b013e3181da8545
- Wagner, B., Horn, A. B., & Maercker, A. (2014). Internet-based versus face-to-face cognitive-behavioral intervention for depression: A randomized controlled non-inferiority trial. *Journal of Affective Disorders*, 152, 113-121. doi:10.1016/j.jad.2013.06.032