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Chapter 1 General introduction

This thesis analyses results from a series of studies on the online group intervention Grip Op Je Dip, designed for Dutch adolescents and young adults aged 16 to 25 who have symptoms of depression. Grip Op Je Dip is translated here as Master Your Mood (MYM). The intervention is based on the principles of cognitive-behavioural therapy (CBT). Before setting out the objectives of the thesis, its context is clarified by stressing the gravity of the problem of depression for young people. The importance is emphasized of detecting the disorder at early stages and of reaching and helping depressed young people, and the opportunities are highlighted that web-based interventions such as MYM have to offer.

Depression in adolescents and young adults

Depression is a common mental health disorder among young people, with a prevalence rate rising from childhood to young adulthood. A meta-analysis by Costello and colleagues (2006) found depression in 2.8% of children under age 13 and in 5.6% of those aged 13 to 18. During adolescence, prevalence rates increase more steeply in girls than in boys (by a 2:1 ratio). Prevalence continues to grow in young adulthood, with depression affecting 6.7% of Dutch 18- to 24-year-olds every year; the risk of depression is greater in this age category than in older categories (De Graaf et al., 2010). By the age of 19, some 20% to 25% of all young people have experienced a depressive episode (Merry et al., 2011). Depression is often accompanied by other mental health issues such as anxiety disorders (25%), obsessive-compulsive disorders (15%) and externalising problems such as attention deficit hyperactivity disorder (25%-40%) (Buitelaar et al., 2009). A depressive episode at a young age predicts a more protracted disorder (Kovacs et al., 1984), carries a high risk (30%) of persistence into adulthood (Buitelaar et al., 2009), and can raise the lifetime risk of suicide from 1.3% in the general population to 6% (NICE, 2005).

Subclinical depression (or minor depression; Smit et al., 2013) is a condition in which several depressive symptoms are present but not all of the DSM-V criteria for clinical depression are met. Subclinical depression is likewise

widely prevalent at youthful ages. Its one-year prevalence rate in Dutch adolescents aged 13 to 17 has been estimated at 21.4% (Smit et al., 2003); no prevalence figures for young adults are available. Early detection and intervention in subclinical depression is crucial from the point of view of disease prevention, as the condition is a strong predictor of major depression in the near future (Cuijpers et al., 2008; Georgiades et al., 2006). That probability is over six times higher than in people without a subclinical depression (Cuijpers et al., 2008).

Adolescent depression may be accompanied by serious problems, including poor school performance (Meijer et al., 2006), school absenteeism and drop-out (Dopheide, 2006), problematic relations with parents and peers (Cicchetti et al., 1998), excessive tobacco and alcohol use (Glied et al., 2002) and suicidal behaviour (Fergusson et al., 2000). All these can have major consequences for the professional and social status that an individual will achieve later in life (Klein et al., 2008). The economic ramifications of depression are also considerable: the costs to society of adult depression have been put at €1.5 billion a year, including health care and work absenteeism (Conijn et al., 2011). No figures are available for adolescent and young adult depression.

Depression does not have one single cause. It is thought to arise from a complex interplay of genetic, biological, psychological and social factors (Smit et al., 2007, 2004). A number of higher-risk groups are known, including children whose parents have mental health problems. Children of parents with depression have nearly a three times greater likelihood of developing the disorder themselves than do children of other parents (Weisman et al., 2006). Although genetic factors may play some part, a parent with mental health problems may also have other problems that heighten their children's vulnerability, such as impaired childrearing competence as a consequence of unsound mental health (Van der Zanden et al., 2010; Christofferson et al., 2003; Duggan et al., 1998). Depression is more common, too, in young people with high inhibitions and low self-esteem, with homosexual preferences, with other mental health disorders or chronic physical illnesses, with low social support, or with distressing, traumatic life experiences such as child maltreatment or emotional neglect (RIVM, 2013). A final group of young people at greater risk for depression are those with a lower socioeconomic status (Van Dorsselaer et al., 2009). A childhood in a two-parent family is a factor that is clearly protective against depression (Van Dorsselaer et al., 2009; Costello et al., 2008). Other protective factors are high levels of intelligence, self-insight and realistic self-estimation, a knowledge and understanding of depression and how to deal with it, a flexible personality, good interpersonal relations, a higher sense of

mastery (perceived control over one's own life) and participation in pleasurable and/or physical activities (Conijn et al., 2011).

The importance of early detection and intervention

The foregoing exposition has illustrated the prevalence and the serious consequences of depression among adolescents and young adults. Worldwide, depression is the fourth-ranked disorder in terms of disease burden, and by 2030 it is expected to carry the highest burden of disease in high-income countries (WHO, 2011; Mathers et al., 2006). The World Health Organization has called for the development of preventive interventions to reduce the burden of depression (Moussavi et al., 2007; Saxena et al., 2006). It has prioritised research on the early detection and management of mental health problems and on improving the quality of mental health services (Fiorillo et al., 2013). Research has shown that early detection and intervention in cases of major and subclinical depression can substantially reduce the public health burden. Meta-analyses of depression prevention trials indicate that the risk of developing a first-onset major depressive episode drops by 10% to 30% after intervention with indicated prevention measures during an early stage of depression symptoms (Dennis et al., 2013; Munoz et al., 2010, Cuijpers et al., 2008, 2007). Delivering indicated prevention to 8 to 13 people may prevent one new depression case (Cuijpers et al., 2008), a rate regarded as favourable in the field of preventive medicine (Thompson et al., 2011).

Recognising, reaching and helping young people with depression symptoms

Because indicated prevention measures at an early stage reduce the risk that major depression will develop, and because most first-onset episodes of depression develop in adolescence and early adulthood (De Graaf et al., 2010; Costello et al., 2006, 2008; Birmaher et al., 1996), teenagers and young adults constitute a crucial target group for depression prevention. The following questions are relevant: how to recognise depression in young people at early stages, how to reach them and what interventions are appropriate.

How to recognise depression symptoms in youth at an early stage

Most initial depression diagnoses are made by general practitioners (Terluin et al., 2004). GPs also account for the majority of referrals of young people with depression symptoms to primary or specialised mental health care providers (Nuijen et al., 2010). Yet research still reveals a serious underrecognition of adult and youth depression by GPs (Kamphuis et al., 2012; Nuijen et al., 2010; Zwaanswijk et al., 2005). Fewer than a quarter of the adolescents with self-reported mental health problems have been appropriately diagnosed by GPs (Zwaanswijk et al., 2005). Milder levels of depression are especially underrecognised; more severe depression, expressed by more DSM symptoms and poorer mental functioning, is less likely to go unnoticed (Kamphuis et al., 2012). GPs readily overlook one or two symptoms, thus complicating the recognition of mild depression. In research studies, the interrater reliability of depression symptoms has also been shown to be lower in mild depression (Terluin et al., 2004). The study by Kamphuis and colleagues (2012) indicates that for patients with a first-onset depressive episode, the timely recognition of a patient's depression symptoms by a GP may be decisive, as the mental functioning of early-detected patients shows greater improvement after one to three years than that of patients whose depression went unrecognised.

We may conclude that early recognition by GPs of depression symptoms in adolescents and young adults – the groups in which the first onset of depression usually occurs – is a pertinent area for research. Studies of how young people express levels of depression, and of how those articulations are interpreted and classified by primary health care professionals in terms of DSM depression symptoms, may help to build relevant knowledge that can expedite early detection, along with the development of user-friendly screening instruments for major and subclinical depression for use by primary care providers (Buitelaar et al., 2009; NICE, 2005).

How to reach young people at early stages of their symptoms

The second question is how to reach young people with depression. Do they consult with primary care services about their depression symptoms? According to a Dutch national record system of diagnoses in GP patients (Nivel, 2010), GPs reported the depression diagnosis in the 15-to-25 age group in 7.2 cases per 1000 patients, and depression symptoms in 6.8 cases. These numbers of cases were lower than those in the 25-to-44 age group (20.2 and 8.9 per 1000), despite the higher 12-month prevalence of depression in the younger group (De Graaf et al., 2010). Other studies have shown that only a minority

of children and adolescents with mental health problems receive specialised care (Zwaanswijk et al., 2011; 2007). As pointed out above, such figures may be partly due to underrecognition of depression in adolescence and young adults. Other factors may be involved as well. A study by Vanheusden and colleagues (2008) indicates that young people experience many obstacles to seeking professional help for mental health problems: they underestimate or deny their problems, they want to solve these by themselves, they are pessimistic about the usefulness of professional help and they fear stigmatisation. Deficient knowledge of psychological problems, of their potential consequences and of the available mental health care is thought to play a significant role. Initiatives have emerged worldwide that try to remove such hindrances and to reach young people with the health services they need (Tylee et al., 2007).

Research has highlighted a range of different approaches that may lower barriers and facilitate access to people in the target group at early stages of their symptoms. These include the dissemination of reliable information about depression, its consequences and the options for effective treatment in forms that appeal to young people (Vanheusden, 2008); the provision of web-based treatments in which young people can take part anonymously and which fit into their digital world (Riper et al., 2012; 2007; Gerrits et al., 2007); positive message framing and positive goal setting to allay fears of stigmatisation and encourage active problem solving (Lankester et al., 2008; Rothman et al., 1997); the provision of universal and indicated depression interventions in social settings like schools, thereby facilitating access to target groups that would otherwise be difficult to reach, such as low-SES groups (Van der Zanden et al., 2013; Crutzen, 2009; Neil et al., 2009); and improvement of symptom recognition in primary health care at early stages of depression (Zuckerbrot et al., 2006).

Approaches incorporating the features just identified need to be developed, tested and implemented in order to gain better access to the target group of adolescents and young adults who have symptoms of depression.

How to intervene in cases of depression symptoms in youth

What interventions and treatments are appropriate to offer adolescents and young adults with depression symptoms? Extensive research has been conducted on cognitive-behavioural therapy (CBT) for depression in adolescents. Meta-analyses have shown that selective and indicated prevention and treatment programmes based on CBT are effective in reducing depression symptoms in adolescents (Stice et al., 2008; Klein et al., 2007; Weisz et al., 2006; Horowitz et al., 2006). However, randomised controlled studies on *web-based* CBT interventions among depressed adolescents and young adults are still

scarce (Riper et al., 2012; Calear et al., 2010), as is research on the long-term effects of CBT in depressed adolescents (Buitelaar et al., 2009).

The Dutch *Multidisciplinary Guidelines on Depression, Youth Addendum* (Buitelaar et al., 2009), recommend CBT or interpersonal therapy for subclinical, mild and severe depression in adolescents. For severe depression, combination therapy using antidepressants is endorsed. This thesis concentrates on CBT, as MYM is founded on its principles. CBT is based on the notion that mental disorders are associated with characteristic alterations in cognitive and behavioural functioning and that this pathology can be modified with pragmatic, problem-focused techniques (Wright et al., 2006). The core components of CBT are *cognitive restructuring*, in which dysfunctional thinking patterns are identified and changed, and *behavioural activation*, in which pleasurable activities are planned and obstacles to performing these are overcome. In addition, CBT may include psychoeducation, realistic goal setting, self-monitoring (of mood, activities and thoughts), social and communication skills, relaxation exercises and problem-solving skills (Buitelaar et al., 2009; McCarthy et al., 2007). In the Dutch specialised youth services, 12 to 16 CBT sessions are customary (Buitelaar et al., 2009); for indicated prevention, ten or fewer sessions are common, with a tendency towards briefer interventions in recent years (information from Trimbos Institute Helpdesk, 2013).

Despite the extensive research on the effectiveness of CBT in young people with subclinical to severe depression, still little is known about which components are effective and what mechanisms of change are at work in the participants. Several outcomes studies on CBT interventions for youth and adults with subclinical to severe depression symptoms have found no dose-response relation, meaning that no relationship was detected between sessions attended or therapy duration and treatment outcome (Warmerdam et al., 2010; Weisz et al., 2006; Speck et al., 2005; Clarke et al., 2005, 2001). Furthermore, it appears that positive change often takes place at the beginning of treatment, or even before the presumed active ingredients of CBT are provided, suggesting that non-specific factors may play a role in recovery (Warmerdam et al., 2010; Longmore et al., 2007). Other studies suggest circularity in recovery processes, whereby there is a reciprocal influence of change in cognitions and change in mental health symptoms, including anxiety and depression (Meulenbeek et al., 2010; Anholt et al., 2008; Jarret et al., 2007). Finally, a meta-analytic review by Stice and colleagues (2009) on depression prevention programmes (universal, selective and indicated) for adolescents found no relation between intervention content (e.g. a focus on reducing negative cognitions or on problem-solving training) and effect sizes. Larger effects emerged for programmes targeting high-risk individuals, samples with more female participants, samples with

older adolescents, programmes with shorter durations and with homework assignments, and programmes delivered by professional interventionists.

Summarising, CBT is an effective approach for reducing depressive symptoms in youth, but which specific elements of the treatment are effective and what exact mechanisms bring on a person's recovery are still at the frontiers of knowledge. Potentially, the analysis of clients' language use, which has been found to be a marker of mental health (Baddely et al., 2011; Molendijk et al., 2010; Pennebaker et al., 1997), will open new ways to detect clues for active components and processes of change. The growing number of web-based treatments, with their textual communication, generates a wealth of data that can be analysed for this purpose, in addition to the usual measurements. Hence, research is needed on the active components of treatment and on processes of change. Additional trials of web-based treatments for youth with depression symptoms are also needed, as e-mental health has become common practice and randomised controlled trials among youth are still rare.

Master Your Mood

In 2005, the online MYM course that is the object of this thesis was developed by the Trimbos Institute, and the mental health services Dimence, De Jutters, Altrecht/Indigo. Other mental health organisations later joined the initiative. The MYM course is a form of CBT-based indicated depression prevention. The intervention was derived from the Dutch version (Cuijpers et al., 2009) of the Coping with Depression course (Lewinsohn et al., 1984). The purpose of developing MYM was to reach young people with an effective intervention at an early stage of their depression symptoms by lowering the threshold for them to seek professional help. The following principles were therefore applied in MYM: online delivery of the intervention, online depression screening, anonymous participation (which decreases fears of stigmatisation), no waiting lists, targeting of the group with subclinical to mild depression (to forestall development of severe depression), group sessions (to support mutual recognition of problems), structured CBT with homework assignments, and delivery by trained prevention workers. These principles enabled MYM to include several components that had been identified by research as being associated with better effect sizes (e.g. Stice et al., 2010) and better access to the target group (e.g. Riper et al., 2012; 2007).

At the core of MYM are two elements: cognitive restructuring of thinking patterns and behavioural activation. Course participants are encouraged to detect their own unproductive, unrealistic thoughts, and they are then taught to

transform these into realistic, helpful thoughts. Performance of pleasurable daily activities is encouraged, and a 'mood measure' is completed daily to elucidate the connection between pleasant activities and mood. The course, which is preceded by an online screening procedure, takes place at fixed times in a secured chatroom, which participants enter with usernames and passwords. Applicants screening with high depression levels and /of suicidal ideation and plan are given tailor-made referrals to other professional help. The course comprises six 90-minute sessions every week, with home exercises and reading materials for the next session. Anonymity is ensured by self-chosen nicknames. During the sessions, course material is introduced by the facilitators and displayed in the chatroom using texts and images. Participants can respond, share experiences and ask questions. The course is guided by one or two trained professionals, depending on group size (6 participants maximum).

The online MYM course is accessible through the public MYM website, which also contains psychoeducational information texts, films, tips, resources for further help and personal stories about depression and 'feeling down' (www.gripopjedip.nl). The visitors can also freely and anonymously consult a 'mood expert' via the e-mail service, which is based on principles of CBT and problem solving (Romijn et al., 2009), both of which have been found to be effective approaches in reducing depression symptoms (Warmerdam et al., 2010). Between 2008 and 2013, MYM reached yearly on average 36.000 unique website visitors, 470 users of the e-mail service who generate 1830 e-mails and 360 applicants for the online group course of whom roughly 50% were admitted and 50% were tailor made referred to other types of professional help. Although the effectiveness of the total stepped-care concept of MYM has not yet been investigated, all the MYM ingredients are theoretically grounded. If the effectiveness of MYM is established, active recruitment and implementation will be realised and regular updates and innovations will be performed, MYM may prove to be a powerful instrument that can help bring about lasting improvement in the early detection and treatment of depressed young people.

Outline

This thesis explores the development and effectiveness of the online group intervention Master Your Mood for adolescents and young adults with depression symptoms. It also identifies possible mechanisms of change in MYM participants and analyses their language use as a psychological marker. All data, excepting that from the first pilot study, are derived from a randomised controlled trial of MYM.

Chapter 2 focuses on the development and content of the online MYM group course and the results of a pilot study that included process and effect evaluations (using pre-post measurements). Chapter 3 presents the protocol of the randomised controlled trial on MYM, which describes the design, the sample and the recruitment, the outcome measures and the statistical analyses. Chapter 4 addresses the clinical effectiveness of the MYM intervention in comparison with the wait-listed control condition. Chapter 5 reports the results of three mediation models, testing for possible circularity in recovery processes. Chapters 6 and 7 report on text analysis studies of transcripts from course application forms and from chat sessions. Chapter 6 focuses on associations between participants' word use and their treatment outcome and adherence; word-use predictors are identified. Chapter 7 addresses the ways that candidates applying for MYM articulate their problems, and it assesses whether and how their phrasings are linked to the depression level and to the depression symptoms as specified by DSM-IV; the clinical relevance of those results is discussed. Finally, chapter 8 gives a general discussion of the research results, including assessments of their clinical implications, the limitations of the study and relevant directions for future research.

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Chapter 2 Online intervention Master Your Mood: pilot study¹

Abstract

The objective of this paper is to describe the opportunities and the challenges of conducting an online prevention intervention for adolescents with depressive complaints. A pilot study was conducted between 2005 and 2006 on the intervention *Grip op je dip online (Master your mood online)*, an online group course conducted in a closed chat room. This group course for adolescents is based on the Lewinsohn's *Coping with Depression* course and utilises the principles of cognitive behavioural therapy (CBT). The intervention was led by mental health professionals and developed by the prevention units from three mental health care organisations in the Netherlands, in close participation with the Trimbos-instituut (the Netherlands Institute of Mental Health and Addiction). Results show that with this type of intervention it is possible to reach the target group and that after participating, the adolescents show a reduction of their depressive complaints, as measured with the Centre for Epidemiological Studies Depression Scale (CES-D). Monitoring figures are presented and our view of the future for *Grip op je dip online* is considered in closing.

Introduction

In the Netherlands every year, approximately 50,000 adolescents suffer from depression (Smit et al., 2003; Veltman et al., 1996). One out of every five adolescents suffers from a sub-clinical depression, which has been found to be a strong predictor of the onset of a major depressive disorder within the next

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year (Cuijpers et al., 2004; Cuijpers et al., 2004; Georgiades et al., 2006). The initial onset of depression usually starts in adolescence or early adulthood. Depression early in life can have serious implications for both the school and professional careers of the individual (Sytema et al., al., 2006). In addition to the suffering of the individual, depression also has serious economic consequences; according to Sobocki (2006), the costs of depression, including

the associated losses of production, for Europe alone can amount to a staggering 100 billion Euro a year. Much can thus be gained with the prevention of depression (Smit et al., 2003).

Sub-clinical depression with its sub-threshold symptoms can be treated fairly well and thereby provides an important starting point for the prevention of full-blown depression (Willemse et al., 2004; Clarke et al., 2001), but in the Netherlands only one percent of all people who develop a depression each year are reached by prevention programs (Meijer, 2007). Therefore in the paper *Langer gezond leven [Living healthily longer]* (Ministerie van VWS, 2003), preventive mental health organisations are called to seek closer association with settings in which people can actually be reached, such as the school, the workplace, the community, and the health care setting (among others). The Internet should be added to this list (Borzekowski et al., 2001) as adolescents can also be reached via websites, forums and e-mail services. The e-mail services of websites of organisations concerned with depression observe that adolescents want and need more support than the organisations themselves can offer with only information and e-mail service (Teunis, 2001). But referral to a face-to-face course at a mental health institution is one bridge too far as most adolescents are simply not inclined to seek the help of mental health organisations (Nicholas et al., 2004; Voordouw et al., 2002; Saunders et al., 1994). The Internet thus offers an opportunity to reach depressed adolescents (Christensen et al., 2004), especially because, in 2004, 96 percent of all adolescents in the Netherlands had access to the Internet (Riper et al., 2007). Also the observation that the anonymity of the Internet increases accessibility of mental health programs (Nicholas et al., 2004), inspired the idea of running an online prevention course in a closed chat box.

Adolescents find it particularly helpful to know that they are not the only ones with a particular complaint and they seek mutual recognition (Lunchtafel LSP, 2002; Teunis, 2001). That is why a group approach instead of a one-on-one approach was adopted. The face-to-face cognitive behavioural therapy (CBT) prevention group course *Grip op je dip (Master your mood)* was originally designed for adolescents between the ages of 16 and 25 years with depressive feelings. This prevention group course involves 10 sessions and draws upon the *Coping with Depression* course, which has been shown to be effective

(Voordouw et al., 2002; Lewinsohn, 1987; Lewinsohn et al., 1984a; Lewinsohn et al., 1984b). The effectiveness of this course and the experience of the authors as instructors contributed to the decision to build an Internet version of it.

Research on online interventions for depression

A literature search of reviews and meta-analyses on (the effect of) e-mental health interventions for depression was conducted (Riper et al., 2007). Databases of PubMed, PsycINFO, MBase, ClinicalTrials.gov and Cochrane were consulted. Based on the recent meta-analyses of Spek et al., (2006) and supplied with studies of van Straten et al., (2008) and Spek et al. (2007), we found eight randomised controlled trials (RCTs). They included *Moodgym*, a self-help program with only technical support (Christensen et al., 2004), and pure self-help programs such as *Overcoming Depression on the Internet* (ODIN) (Clarke et al., 2002, Clarke et al., 2005) and *Colour your Life* (Spek et al, 2008). None of these studies concerns interventions for youth and only two studies involve indicated prevention (sub-clinical population) (Spek et al., 2007; Patten, 2003). Mean effect sizes of the online interventions are 0.66 for the (early) treatment programs for depression and 0.55 for prevention. There is some evidence that therapeutic contact heightens the effect of the Internet program (Riper et al., et al). The designs of the studied interventions are pure self-help or self-help with therapeutic contact. No intervention is like *Grip op je dip (Master your mood)*: a structured group course in a chat room supervised by mental health professionals.

The literature search however brought one review to light (by Fenichel et al., 2002) in which the authors referred to Barak and Wander-Schwartz's (2000) use of a chat box for therapeutic purposes. Barak and Wander-Schwartz conducted a small study in which a comparison was made between a chat room therapy group and a standard face-to-face group. Both groups met for seven consecutive weekly sessions of ninety minutes each. These groups were compared to a no-treatment control group who were referred to group therapy. Comparisons of the groups showed that both therapeutic groups had a small, statistically insignificant positive improvement in participants' self-image, social relations, and well-being, with a trend in favor of the Internet group. The authors attributed this statistical non-significance to the small group size in their study. Participants in the no-treatment control group generally remained unchanged. Participants in both therapy groups expressed general satisfaction with their respective group therapies.

The intervention

The research on online interventions for depression shows the opportunities of online courses; therefore, the face-to-face version of the *Grip op je dip* course was adapted for use on the Internet and built into the chat box. The total of ten sessions from the face-to-face course was cut back to eight sessions (as outlined in Box 1). The main text adjustments are that the Internet texts are written in a more compact style. As already noted, the course is based on the principles of CBT and thus aimed at clarification of the relations between thoughts, feelings, and behaviour, the detection of negative thought patterns and modification of these negative thoughts, and the stimulation of participants to undertake more pleasant activities.

Box 1. Outline of the *Grip op je dip* online course

Session	Actions
1	Your mood Understanding how the relationship between feelings, thoughts and actions works
2	Your mood and being active Becoming more active and more aware of the importance of the influence that activities have on your mood
3	Tracing negative thoughts Becoming aware of negative thoughts and what they do to your mood and self-esteem
4	New ways of thinking Changing the negative thoughts into more positive (but realistic) thoughts
5	More action with positive thinking Combining the new way of thinking with being more active Becoming more aware of positive things about yourself and others
6	Stand up for yourself Becoming more assertive
7	Handling conflicts Resolving conflicts in an assertive way
8	The future Making a plan to prevent falling back into depressive moods in the future

The chat course is part of the publicly available website www.gripopjedip.nl. This chat box contains several specific functionalities. When one is 'inside' the chat box the screen is divided in two parts (see Figure 1). The left panel is the 'chat' part where participants and the professional write down their comments and feelings. In the right panel, participants can read the chapter of that week's course material. This course material is familiar to them because one week prior to a chat session, the course participants receive instructions, explana-

tions, and some preparatory homework. The participants are motivated by the course instructors to do the homework by mentioning it in the chat sessions, by sending a SMS and by e-mails; doing the homework before talking about it in the chat box helps to bring structure to the chat room. In the right part of the chat box screen the homework text and figures can be flashed in by the course leader.

Figure 1. The chat box screen (chat text and course material are translated)

www.gripopjedip.nl

<p>Bob: Welcome <i>Crazy: Hello</i></p> <p><i>Downer: Hi</i></p> <p><i>Butterfly: I'm sorry I'm a little late</i></p> <p><i>LoveU: W8 for me!</i> 🌈</p> <p><i>Brad: Howdi!</i> Bob: Today we are going to discuss how the relation between feeling, thinking and acting works. You've made your homework so let's start.</p> <p><i>Downer: I found it difficult to understand the difference between feeling and thinking</i></p> <p><i>Butterfly: Me too!</i> 🌈</p> <p>Bob: Can someone explain what the difference is? Brad will you give it a try?</p> <p><i>Brad: Oké, I'll try.</i></p>	<p style="text-align: center;">Master your Mood</p> <p style="text-align: center;">MEETING 1: YOUR MOOD</p> <p style="text-align: center;"><i>INFORMATION FOR THE MEETING</i></p> <p>In this figure you see a triangle that explains how feelings, thoughts and actions are related:</p> <div style="text-align: center;"> <pre> graph TD Feeling --- Thinking Feeling --- Acting Thinking --- Acting </pre> </div>
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The maintenance of privacy is an important issue; therefore, the chat course is conducted in a secured, password-protected environment. Participants only have access to the chat box when they have a login code. To obtain this, participants have to fill in two questionnaires and agree with the 'rules of the house' for the chat course. For example, some of the rules are: 'Do not curse,' and 'Treat all the other participants with respect.' Participants can only enter the chat box at a certain time, for example every Wednesday afternoon at 4pm. During the eight sessions (conducted over eight weeks) the adolescents participate in the same group. The meetings take 1.5 hours and are guided by a

trained mental health professional, specialised in prevention and CBT. A chat box group consists of six participants at most.

Goals of the pilot

The purpose of the present pilot study was (a) to explore the possibilities of a chat box for (offering) a CBT group course for adolescents with depressive complaints and their satisfaction with this medium, (b) to explore whether the participants experienced a reduction in depressive complaints after the course, and (c) to find out whether it is possible for professionals/instructors to manage a group process in a chat box.

Method

Measures

For admission to the chat course, an open ended questionnaire was developed. In this questionnaire the respondent is asked about the reason for registration, available social support, suicidal thoughts, self-mutilation, and motivation. The adolescent is asked also whether he/she had any negative experiences in his/her life, such as loss of parents, sexual harassment or bullying.

The level of depression was measured with the CES-D Scale, the Dutch version of the Centre for Epidemiological Studies Depression Scale (Bouma et al, 1995) when the adolescent applied for admission and again at the end of the course. For registration and admission online the open ended questionnaire is completed along with the CES-D Scale. The CES-D scale ranges from 0 to 60 with higher scores indicating a higher level of symptoms.

At the end of the course, or if the participant stopped before the last session, the adolescent was asked to complete a satisfaction list, which was based on the widely used satisfaction list for the face-to-face *Grip op je dip* courses that are administered nationwide. Satisfaction was measured on a 10-point scale (1 = very poor, 10 = very good), and another question asked whether the respondent would recommend (1 = absolutely, 5 = absolutely not) the chat course to other adolescents with feelings of depression.

The technical possibilities of the course were explored by asking the adolescents in the chat box after each session whether they thought the content of that session worthwhile and by interviewing the professionals who ran the chat course. Findings were intended to improve the intervention and its implementation before planning future research on its (cost) effectiveness.

Selection of participants

The selection of possible participants is done completely via the site. In principle the application is anonymous; an adolescent has only to give a nickname and a mobile phone number. All other information (age, sex, area of living) is facultative.

The target group for the pilot were adolescents with sub-clinical and mild depression. Criteria for chat box participation are the same as for the face-to-face version of the course (Voordouw et al., 2002). In addition to the age criterion, the following criteria must be met: a score that is not too high on a depression inventory, available social support, no active suicidal thoughts, no self-mutilative behaviour, and motivation to invest in the course. The CES-D Scale score was weighted with the answers of the open ended questionnaire, such that adolescents with a high CES-D score but without suicidal thoughts could be admitted. Of all the adolescents who applied, 16% reported plans to commit suicide while 66.6% reported having thought about suicide. Furthermore, 27.7% of the adolescents who applied reported self-mutilation. When the reported symptoms are judged by the instructors to be too severe, the adolescent is referred to his or her family physician and for regular mental health help; 205 adolescents (52%) were thus referred.

Procedure

Adolescents can register to participate in the e-course via the website www.gripopedip.nl. Every new course is announced on the site, and admission to a particular course is closed as soon as a maximum number has been reached. After the first try-out period with the chat box, the website went 'on air' in June 2005. In September 2005 newspapers wrote about the chat box and it became an item on television channels. In the following three months there were about 40,000 visitors to the website and 290 adolescents wanted to participate in the chat box course. Up to July 2007 statistics show about 600 applications for the chat box course and yearly there are 100,000 visitors.

After course admission clear agreements are made with the participant. The participant is informed about what to expect of the course and of the fact that the application forms can be used for monitoring and research purposes. The participants were asked to contact the course instructor should his or her complaints worsen. Guidelines have been formulated for cases of crisis, which may include attempted suicide or threats of such (Kerkhof, 2004; Wilson et al., 1998). When worried about a participant, the course instructor always contacts the individual via e-mail or telephone. The participant is urged to contact his

or her family physician and/or another important support person. Clear agreements are made about the further participation of the adolescent and the support to be provided by the instructor.

Results

Applicants

Between the spring of 2005 and the summer of 2006, 394 adolescents applied to participate in the e-course. During this same period, the prevention units from three mental health care organisations in the Netherlands conducted 35 courses with a maximum of six participants each; up to the time of writing, only once has it been necessary to apply the crisis guidelines.

The average age of the 394 applicants was 19.7 years ($SD = 3.8$), and 81.5% of them were female. They reported considerable feelings of sadness and anxiety and 80% reported one or more negative life events, such as the divorce of their parents, sexual harassment, child abuse, bullying.

The average depression score on the CES-D scale upon application was 36.8 ($SD = 10.1$). Males scored significantly lower (32.9, $SD = 10.4$) than females (37.3, $SD = 9.8$) ($t = 3.44$, $df = 384$, $p < 0.001$). The educational level of the applicants varied from vocational schooling (53.2%) to a higher and college education (46.8%).

A total of 189 adolescents (or 48% of the applicants) were admitted to the e-course. Of this group 49 (26%) dropped out before the course started. The average age of the 140 participants was 19.8 years ($SD = 3.3$) with 115 females and 25 males. Of the participants, 98% reported being physically 'reasonably healthy' to 'healthy', 15% were on medication, and 81.5% reported the availability of social support from family, friends or teachers. Finally, 61.5% of the participants reported having had professional help for psychological problems in the past or currently having professional help for such problems.

Of the 140 adolescents who initially participated in the e-course, 75 (53.6%) participated in less than four chat sessions and 65 (46.4%) participated in four or more chat sessions; 50 of the 140 (35.7%) finished all eight sessions.

Opinions of the participants

The downside of easy access to the course clearly manifested itself; more than 50% of the admitted adolescents quit before half of the course was completed. The reasons most mentioned for dropping out were 'time of the course no

longer convenient,' 'had obtained other help,' 'no longer had depressive symptoms,' 'had computer problems,' 'did not feel motivated by the materials provided,' or 'found the course too difficult.'

All of the 50 participants who completed the satisfaction questionnaire were positive about the conduct of the course. The entire course was assigned a score of 7.5 on a 10-point scale (1 = very poor, 10 = very good) and 79.3% of the respondents would recommend the chat course for other depressed adolescents.

The respondents found chatting to be a pleasant and positive way to talk about being down and their feelings of depression. The use of smilies or emoticons also helped the participants give expression to their feelings and to understand the feelings of other participants. The course was considered tough and sometimes quite tiring; the participants had to get used to the course online. They considered the high drop-out rate to be a pity. Participants therefore suggested stricter selection criteria to include only strongly motivated individuals. The selection criteria have thus been adjusted and made stricter since the initial conduct of the e-course.

With respect to the duration of the sessions (1.5 hours) and the number of sessions (8), 75% of the 50 responding participants reported indeed being satisfied. Opinions were divided about the scheduling of the course, which was either at the end of the afternoon or in the evening. The respondents were very positive about the course instructors and thought that they were good listeners, friendly and concerned, and did their best to help the sessions proceed as smoothly as possible.

When asked why they preferred an online group course, participants answered that online they were anonymous and only judged by what they wrote, not by their looks: 'Online your looks do not play a role.' Mostly these adolescents considered themselves unattractive. The anonymity of course participation was highly valued. As one participant noted, 'The likelihood of other participants knowing you is really small because they come from all over the country. If you sit together in a face-to-face group, then they usually come from your area.' Another participant observed: 'You might learn more in a live group, but communication via a chat box is much easier and you dare to say more in a chat box.' For some adolescents, a live group is not an option. As one participant put it: 'I think a standard group course is scary.' Nevertheless, some of the participants at the end still reported a preference for a live course precisely because of the 'real' contact that this provides.

Mutual recognition was also considered an important aspect of the *Grip op je dip online* course. That is, the experience of contact with other adolescents in a 'dip' was positively evaluated. As one participant who did not dare to talk

to anyone about her problems put it: ‘The recognition is really nice because I have never talked about these things with anyone before.’ In the words of another participant: ‘It’s nice to be able to talk to age mates with the same feelings. They understand me, and it’s good to know that I’m not the only one in a dip.’ Despite the anonymity, a bond developed between the group participants. In the eighth session almost all participants wanted to exchange e-mail addresses to keep in contact with their new friends.

Course participation and the decline of depression

As shown in Table 1, the group of adolescents participating in less than four chat sessions showed higher CES-D scale scores at the start of the online course than the group of adolescents participating in four or more chat sessions ($t = -2.95$, $df = 120$, $p < .05$).

Table 1. Comparison of CES-D scores before and after participation

	Participants <i>n</i> (%)	CES-D	
		Start <i>M</i> (<i>SD</i>)	Completion <i>M</i> (<i>SD</i>)
Total group at the start	140	33.7 (8.1)	–
Group < 4 chat sessions	75 (53.6%)	37.2 (6.8)	–
Group > 4 chat sessions	65 (46.4%)	33.0 (8.6)	–
Group that followed all 8 sessions	50 (35.7%)	32.6 (9.3)	18.7 (9.4)*

* $p < .001$

All participants who finished the seventh session received the follow-up CES-D. Of these participants, 50 completed the CES-D scale. The average CES-D scale score after the e-course (18.7, $SD = 9.4$) was significantly lower than the average CES-D scale score at the start of the e-course (32.6, $SD = 9.3$) ($t = 8.23$, $df = 48$, $p < .001$). These results largely correspond to the results for the face-to-face course (Voordouw et al., 2002). Whether or not the decreases in depressive symptoms can be directly attributed to the e-course cannot be determined on the basis of this limited research; additional effects research is clearly required. However, it can be noted that most of the adolescents who experienced a reduction in depressive symptoms stated that the e-course greatly contributed to this.

Opinions of the instructors

The *Grip op je dip online* course described here was conducted by a mental health care prevention worker and/or some other care provider. In the meantime, a training program has been developed for potential course instructors. Seven of the 15 course instructors were interviewed about their experiences with the online course.

The course instructors were very enthusiastic about the online course. On average, they assigned a score of 8.9 on a 10-point scale (0 = very bad, 10 = very good) for the ease of giving the course, and they reported gaining energy from the experience. The easy accessibility of the course and low threshold for participation appealed to the course instructors along with the dynamic nature of the medium and the speed of the computer.

A problem in the eyes of the instructors was the 'no-show'. That is, some of the youth would not show up or would drop out without further notice. The no-show phenomenon is a familiar problem for adolescent mental health care and the Internet is known to be of a fleeting character, which means that the no-show phenomenon may be inherent to this target group and the medium.

The fact that the course participants could not see each other had some advantages and some disadvantages, according to the instructors. An advantage was that the adolescents were much more open than in a regular group session due to the complete anonymity of the online interactions. But how a course participant receives the written words of the instructor or the other participants is often not apparent from simply a text response, or no response, for instance. The invisibility of the participants then poses a problem and therefore constitutes a disadvantage at times. In the words of one instructor: 'You have no idea of how the kid is sitting there and, as a consequence, you wonder if the participants are really doing anything with the information ... if their behaviour is changing.' Nevertheless, the course instructors all note that a working alliance can be established. Also the course can be seen to have an effect, certainly when the participants have attended all of the sessions. The changes are evident in the reactions of the participants and also in their CES-D scores.

The course instructors were also satisfied with the group process. A bond was quickly established between the course participants themselves and a working alliance was established between participants and the instructors. The maximum group size appears to be about six participants. Most of the instructors were able to cover all of the course information during the sessions; only one or two experienced difficulties doing this. The content of the course was also judged to be sufficient. An advantage is that the sessions are archived and

could be consulted by participants and the course instructors. This is also handy for new course instructors: 'You can prepare yourself by reading the archived sessions from other instructors.' The archive is also used for evaluation purposes by colleagues.

The possibility of the adolescents using aggressive language or misbehaving was taken into consideration during the development of the online course. A prerequisite for course participation was that the participants agree to abide by the rules of the house. Contrary to all expectations and possibly due to these rules, the behaviour of almost all of the participants was exemplary.

The course instructors were unanimous about the importance of the participants being sufficiently motivated. This aspect of the admission procedure is therefore given much attention. The opinions of the course instructors were divided with respect to level of education. The majority of the instructors thought that the level of education did not matter. Encouraging is that 'the smarter to help the less smart' appeared to work. Opinions were also divided with respect to the severity of the adolescents' problems. On the one hand, instructors felt that the depressive complaints should not be too severe. On the other hand, the complaints of depression should not be too mild as this increases the probability of early drop-out. Another problem is that it is hard to filter out individuals with a personality disorder. It is therefore suggested that a better method for this selection should be sought prior to the start of the course.

Discussion

Limitations of this study are that there was no control group, there was a limited number of participants, and there was a high attrition rate. The study is of an explorative nature and a randomised controlled trial will be launched at the end of 2007.

Despite the limitations, some careful conclusions can be drawn. First of all, the results of this pilot study show that it is possible, both technically and substantively, to conduct a preventive mental health group course for adolescents with depressive complaints via the Internet. The results also show that an online course is an attractive option for adolescents: numerous individuals applied to participate and the majority of those who participated and finished the course reported being quite satisfied with the course. As expected, the anonymity of the course and the element of mutual recognition were highly valued.

The second goal of the pilot was to assess whether the participants experienced a reduction of depressive complaints. The preliminary findings do suggest that this is the case and that the results for the e-course resemble those for the face-to-face course; however, these findings should be carefully interpreted given the methodological limitations of the pilot study. Nevertheless, this intervention is promising in its ability to help adolescents overcome their depressed feelings. Further effect research with control conditions is nevertheless needed and will be addressed in the planned RCT.

The third goal of the pilot was to find out whether it is possible for professionals/ instructors to manage a group process in a chat box. The trainers were enthusiastic about the possibilities of an online preventive group course. They were able to manage the group process in a chat box and they stated that a working alliance (bond) was established. This is consistent with the findings of Cook et al. (2002). How this is perceived by the adolescents is not clear yet, and whether the high drop out rate may be attributed to the perceived quality of that working alliance is something that will be taken into account in the RCT.

The low degree of commitment on the part of the adolescents was a possible drawback of easy access to the online chat box. Drop-out was high. Several hypothesis for drop-out were explored, such as technical aspects, the length of the course (8 sessions), the duration of the sessions (90 minutes), the accessibility of the content or participants' difficulties with confronting their own depressive feelings. The pilot study produced relevant data that could shed light on these hypotheses. The majority of the participants completing the evaluation questionnaire indicated approval of the length of the sessions; not a single respondent judged them to be too long. We also asked the drop-outs to indicate why they stopped attending. Neither length of the sessions nor difficulties with confronting their depressive feelings were given as a reason for leaving the course. The reasons for drop-out varied and included the scheduling of the course, technical problems such as blocked access to the Internet, or help found elsewhere. Some of the youth also indicated that the course was not what they wanted after all. More research on the predictors of drop-out, course completion and success should be undertaken in the future.

Activities to boost the motivation to login at every session have been developed. A new application of the chat course is that each participant receives a SMS message just before the start of a session. The effect of this application has not yet been evaluated, but it seems to help participants to remember.

The pilot data led to the consideration of a more compact course as the attrition rate at the first four to five sessions seems to be lower than at the last few sessions. The pilot also showed that the course sessions in the evening

were more popular and resulted in better course adherence than the sessions in the daytime. Considering that most applicants are involved with schooling and work, this seems plausible. Also of importance is the difficulty of the course for young people with lower educational levels. They tend to drop out because of the difficulty they met with the content, so this led us to sharpen the inclusion criteria. These adaptations should enhance course adherence, but further research is needed to assess this.

Since launching the online course, many adolescents with severe complaints have wanted to participate; there has been much discussion among the mental health professionals about their participation. In the pilot, the moderate depressive complaints were weighted against other factors of the young person's life. In some individual cases the group course helped adolescents with high CES-D scores to cope with their depressed feelings. The course and the trainers also helped some participants to decide that the course was not what was needed and they decided to seek specialized help. Nevertheless, there are problems (ethical, risks of a crisis) with letting adolescents with severe depressed feelings participate in an online group course. This led to the decision to develop a better online screening method for future use. In the application system on the site, a diagnostic instrument (MINI plus) will be built in to screen for severe depressions. This screening method will be evaluated in the RCT

The chat box format offers still other new possibilities. Many adolescents with severe symptoms of depression, who did not qualify for the *Grip op je dip online* course, at first absolutely refused to be referred for regular mental health care. The online course thus draws this severe group successfully within sight of mainstream mental help and thereby presents an opportunity to reduce barriers to mental health care and raise an awareness of the need and possibilities for help (Saunders et al., 1994). For these more severely depressed adolescents, the help may occur in the form of e-mail correspondence or a group chat box led by a specialised mental health professional. The question, of course, is whether prevention should concern itself with this particular target group and, if so, under what conditions. A number of ethical and legal issues present themselves.

It is clear that the Internet is a powerful medium for reaching adolescents and that both the treatment and prevention sectors should therefore explore the possibilities of this medium to the fullest. A variety of conferences on mental health and the Internet show the blossoming of Dutch e-mental health initiatives. The online offering of e-courses, as indicated by the demonstrated effectiveness of the online group *Grip op je dip* e-course, opens up a completely new manner of working within the treatment and prevention sectors.

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Chapter 3 Protocol for a randomised controlled trial¹

Abstract

Background Depression is a common condition whose first onset is usually in late adolescence or early adulthood. Internet-based interventions are an effective treatment approach to depression. The aim of this study is to investigate the effectiveness of a Dutch online cognitive-behavioural group course known as Master Your Mood (Grip op Je Dip) for young people reporting depressive symptoms. Secondary research questions involve maintenance of effect at 6 months, mediators, and predictors of better outcomes.

Methods We will conduct a randomised controlled trial (RCT) in which 244 young people aged 16-25 are randomly allocated to the Grip op Je Dip (GOJD) online group course or to a waiting list control group. The participants will be recruited from the general population. The primary outcome measure will be the severity of depressive symptoms according to the Center for Epidemiological Studies Depression Scale (CES-D). Other outcomes will include anxiety (Hospital Anxiety and Depression Scale-Anxiety, HADS) and mastery (Mastery Scale). Assessments will take place in both groups at baseline and three months later. Effect maintenance will be studied in the GOJD group six months after baseline, with missing data imputed using the expectation-maximisation method. Mediators and predictors of better outcomes will also be identified. **Discussion** The trial should add to the body of knowledge on the effectiveness of Internet-based interventions for depression. To our knowledge, this will be the first RCT on an online group intervention in this field. *Trial registration:* NTR1694

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Background

Depression is a common mental disorder among adolescents and young adults. One recent study found a 12- months prevalence of 6.7% of 18- to 25-year-olds (De Graaf et al., 2010). First onset is usually in adolescence; by 18 years of age, up to one in every four adolescents has had at least one depressive episode (Clarke et al., 2001; Lewinsohn et al., 1999; Birmaher et al., 1996). Depression early in life can have serious implications for individuals' school and professional careers (Meijer et al., 2006). Adolescent depression is associated with problems such as poor school performance, school absence and dropout (Dopheide, 2006), problematic relations with parents and peers (Cicchetti et al., 1998), increased use of tobacco and alcohol (Gied et al., 2002) and suicidal behaviour (Fergusson et al., 2000).

Subclinical depression is also a common condition, with an estimated prevalence of 17% to 21% among Dutch adolescents (Smit et al., 2003; Ter Bogt et al., 2003). It involves having some depressive symptoms which together do not meet the full DSM-IV criteria for major depression (Cuijpers et al., 2008). Subclinical depression has been found to be a strong predictor of the onset of major depressive disorder within the next year (Georgiades et al., 2006; Cuijpers et al., 2004). There are also indications that the psychosocial functional impairment of people with subclinical depression is comparable to that experienced by people diagnosed with major depression (Wagner et al., 2000; Gotlib et al., 1995). Beyond the personal suffering involved, both major and subthreshold depression impose significant economic burdens in terms of health care costs and production losses in paid and unpaid work (Cuijpers et al., 2007; Smit et al., 2006).

In view of the high prevalence rates, the serious outcomes and the economic costs of depression, it is essential to intervene at an early stage. Yet young people are not inclined to seek professional help. They tend to deny or underestimate problems, question the benefits of help and fear stigmatisation (Vanheusden et al., 2008). And if they do seek help, they often encounter waiting lists (Lepine et al., 1997).

Internet-based approaches may offer a solution for the stigmatisation problem, in that they provide anonymity and the opportunity to undergo the intervention in the privacy of home. Another benefit is to enable a reduction in contact hours between professionals and clients. This could help tackle the problem of waiting lists and shortages of therapists. Internet-based interventions, with or without professional support and mostly based on cognitive-behavioural principles, have been found effective in treating depression, with

results comparable to traditional psychological approaches (Andrews et al., 2010; Cuijpers et al., 2010; Andersson et al., 2009; Spek et al., 2007).

The current study will focus on one specific type of Internet-based intervention: a professionally facilitated, cognitive-behavioural group course designed for young people with symptoms of depression. The perceived advantages of online group sessions as compared to individual approaches are social support and mutual recognition by group members (though they remain anonymous to one another) and the reduction of professional contact hours per participant as compared to individual treatment with support (Van der Zanden et al., 2005). Three earlier studies on online group courses in mental health care have found positive outcomes in pre-post measurements, although relatively high attrition rates were reported, a general problem in Internet interventions (Eysenbach et al., 2005).

Despite the clear benefits of web-based interventions for depression and their availability for all age groups from about 13 onwards, there is a lack of outcome studies on adolescents (Calear et al., 2010; Riper et al., 2007). Only two randomised controlled trials have been conducted on prevention programmes for depression and anxiety (Calear et al., 2009; Van Voorhees et al., 2009). The Calear study found that a universal prevention programme was effective in reducing symptoms of anxiety and depression only in males. The Van Voorhees study showed that a web-based behavioural change programme in primary care, in combination with either motivational interviewing or brief advice, was associated with declines in depressed mood and in the likelihood of clinical depression symptom levels; in combination with motivational interviewing it reduced the likelihood of depressive episodes and hopelessness.

The primary aim of the study we describe here will be to evaluate the effectiveness of a web-based group course called *Grip op Je Dip* (Master Your Mood), designed for young people aged 16 to 25 with depressive symptoms, by comparing it to a waitlisted control group. Secondary aims concern effect maintenance and potential predictors of positive outcomes. The present article describes and discusses the study design.

Methods

Study design

We will conduct a randomised controlled trial with two parallel groups: the GOJD online course group versus a waiting list control group. Ethical ap-

proval has been granted by an independent medical ethics committee (CCMO no. NL18984.097.07).

Participating mental health care agencies

A total of 10 mental health care agencies have agreed to participate in the project. In providing the online GOJD course, all agencies work at a nationwide level with participants from all over the Netherlands.

Sample

The sample is to consist of 242 young people aged 16-25 with mild to moderate depressive symptoms. The inclusion criteria are as follow: age 16 to 25, informed consent (including parental consent if aged 16 or 17) and a CES-D depression score from 10 to 45. The CES-D cut-off score for clinical depression is 16 (Bouma et al., 1995) for adults, and for adolescents it is either 22 (Cuijpers et al., 2008) or 24 (Roberts et al., 1991). For subclinical depression, no CES-D cut-off scores have been determined, but we have set the lower limit at 10 for this study. Applicants will be excluded if there are indications of suicidal ideation with intent and plan as assessed with the MINI-International Neuropsychiatric Interview (MINI-Plus) (Van Vliet et al., 2000; Sheehan et al., 1998);. MINI-Plus assessment is mandatory for individuals with CES-D scores higher than 24; the MINI-Plus will be administered online in the chatroom.

Recruitment

Participants will be recruited in the general population through advertisements in local and national newspapers, banners on websites, and leaflets provided in doctors' offices, mental health agencies and schools. Interested young people may apply for participation by completing a screening questionnaire on the website <http://www.gripopjedip.nl>. Those with CES-D scores between 10 and 45 will receive additional information about the study, an informed consent form and a baseline questionnaire. For those aged 16 or 17, parental consent is also required. Those with scores between 25 and 45 will be invited for an online session to assess suicidal ideation and plan using the MINI-Plus interview. Once judged eligible for the GOJD course, applicants will be randomly allocated to the course group or the waitlisted group (3 months).

Randomisation

Randomisation will take place after completion of the screening procedure, informed consent statement and baseline questionnaire before the start of the course. Random allocation will be generated automatically by an online computer program so it cannot be influenced by course facilitators or researchers. A blocked randomisation scheme will be used (blocks of two), stratified by depressive symptoms (scores 10-24 versus 25-45) and age (younger than 18 versus 18 or older). These allocation sequences will be unknown to the course facilitators who are pushing the randomization button. Participants will be informed of their allocation by email and will receive a tailored referral if declined. Course participants will also receive a log-in code and homework for the first session.

Conditions: the intervention

The GOJD online course derives from the face-to-face intervention of the same name developed by the Trimbos Institute (Netherlands Institute for Mental Health and Addiction). That intervention was based on the Dutch version of the Coping with Depression Course (Cuijpers et al. 2009). The face-to-face course was adapted to the Internet in a collaborative effort involving the Trimbos Institute and three mental health institutions (Gerrits et al., 2008).

The resulting online GOJD group course is a structured, psychoeducational form of cognitive-behavioural therapy for depression. The core focus is the cognitive restructuring of thinking patterns. Course participants are encouraged to detect their own unproductive, unrealistic thoughts, and they are then taught to transform these into realistic, helpful thoughts. Performance of pleasant daily activities is also encouraged, and a mood measure is filled in daily to help understand the connection between pleasant activities and mood level. The course is given in a secured chatroom that is part of the website <http://www.gripopjedip.nl>, which also provides information and video films about depression. Participants' anonymity is guaranteed by a self-chosen nick-name. Only a mobile phone number must be given to facilitators for sending pre-session SMS reminders. The course makes use of text and figures, smileys to express feelings in written texts, and home exercises.

GOJD consists of six 90-minute sessions, conducted at a fixed time once a week. The course is facilitated by one or two trained mental health promotion workers, depending on group size (a maximum of 6) and their experience in conducting online courses. Facilitators receive two days' prior training in the

technical and therapeutic conduct of the course and in administering the on-line MINI-Plus interview.

Conditions: the waiting list

The wait listed group does not get an intervention. They are told by e-mail that they will receive an invitation to participate after the waiting period of 3 months.

Support

After the screening procedure, the participants are in contact with the facilitator and the group members only during the weekly course sessions in the chat-room. They are allowed to seek additional help outside the course if they wish.

Assessments

Assessments will take place before randomisation (t₀), three months later (t₁) and three months after t₁ (t₂). Participants in both groups will receive automated emails with invitations to complete online questionnaires. Subsequent email reminders will be sent five and ten days after the first invitation, if necessary. To encourage response, participants will receive 10 euros' compensation for completing the t₁ questionnaire and 10 euros for the t₂ questionnaire. If they complete both questionnaires, a 5-euro bonus will be added, totalling 25 euros.

Instruments

Primary outcome

Symptoms of depression will be assessed with the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977; Bouma et al., 1995). It measures the frequency of 20 depressive symptoms over the past week using 4-point Likert scales. The total score range is 0 to 60, with a higher rating meaning more depressive symptoms. Computerised and paper-and-pencil versions of the CES-D correlate at a very high level (Ogles et al., 1998). The web-based CES-D has proved a reliable and valid screening instrument in a Dutch adolescent population (Cuijpers et al., 2008).

Secondary outcomes

Anxiety symptoms. The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS) (Zigmond et al., 1983) will be used to assess anxiety symptoms. The Dutch version of the HADS has been validated (Spinhoven et al., 1997). The anxiety subscale consists of seven items measuring anxiety symptoms on a 4-point Likert scale, with a score range of 0 to 21, and a higher rating indicating a higher state of anxiety.

Perceived control. The Dutch version of the 5-item Mastery Scale will be used to assess perceived control (Pearlin et al., 1978). The concept of mastery refers to beliefs about one's own ability to control one's environment. Responses are rated on a 5-point Likert scale, with a total score range of 5 to 25; a higher score indicates a greater sense of mastery. The Mastery Scale has good psychometric properties (Pearlin et al., 1978).

Additional measures

Motivation. At baseline we will assess motivation to take part in preventive group interventions, using four subscales of the Nijmegen Motivation List for Prevention (NML-P) (Allart-Van Dam et al., 2004). The subscales are Readiness, Doubt, Support and Burden. Their reliability is acceptable, with Cronbach's alphas ranging from .80 to .84.

Other information

At baseline we will also assess demographic information and any previous or present receipt of professional help for psychological problems. Follow-up assessments will record the use of professional help (t₁ and t₂) and participants' evaluations of the intervention (t₁, in course group only).

Course adherence will be measured in terms of session attendance and completion of homework assignments. Session attendance will automatically be recorded when the participant enters the chatroom. Homework completion will be recorded by the facilitators in an online logbook.

Sample size

The trial is powered to detect a clinical effect size of $d = 0.32$ or larger in a one-sided test ($\alpha = .05$) at a power of 80% ($1-\beta$). The hypothesis is directional, with better outcomes expected for the course group. A total of 242 participants are needed in the study, $n = 121$ per condition.

Statistical analyses

To assess whether the randomisation results in two comparable groups at baseline, and whether differential loss to follow-up later occurs, we will use t-tests, chi-square tests and logistic regression ($p < .10$). Analyses with regard to effectiveness will be based on the intention-to-treat principle.

Missing data at t1 and t2 will be imputed using the expectation-maximisation (EM) method, as implemented in SPSS Missing Value Analysis. It imputes missing values by maximum likelihood estimation using the observed data in an iterative process (Dempster et al. 1977). All randomised participants will be included in the analyses in line with their allocation, regardless of how many sessions they complete (intention-to-treat principle).

Since the online GOJD is a group course, some subjects will be participating in the same course group, leading to some amount of clustering. The clustering would violate the assumption of independence of observations and might thus affect standard errors and *P*-values. We will therefore use linear regression models, controlling for data clustering, in analysing post-test (t1) between-group differences on the continuous outcome measures. Robust standard errors and correct *P*-values will be obtained using the first-order Taylor-series linearisation method, as implemented in Stata.

Magnitudes of intervention effects will be estimated using Cohen's *d* (Cohen, 1988). Effect sizes will first be calculated for each condition separately by subtracting the mean post-test score from the mean pre-test score and dividing the result by the standard deviation at pre-test. The effect size of the comparison group will then be subtracted from that of the experimental group. A difference in *d* 0.5 would indicate that the experimental group mean is half a standard deviation greater than the control group mean. For Cohen's *d*, an effect size of 0.2 to 0.3 may be regarded as a small effect, around 0.5 as a medium effect and 0.8 to infinity as a large effect.

To determine effect maintenance at 6 months in the experimental group, we will use the follow-up (t2) assessment data. The number of participants showing reliable, clinically significant change on the CES-D from pre-intervention to post-intervention and follow-up will be calculated using the method of Jacobson and Truax (Jacobson et al., 1992). To find predictors for more or less successful intervention outcomes, we will use regression analyses to study effect modification. The individual standardised change scores (effect sizes; pre-to post-intervention) will serve as the outcome measure, and interaction terms between the treatment dummy and participants' characteristics will be included as predictors, along with their constituent main effects. Predictors for successful and unsuccessful outcomes will be demographic variables such as

age, gender and educational attainment and course-related variables such as web-chatting experience and motivation to take part in preventive group interventions (Allart-Van Dam et al., 2004).

To detect possible dose-response relationships in respondents randomised to the course, we will use a linear model to regress the primary outcome (depressive symptoms) on the number of sessions they attended. Tests will be conducted at $\alpha = .05$ with 95% confidence intervals.

Discussion

The study described here is a randomised controlled trial in which young people aged 16 to 25 with depressive symptoms will take the GOJD (Master Your Mood) online group course; the outcomes will be compared to those of a waiting list control group. The primary aim is to assess the effectiveness of the online course in terms of severity of depressive symptoms. Secondary aims are to study effect maintenance and to identify predictors of positive outcomes.

Internet-based interventions are known to be effective in addressing depression. By virtue of their anonymity and the reduced need for contact between participants and professionals, they hold promise to reach many individuals who need them. In the field of web-based interventions for depression, studies with young people are still scarce, as are studies on online group courses. This trial should add to the body of knowledge on the effectiveness of such interventions. We shall now discuss some methodological issues in the current trial.

A strong feature of the current trial is that the recruitment and screening of participants and the inclusion and exclusion criteria are similar to the usual procedures in mental health agencies. This should enhance the external validity of the results. The main differences between the study and routine care are the randomisation and the informed consent required for the study. In addition, in routine care, participants with CES-D scores higher than 45 may be allowed to participate in the course, if only in exceptional cases in pressing circumstances and under specific conditions.

One limitation of the study concerns the impossibility of comparing the GOJD outcomes with those of the wait-listed group at the six-month follow-up, since the latter will receive access to the course three months after baseline. This means that the longer-term effectiveness of the course cannot be assessed in this study. We will, however, study effect preservation at six months in the GOJD group. Another study limitation is that the blinding of participants to

experimental conditions is not feasible, because of the behavioural nature of the intervention.

A point of discussion is how far results can be generalised. To minimise selection bias, we will recruit participants via a broad range of channels: advertising in local and national newspapers, website banners, and leaflets in doctors' offices, mental health agencies and schools. Each participant's recruitment channel will be recorded; the distribution of the various channels will determine the degree of generalisability. Selection bias could also arise from personality traits of people attracted to a group intervention; these might differ from the traits of those who prefer individual therapy or no help at all.

A final limitation is that study participants will not be diagnosed. They will be selected on the basis of self-rated instruments, together with a diagnostic interview (MINI- Plus) in the chatroom, which is used as a screener to exclude applicants with suicidal tendencies. This means that the current study will be difficult to compare with studies in which participants have been diagnosed. The results will therefore not be generalisable to people with a DSM diagnosis of depression.

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Chapter 4 Clinical Effects¹

Abstract

Background Depression is a serious mental health problem, whose first onset is usually in adolescence. Online treatment may offer a solution for the current undertreatment of depression in youth. For adults with depressive symptoms, the effectiveness of Internet-based cognitive behavioral therapy has been demonstrated. This study is one of the first randomized controlled trials to investigate the effectiveness online depression treatment for young people with depressive complaints and the first to focus on an online group course. **Objective** To evaluate and discuss the effectiveness of a guided Web-based group course called Grip op Je Dip (Master Your Mood [MYM]), designed for young people aged 16 to 25 years with depressive symptoms, in comparison with a wait-listed control group. **Methods** We randomly assigned 244 young people with depressive symptoms to the online MYM course or to a waiting-list control condition. The primary outcome measure was treatment outcome after 3 months on the Center for Epidemiologic Studies Depression Scale. Secondary outcomes were anxiety (measured by the Hospital Anxiety and Depression Scale) and mastery (Mastery Scale). We studied the maintenance of effects in the MYM group 6 months after baseline. Missing data were imputed. **Results** The MYM group ($n = 121$) showed significantly greater improvement in depressive symptoms at 3 months than the control group ($n = 123$) ($t_{187} = 6.62$, $P < .001$), with a large between-group effect size of $d = 0.94$ (95% confidence interval [CI] 0.64–1.23). The MYM group also showed greater improvement in anxiety ($t_{187} = 3.80$, $P < .001$, $d = 0.49$, 95% CI 0.24–0.75) and mastery ($t_{187} = 3.36$, $P = .001$, $d = 0.44$, 95% CI 0.19–0.70). At 12 weeks, 56% (68/121) of the participants in the MYM group and 20% (24/123) in the control group showed reliable and clinically significant change. This between-group difference was significant ($\chi^2_1 = 35.0$, $P < .001$) and yielded a number needed to

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treat of 2.7. Improvements in the MYM group were maintained at 6 months. A limitation is the infeasibility of comparing the 6-month outcomes of the MYM and control groups, as the controls had access to MYM after 3 months. **Conclusions** The online group course MYM was effective in reducing depressive symptoms and anxiety and in increasing mastery in young people. These effects persisted in the MYM group at 6 months.

Introduction

Depression Among Adolescents

Depression is a major health problem. Worldwide it is the fourth-ranked disorder in terms of disease burden, and it is expected to carry the highest disease burden in high-income countries by 2030 (Mathers et al., 2006). The 12-month prevalence of depression is now 5.5% in high-income countries (Bromet et al., 2011). It is a common condition in adolescents and young adults. One study found a 12-month prevalence of 6.7% among 18- to 25-year-olds (De Graaf et al., 2010). Adolescent depression is associated with serious problems, including poor school performance (Meijer et al., 2006), school absenteeism and dropout (Dopheide, 2006), problematic relations with parents and peers (Cicchetti et al., 1998), excessive tobacco and alcohol use (Glieb et al., 2002), and suicidal behavior (Fergusson et al., 2000).

Subclinical depression is also common, with an estimated prevalence of 17% to 21% among Dutch adolescents (Smit et al., 2003; Ter Bogt et al., 2003). It involves having some depressive symptoms that together do not meet the full *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition criteria for major depression (Cuijpers et al., 2008). Subclinical depression is a risk factor for the development of major depression within a year (Georgiades et al., 2006; Cuijpers et al., 2004). The psychosocial functional impairment of people with subclinical depression is comparable with that in those who have a diagnosis of major depression (Wagner et al., 2000; Gotlib et al., 1995). Beyond the personal suffering involved, both major and subthreshold depression impose significant economic burdens in terms of health care costs and production losses in paid and unpaid work (Cuijpers et al., 2007; Smit et al., 2006).

Given the high prevalence rates, serious outcomes, and economic burden, the World Health Organization calls for the development of preventive interventions to reduce the burden of this disorder (Moussavi et al., 2007; Saxena et al., 2006). The first onset is usually in adolescence (Bormaher et al., 1996), and

it is wise to intervene at an early stage. Yet young people experience many barriers to seeking professional help. They tend to deny or underestimate the problems, fear stigmatization, and question the benefits of help (Vanheusden et al., 2008). If they do seek help, they often encounter waiting lists (Nuijen et al., 2010; Lépine et al., 1997).

Internet-Based Interventions for Depression

By offering a solution to the stigmatization problem, Internet-based approaches could help in reaching target groups who might otherwise remain untreated. The Internet provides anonymity and the opportunity to take part in an intervention in the privacy of the home. Another strong benefit is that Internet-based approaches enable a reduction in contact hours between professionals and clients, which could help tackle the problem of waiting lists, shortages of therapists, and rising health care costs. Web-based interventions with professional support have been found effective in treating depression in adults, with results comparable with traditional psychological approaches (Andrews et al., 2010; Cuijpers et al., 2010; Andersson et al., 2009).

The present study focused on one specific type of Web-based intervention: a professionally facilitated, cognitive behavioral therapy (CBT) group course designed for young people with symptoms of depression. The perceived advantages of online group sessions as compared with individual approaches are social support and mutual recognition by group members (though they remain anonymous to one another) and the reduction of professional contact hours per participant in comparison with individual treatment (Van der Zanden et al., 2005). Three earlier studies on online group courses in mental health care (Van der Zanden et al., 2010; Gerrits et al., 2007; Barak et al., 2000) showed that it is possible, both technically and substantively, to conduct Internet-based group courses for adolescents and adults with mental health problems via the Internet. Two of these three studies showed significant positive outcomes in pre–post measurements, though also reporting relatively high attrition rates – a common problem for Internet interventions (Barak et al., 2000). The pilot study by Gerrits et al (2007) among 140 adolescents with depressive complaints who received the online CBT group course *Master Your Mood (MYM)* showed a significant decline in depressive symptoms. And the pilot study by Van der Zanden et al (2010) of 48 parents with mental illness who received parenting support in an online group course showed significant improvement in parenting skills and parental sense of competence.

Lack of Outcome Studies for Youth

Despite the clear benefits of Web-based interventions for depression, there is a lack of outcome studies specifically focusing on adolescents and young adults (Calear et al., 2010; Riper et al., 2007). Only two randomized controlled trials have been conducted on prevention programs for depression and anxiety (Calear et al., 2009; Van Voorhees et al., 2009). Calear and colleagues (2009) found effects of a universal prevention program for male and female participants for anxiety but found effects for depression only in male participants. Van Voorhees et al (2009) showed that a Web-based behavior change program in primary care, in combination with either motivational interviewing or brief advice, was associated with declines in depressed mood and levels of depressive symptoms.

Objective

We evaluate and discuss the effectiveness of a Web-based group course called *Grip op Je Dip* (Master Your Mood), designed for young people aged 16 to 25 years with depressive symptoms, in comparison with a wait-listed control group. The primary outcome measure was depression, and secondary outcomes were anxiety and sense of control. Based on the results of the pilot study (Gerrits et al., 2007) we expected better outcomes for the course group.

Methods

Study Design

We conducted a randomized controlled trial with two parallel groups to examine the effectiveness of the MYM course, comparing the intervention group with a waiting-list control group. Ethical approval was granted by an independent medical ethics committee (CCMO no. NL18984.097.07). The trial is registered (NTR1694), and the study protocol has been published (Van der Zanden et al., 2011).

Participating Mental Health Agencies

A total of 14 mental health care agencies participated in the project, all working with online course participants from all over the Netherlands. The courses were supervised by professional mental health promotion workers, trained in

administering the Mini-International Neuropsychiatric Interview (MINI-Plus) (Van Vliet et al., 2000; Sheehan et al., 1998) and in conducting the course.

Study Population

The inclusion criteria were the following: age 16 to 25 years, informed consent (including parental consent for those less than 18 years of age), and a Center for Epidemiologic Studies Depression Scale (CES-D) score between 10 and 45. Applicants were excluded on indications of suicidal ideation with intent and plan, as assessed with the MINI-Plus.

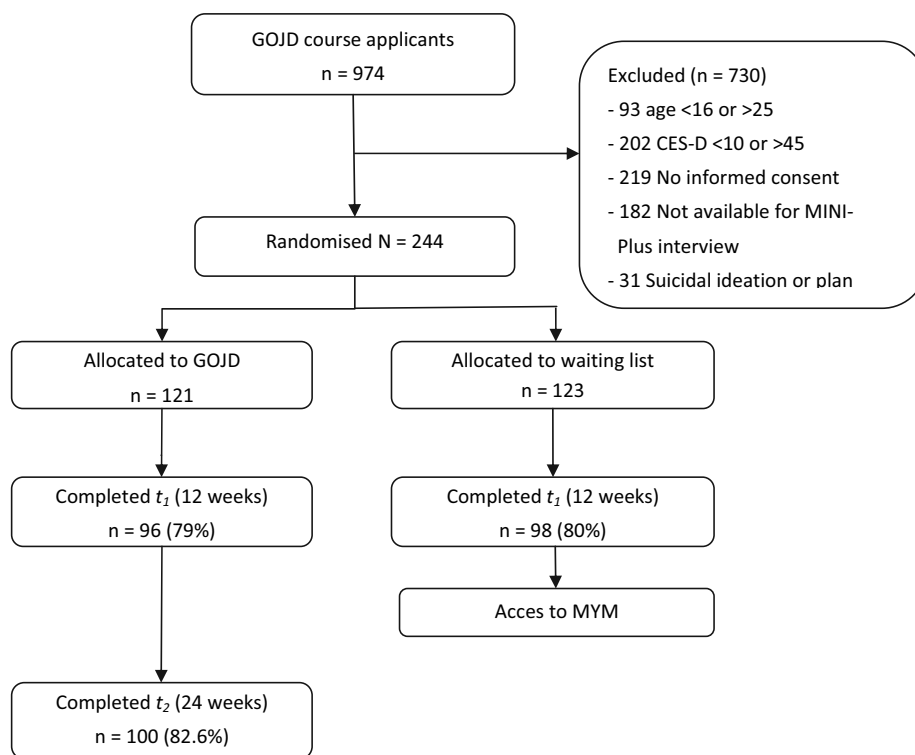
Recruitment Procedure

Participants were recruited from the general population by means of promotional materials in general practitioners' offices and educational institutions. Banners and links were also placed on mental health-related websites and on websites popular with young people. There were no explicit restrictions on country of origin, but the course language was Dutch and the recruitment took place in Dutch. The minimum requirements for Internet access were a stable Internet connection and a recent browser (minimum: Internet Explorer 6.0). Participants also had to be able to read, write, and chat in Dutch on at least the primary school level. Those interested were referred to the MYM website (www.gripopjedip.nl) to complete an online preliminary screening questionnaire and apply for the course. Those with CES-D scores between 10 and 45 then received additional information about the study, an informed consent form (including a parental consent form for 16- and 17-year-olds), and a baseline questionnaire. For course applicants scoring 25 to 45 on the CES-D, a mandatory online chat session followed, in which suicidal ideation was assessed with the MINI-Plus interview. Those for whom suicidal ideation and plan were determined were excluded from the study and advised to see their general practitioner.

Eligible applicants were randomly assigned to the intervention group (MYM) or the control group (wait-listed for 14 weeks). Random allocation was automated by a computer program with no interference by course facilitators or researchers. A blocked randomization scheme was used with blocks of two, stratified by depressive symptoms (CES-D scores of 10–24 vs 25–45) and age (younger vs older than 18 years). The outcome of the randomization was generated and made available at the moment the course facilitator indicated that the applicant was eligible for the course. Applicants were informed of their allocation by email and received a tailored referral if they were declined.

Participants then received a personal email from their facilitator to inform them of the specific times and dates of the course, the homework assignment for the first session, and a username and password for the chat room. During the trial, participants in both conditions were allowed to seek additional help if they wished. Figure 1 shows a flow chart of respondent selection.

Figure 1. Flow chart of respondent selection. CES-D = Center for Epidemiologic Studies Depression Scale; MINI-Plus: Mini-International Neuropsychiatric Interview; MYM = Master Your Mood.



Conditions: The Intervention

The online MYM course is based on the face-to-face intervention of the same name, which was developed by the Trimbos Institute, the Netherlands Institute of Mental Health and Addiction. That intervention was derived from the Dutch version (Cuijpers et al., 2009) of the Coping with Depression course (Lewinsohn et al., 1984). The face-to-face course was adapted to the Internet

in a collaborative project involving the Trimbos Institute and three mental health agencies (Gerrits et al., 2008; Gerrits et al., 2007).

The online MYM group course is a structured form of CBT for depression. At the core of MYM is the cognitive restructuring of thinking patterns. Course participants are encouraged to detect their own unproductive, unrealistic thoughts, and they are then taught to transform these into realistic, helpful thoughts. Performance of pleasant daily activities is also encouraged, and a mood measure is filled in daily to help understand the connection between pleasant activities and mood level. The course we evaluated took place at fixed times in a secured chat room, which participants entered with their username and password. Anonymity within the group was ensured by a self-chosen nickname. Text messages reminders were sent to participants' mobile phones one-half hour before each session. The course comprised six sessions of 90 minutes each, each at a set time every week, and home exercises. The sessions were structured around six themes (see Table 1). During the sessions, course material was introduced by the facilitators and displayed in the chat room using text and images. Participants could respond, share experiences, and ask questions. Emoticons could be used to express feelings. Participants and professionals could read through the session transcripts afterward. The course was guided by one or two trained professionals, depending on group size (6 participants was the maximum).

Table 1. Outline of the online course Master Your Mood.

Session	Actions
1 Your mood	Learning to understand the relationship between feelings, thoughts and actions.
2 Your mood and being active	Becoming aware of the influence that activities have on one's mood and starting to be more active.
3 Tracing negative thoughts	Becoming aware of negative thoughts and starting to understand what they do to one's mood and self-esteem.
4 New ways of thinking	Challenging the negative thoughts and changing them into more positive (but realistic) ones.
5 More action with positive thinking	Combining the new way of thinking with being more active. Becoming more aware of positive things about yourself and others.
6 The future	Making a plan to prevent relapse into depressive moods in the future. Learning the personal signals of a coming depression and knowing how to address that threat. Making a personal plan for the future, to include wishes about schooling, jobs and relationships and ways to achieve those wishes.

Conditions: the waiting list

The wait-listed group did not receive an intervention. They were told by e-mail that they would be invited to participate after the waiting period of 3 months.

Assessments

Assessments took place before randomisation (baseline, t_0), 12 weeks later (t_1) and 12 weeks after that (t_2). Participants received automated e-mails with invitations to complete the online questionnaires. Subsequent reminders were sent five and ten days after the first e-mail invitation, if necessary. To stimulate response, we offered the participants 10 euros' compensation for completing the t_1 questionnaire and 10 euros for the t_2 questionnaire, plus an additional 5-euro bonus (totalling 25 euros) if they completed both.

Measures

Primary outcome measure

Depressive symptoms. The Center for Epidemiologic Studies Depression Scale (CES-D) (Bouma et al., 1995; Radloff et al., 1977) measures the frequency of 20 depressive symptoms over the past week on a 4-point Likert scale. The total score may range from 0 to 60, with higher scores indicating higher levels of depression. Computerised and paper-and-pencil versions of the CES-D correlate at a very high level (Ogles et al., 1998). The web-based version of the CES-D has been shown to be a reliable and valid screening instrument in a Dutch adolescent population, with a Cronbach's alpha of 0.93 (Cuijpers et al., 2008). In our study, the Cronbach's alpha was 0.91.

Secondary outcome measures

Anxiety. The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS) was used to assess anxiety symptoms (Zigmond et al., 1983); the Dutch version of the HADS has been validated (Spinhoven et al., 1997). The Cronbach's alpha was 0.84 for adults (18+ years) in the general population. The anxiety subscale consists of seven items measuring symptoms of anxiety on a 4-point Likert scale, with a score range of 0 to 21 and a higher rating indicating a higher state of anxiety. In our study the Cronbach's alpha of this subscale was 0.74.

Sense of control. The Dutch version of the 5-item Mastery Scale (Pearlin et al., 1978) was used to assess perceived control. The concept of mastery refers to beliefs about one's own ability to control one's environment. Responses are rated on a 5-point Likert scale, with a total score range of 5 to 25; a higher score indicates a greater sense of mastery. The Mastery Scale has good psychometric properties (Pearlin et al., 1978). In our study, the Cronbach's alpha was 0.77.

Additional measures

At baseline, we assessed demographic information (sex, age, educational level, living situation), previous or present professional help for psychological problems, and experience with web-chatting. At 3 months (t_1) and 6 months (t_2), we inquired about subsequent use of professional help and antidepressant medication.

Analyses

The trial was originally powered to detect a clinical effect of $d = 0.32$ or larger in a one-sided test with a power of 80% ($1-\beta$) (Van der Zanden et al., 2011). Hypotheses were directional, with better outcomes expected for the MYM group. A total of 242 participants were needed for the study, $n = 121$ per condition (Stata 11.1 syntax: sampsi; StataCorp LP, College Station, TX, USA).

We used t tests, chi-square tests, and logistic regression ($P < .05$) to determine whether the randomization had resulted in two comparable groups at baseline and whether any differential loss to follow-up occurred.

The expectation-maximization method was used to impute data missing at t_1 and t_2 . It imputes values by maximum-likelihood estimation using the observed data in an iterative process (Dempster et al., 1977). These analyses were based on the intention-to-treat principle, including data from all participants, whether or not they received the intervention.

To test course effectiveness, we calculated difference scores between t_0 and t_1 for all outcome variables (positive scores meaning improvement) and compared them across groups in linear regression models, controlling for data clustering (some participants attended the same course sessions). Clustering would violate the assumption of independence of observations and might affect standard errors and P values. To adjust for clustering, we obtained robust standard errors and P values using the first-order Taylor series linearization method, as implemented in Stata. At t_2 (24 weeks), we studied effect maintenance in the MYM group only; we made no between-group comparisons, as the control group had since been given access to the course.

The sizes of intervention effects were estimated using Cohen's d (Cohen, 1998). Effect sizes were first calculated for each condition separately, $(t_0 - t_1)/SD_{t_0}$, and then the differential effect size was calculated by subtracting the control group effect from that of the MYM group. A difference of $d = 0.5$ would indicate that the experimental group mean was half a standard deviation greater than the control group mean. For Cohen's d , an effect size of 0.2 to 0.3 may be regarded as a small effect, around 0.5 as a medium effect, and 0.8 to infinity as a large effect.

The proportion of participants showing reliable and clinically significant improvement (Jacobson et al., 1992) was determined in terms of an improvement of 5 points on the CES-D in combination with a score lower than 22 on the CES-D (cut-off based on Cuijpers et al., 2008). Subsequently, the number needed to treat was calculated as $1/\text{risk difference}$. The number needed to treat indicates here how many young people with depressive symptoms would need to take the MYM course in order to generate a health gain in 1 person over 12 weeks.

We determined effect maintenance in the MYM group on the basis of the results at 24 weeks (t_2). Paired t tests were used to identify significant changes in outcomes between baseline, 12 weeks (t_1), and 24 weeks in the intention-to-treat sample.

Results

Participants

Recruitment took place from May 20, 2008 to March 6, 2010. Figure 1 shows the flow of participants through the trial. Of the 974 people who applied for the online MYM course, 244 (25.1%) were included in the study. Reasons for noninclusion were lack of informed consent (219/730, 30.0%), CES-D depression score outside the 10–45 range (202/730, 27.7%), no-show at the MINI-Plus interview (182/730, 24.9%), and age outside the 16–25 range (93/730, 13%). Additional exclusions were made for suicidal ideation (31/730, 4%) and other reasons (3/730, 0%). The 244 selected participants were randomly assigned to one of the two conditions: the online MYM course ($n = 121$) and the waiting-list control group ($n = 123$). Table 2 shows baseline demographic and psychosocial characteristics of the 244 participants. Professional help was provided in most cases by a psychologist or other professional from a mental health agency. No significant differences were found on any of these variables between the ex-

perimental group and control group ($P < .05$), indicating that the randomization was successful.

Table 2. Baseline characteristics of the 244 participants

	Experimental <i>n</i> =121	Control <i>n</i> =123	All <i>N</i> =244	Statistics
<i>Female gender</i>	101 (83.5)	105 (85.4)	206 (84.4)	$\chi^2(1)=0.17, p=.68$
<i>Age, mean (SD)</i>	20.8 (2.2)	21.0 (2.3)	20.9 (2.2)	$t(242)=0.64, p=.53$
<i>Age groups</i>				$\chi^2(2)=0.16, p=.92$
16–17	5 (4.1)	4 (3.3)	9 (3.7)	
18–21	66 (54.5)	69 (56.1)	135 (55.3)	
22–25	50 (41.3)	50 (40.7)	100 (41.0)	
<i>Education level^a</i>				$\chi^2(2)=0.63, p=.73$
low	10 (8.2)	10 (8.1)	20 (8.1)	
middle	50 (41.3)	45 (36.6)	95 (38.9)	
high	61 (50.4)	68 (55.3)	129 (52.8)	
<i>Daily activities</i>				$\chi^2(2)=1.90, p=.38$
study	83 (68.6)	85 (69.1)	168 (68.9)	
paid employment	32 (26.4)	27 (22.0)	59 (24.2)	
other	6 (4.9)	11 (8.9)	17 (7.0)	
<i>Living situation</i>				$\chi^2(3)=3.54, p=.32$
with parents	56 (46.3)	59 (48.0)	115 (47.1)	
with partner	13 (10.7)	18 (14.6)	31 (12.7)	
alone	26 (21.5)	16 (13.0)	42 (17.2)	
with others	26 (21.5)	30 (24.4)	56 (23.0)	
<i>Experienced in web-chatting</i>	63 (52.1)	64 (52.0)	127 (52.0)	$\chi^2(1)=0.00, p=.99$
<i>Prior professional help</i>	75 (62.0)	76 (61.8)	151 (61.9)	$\chi^2(1)=0.00, p=.98$
<i>Current professional help at baseline</i>	36 (29.8)	39 (31.7)	77 (31.6)	$\chi^2(1)=0.11, p=.74$
<i>CES-D depression score, mean (SD)^b</i>	32.5 (8.4)	32.3 (8.2)	32.3 (8.3)	$t(242)=0.28, p=.77$
<i>HADS-Anxiety, mean (SD)^c</i>	11.2 (3.6)	11.8 (3.7)	11.5 (3.6)	$t(242)=1.27, p=.21$
<i>Mastery, mean (SD)^d</i>	12.8 (3.4)	12.8 (3.6)	12.8 (3.5)	$t(242)=0.17, p=.86$

^a Combination of highest completed or present education: low = primary or lower secondary school or less; middle = intermediate vocational school or secondary school; high = professional school or university.

^b Dutch version of the Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995)

^c Dutch version of the Hospital Anxiety and Depression Scale (Spinhoven et al., 1997)

^d 5-item Mastery Scale (Pearlin et al., 1978)

Attrition

A total of 21% (50/244) of the sample did not complete the assessment at the end of 12 weeks (t_1). We do not know the reasons for noncompletion of questionnaires. There were no significant differences between groups in completing t_1 . Nor were there significant differences between participants who did and who did not complete the t_1 assessment ($P < .10$). This indicates that loss to follow-up was random. The assessment at 24 weeks (t_2) was used to study the maintenance of effects in the MYM group and was not completed by 17% (21/121) of that group. There were several significant differences at baseline between the MYM participants who completed t_2 and those who did not. Those who did not return that questionnaire were more likely to be male ($\chi^2_1 = 5.2, P = .02$), to have lower education levels ($\chi^2_2 = 5.3, P = .07$), and to have shown higher anxiety ($t_{119} = 2.5, P = .01$) and sense of mastery ($t_{119} = -1.77, P = .08$) at a previous assessment.

Effects of the Intervention

Table 3 shows outcomes in the intention-to-treat sample for the primary (CES-D) and secondary (HADS Anxiety and Mastery) measures as produced by estimation-maximization imputation. The results of the regression analyses with adjustment for clustering were nearly identical to those without adjustment for clustering, indicating the absence of a cluster effect. We therefore present the results of independent-samples t tests. From baseline to 12 weeks, the MYM group showed significantly greater improvement in depressive symptoms, anxiety, and mastery than the control group, with a large effect size for depressive symptoms (CES-D, $d = 0.94$, 95% confidence interval [CI] 0.64–1.23) and moderate effect sizes for anxiety (HADS Anxiety, $d = 0.49$, 95% CI 0.24–0.75) and mastery ($d = 0.44$, 95% CI 0.19–0.70).

Table 4 shows the outcomes for the subsample completing the t_1 questionnaires (with no imputation for the MYM or control group). These outcomes scarcely differed from those in Table 3, indicating that imputation had little effect on outcome. Table 5 shows outcomes for the subsample that attended at least one course session compared with the control group, using expectation-maximization imputation for missing values. Compared with the intention-to-treat sample in Table 3, effect sizes were slightly better still, with again a large effect for depressive symptoms (CES-D, $d = 1.13$, 95% CI 0.78–1.47) and moderate effects for anxiety (HADS Anxiety, $d = 0.53$, 95% CI 0.25–0.81) and mastery ($d = 0.51$, 95% CI 0.23–0.79).

Table 3. Effects of Master Your Mood (MYM) course: intention-to-treat analysis of full sample, expectation-maximisation imputation.

	MYM group (n = 121)			Wait-listed controls (n = 123)			Between-group outcomes			
	Baseline mean (SD)	12-week mean (SD)	d ^a	Baseline mean (SD)	12-week mean (SD)	d ^a	Dif d ^b	t	df	p
Depression (CES-D) ^c	32.5 (8.4)	19.3 (9.7)	1.57	32.2 (8.2)	27.0 (8.6)	0.63	0.94	6.62	179.1	< .001
Anxiety (HADS) ^d	11.2 (3.6)	8.0 (3.9)	0.89	11.8 (3.7)	10.4 (3.3)	0.39	0.49	3.80	215.9	< .001
Mastery	12.8 (3.4)	15.9 (4.1)	0.91	12.8 (3.6)	14.5 (3.5)	0.47	0.44	3.36	226.8	.001

a Individual standardized effect size ($d = t_0 - t_1 / SDt_0$), with positive effect sizes indicating improvement. b Effect size differences between MYM group and wait-listed control group. c Dutch version of the Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995). d Dutch version of the Hospital Anxiety and Depression Scale (Spinhoven et al., 1997). e 5-item Mastery Scale (Pearlin et al., 1978).

Table 4. Effects of Master Your Mood (MYM) course: comparison of responding participants only, no imputation.

	MYM group (n = 96)			Wait-listed controls (n = 98)			Between-group outcomes			
	Baseline mean (SD)	12-week mean (SD)	d ^a	Baseline mean (SD)	12-week mean (SD)	d ^a	Dif d ^b	t	df	p
Depression (CES-D) ^c	32.5 (8.0)	19.1 (10.7)	1.60	31.6 (7.7)	26.7 (9.4)	0.60	0.99	5.69	179.1	< .001
Anxiety (HADS) ^d	10.9 (3.5)	7.8 (4.2)	0.88	11.7 (3.2)	10.2 (3.5)	0.39	0.49	3.10	192	.002
Mastery ^e	12.9 (3.3)	16.1 (4.3)	0.93	12.9 (3.3)	14.6 (3.8)	0.47	0.46	2.82	184.5	.005

a Individual standardized effect size ($d = t_0 - t_1 / SDt_0$), with positive effect sizes indicating improvement. b Effect size differences between MYM group and wait-listed control group. c Dutch version of the Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995). d Dutch version of the Hospital Anxiety and Depression Scale (Spinhoven et al., 1997). e 5-item Mastery Scale (Pearlin et al., 1978).

Table 5. Effects of Master Your Mood (MYM) course: MYM participants attending at least one session compared with wait-listed control group, expectation-maximization imputation.

	MYM group (n = 96)			Wait-listed controls (n = 123)			Between-group outcomes			
	Baseline mean (SD)	12-weeks mean (SD)	d ^a	Baseline mean (SD)	12-weeks mean (SD)	d ^a	Dif d ^b	t	df	p
Depression (CES-D) ^c	33.2 (7.8)	19.6 (10.3)	1.76	32.2 (8.2)	27.0 (8.6)	0.63	1.13	6.15	170.6	< .001
Anxiety (HADS) ^d	11.3 (3.5)	8.6 (4.4)	0.92	11.8 (3.7)	10.4 (3.3)	0.39	0.53	3.53	217	.001
Mastery ^e	12.6 (3.4)	15.8 (4.1)	0.98	12.8 (3.6)	14.5 (3.5)	0.47	0.51	3.36	217	.001

a Individual standardized effect size ($d = t_0 - t_1 / SDt_1$), with positive effect sizes indicating improvement. b Effect size differences between MYM group and wait-listed control group. c Dutch version of the Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995). d Dutch version of the Hospital Anxiety and Depression Scale (Spinhoven et al., 1997). e 5-item Mastery Scale (Pearlin et al., 1978).

Reliable and Clinical Change

At 12 weeks, 56% (68/121) of the participants in the MYM group and 20% (24/123) in the control group showed reliable and clinically significant change (a positive change of 5 points or more on the CES-D in combination with a score below 22). This between-group difference was significant ($\chi^2_1 = 35.0, P < .001$) and yielded a number needed to treat of 2.7.

Maintenance of Effects in the MYM Group

Table 6 shows the results of the paired *t* tests for the MYM group (intention-to-treat sample). There was significant improvement in depressive symptoms, anxiety, and mastery from baseline (*t*₀) to 12 weeks (*t*₁), as well as from baseline to 24 weeks (*t*₂). The effect sizes (*d*) were large for all measures. Sense of mastery even improved significantly with a small effect size from 12 weeks (*t*₁) to 24 weeks (*t*₂). The positive results achieved at 12 weeks were thus maintained at 24 weeks, and mastery continued improving.

Table 6. Effect maintenance in the Master Your Mood group (*n* = 121).

	Baseline <i>t</i> ₀ 12 weeks <i>t</i> ₁ 24 weeks <i>t</i> ₂			<i>t</i> ₀ - <i>t</i> ₁		<i>t</i> ₀ - <i>t</i> ₂		<i>t</i> ₁ - <i>t</i> ₂				
	Mean (SD)	Mean (SD)	Mean (SD)	<i>t</i> ^a	<i>p</i>	<i>d</i> ^b	<i>t</i> ^a	<i>p</i>	<i>d</i>	<i>t</i> ^a	<i>p</i>	<i>d</i>
Depression (CES-D) ^c	32.5 (8.4)	19.3 (9.7)	18.3 (10.7)	13.3	<.001	1.57	9.4	<.001	1.69	1.0	.31	0.10
Anxiety (HADS) ^d	11.2 (3.6)	8.0 (3.9)	7.8 (3.8)	12.8	<.001	0.89	10.0	<.001	0.96	0.8	.42	0.06
Mastery ^e	12.8 (3.4)	15.9 (4.1)	16.7 (4.1)	9.2	<.001	0.91	10.4	<.001	1.14	2.8	.006	0.19

a *df* = 120.

b Individual standardized effect sizes [*d* = (*t*₀ - *t*₁) / *SD**t*₀]; *d* = (*t*₀ - *t*₂) / *SD**t*₀; *d* = (*t*₁ - *t*₂) / *SD**t*₁] with positive effect sizes indicating improvement.

c Dutch version of the Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995).

d Dutch version of the Hospital Anxiety and Depression Scale (Spinhoven et al., 1997).

e 5-item Mastery Scale (Pearlin et al., 1978). Higher scores stand for higher sense of mastery; differences calculated as *t*₁ - *t*₀, *t*₂ - *t*₀, *t*₂ - *t*₁.

Sessions Attended and Outcome

Not all MYM group participants attended all course sessions: 21% (25/121) did not attend any sessions, 52% (63/121) attended at least four sessions, and 20% (24/121) attended all six. The average number of sessions attended was 3.2 (SD 2.2) with a range from 0 to 6. Tested at *P* < .05, there were no significant differences in the CES-D mean effect sizes between those attending no sessions (*d* = 1.3) and those attending one or more (*d* = 1.6, *t*₁₁₉ = 1.03, *P* = .31), nor

between those attending fewer than 3 ($d = 1.5$) or more than 3 sessions ($d = 1.6$, $t_{110.6} = 0.73$, $P = .47$). Tested at $P < .10$, some differences emerged between participants attending no sessions and those attending at least one. Nonattendees included fewer experienced Web chatters (9/25, 36%) as compared with attendees (54/96, 56%; $\chi^2_1 = 3.3$, $P = .07$), and nonattendees also had lower mean baseline CES-D scores (mean 29.6, SD 10, vs 33.2, SD 7.8; Wald $\chi^2_1 = 3.6$, $P = .06$).

Discussion

Main Results

In this study, the Internet-based CBT group course known as Grip op Je Dip (Master Your Mood) for young people aged 16 to 25 years proved significantly more effective than a waiting-list control group in decreasing depressive symptoms. At 3 months, a large between-group effect size of 0.94 was found. The MYM group also showed a significantly greater reduction in anxiety symptoms (with a medium between-group effect of 0.49) and improvement in sense of control or mastery (medium effect of 0.44). The proportion of participants showing reliable and clinically significant change was 0.56 in the MYM group versus 0.20 in the control group ($\chi^2_1 = 35.0$, $P < .001$). The reductions in depressive and anxiety symptoms and the increased sense of mastery were maintained in the MYM group at 6-month follow-up.

Comparison With Other Work

Our study is one of the first randomized controlled trials to study online depression treatment for young people (Riper et al., 2007; Calear et al., 2010), and it is the first to focus on an online group course (Van der Zanden et al., 2010). This hampers any solid comparison with prior Internet intervention research, which has chiefly focused on adults and on individual approaches. It is with this limitation in mind that we compare the results of the current study with other work.

The effectiveness of online treatment for depression in adults has already been demonstrated (Andrews et al., 2010; Cuijpers et al., 2010; Andersson et al., 2009). Our study showed the effectiveness of an online intervention for young people with depressive symptoms. The large effect size of 0.94 for the MYM course is comparable with the effects of face-to-face psychotherapy for depression in youth (Michael et al. 2002; Reinecke et al., 1998; Clarke et al.,

1999). So far, effect size differences for Internet-based adult therapies for depression and anxiety have appeared to be related to the amounts of accompanying therapist support (Spek et al., 2007). Since the MYM intervention provided substantial support by the course facilitator in the weekly group sessions, this might partly account for the large effect we obtained. In addition to the significant declines in CES-D scores, the MYM course was also associated with significantly lower scores on the HADS Anxiety subscale. Young people with primary anxiety may therefore also stand to benefit—a possibility supported in a recent trial that showed the effectiveness of an online CBT protocol for adult anxiety disorders and/or depression (Titov et al., 2011).

We also analyzed clinically significant change in the present study. The proportions of improved and recovered participants (56% in the MYM group vs 20% in the control group) seem in line with those for Web-based interventions for adult depression (Van Straten et al., 2008; Warmerdam et al., 2008; Clarke et al., 2005).

Dose–effect analysis in our study found no correlation between the number of sessions attended and the intervention outcomes, likewise corresponding to other studies (Warmerdam et al., 2008; Spek et al., 2007; Clarke et al., 2005; Clarke et al., 2001). Similarly, a meta-analysis by Weisz et al (2006) found treatment duration not to be correlated with outcome. The explanation for this is not clear. In our study we did not ask the participants of the MYM group for their reasons for stopping after one or a few sessions. It could be that those who stopped felt they had recovered enough. This may have leveled out the correlation between sessions attended and outcome. The MYM group also included participants who did not attend any session, and they still displayed intervention effects. An explanation for this might be the difference in study conditions to which the MYM group and the wait-listed group were assigned: although both groups attended no sessions, the MYM participants made an active decision about this, while the wait-listed group did not. Indeed, which specific elements of a treatment are effective and which exact mechanisms bring on a person’s recovery are still at the frontiers of knowledge.

In the current field of Internet-based help, there is an ongoing search for an optimal balance (in terms of outcome and costs) between the relative amounts of therapist support and self-guidance (Riper et al., 2007). In comparison with an individual eight-session CBT-based online self-help intervention with professional support (Warmerdam et al., 2008), the facilitated six-session MYM course entailed less supervision time per participant (160 minutes in the eight-session CBT vs 135 minutes in six-session MYM, based on an average of 4 participants per facilitator), while the between-group effect size in the MYM was larger (0.94 MYM vs 0.72 CBT self-help at 12-week posttest). One possibil-

ity is that the group interaction, whereby group members provide some support to one another, might have boosted outcomes over the therapist support.

Limitations

This study has several limitations. One of them is the infeasibility of comparing the 6-month (t_2) outcomes of the MYM and control groups, since the control group had access to the course after t_1 . Another limitation is the passive (waiting-list) control condition. This makes it difficult to conclude that the treatment contained components that were ‘specifically effective over and above simple compassion, friendliness, attention and belief’ (Jensen et al., 2003). Furthermore, the fact that participants were not blind to their condition, though generally inherent in psychotherapy studies, could have introduced some bias. The exclusive reliance on self-report measures is another limitation; other sources of information were missing. In this study we encountered missing data, though the attrition rate was much lower than in some other studies. High attrition rates are common in studies of Internet-based interventions (Warmerdam et al., 2008; Eysenbach et al., 2005). We found no indication in the analyses that our missing data had affected the results. We dealt with missing values at posttest and follow-up using the expectation-maximization imputation method (Dempster et al., 1977).

Our participants had rather high levels of education relative to the general population, so it is uncertain whether results can be generalized to people with lower education levels. The same can be said for male participants, who were underrepresented in our study in relation to the depression prevalence in the male general population. Adolescents aged 16 and 17 years were also underrepresented, due apparently not to lack of willingness to participate, but to a lack of consent given by parents. Further, we are uncertain whether results can be generalized to people with severe depression, as they were excluded from the study.

Future Research Directions

We have pointed out that there is a lack of randomized controlled trials of Web-based interventions that specifically target adolescents and young adults with depression. From a preventive point of view, research on depression in youth is acutely needed, given the frequent early onset of subclinical and major depression and their far-reaching impacts. Future research should focus on the economic evaluation of Internet-based interventions for youth and on outcome research regarding stepped-care interventions (minimal where possible,

sustainable where necessary). Trials are also needed in which online treatment groups are compared with active online control groups. This could help identify more specific elements of treatment that are effective. People with low socioeconomic status backgrounds are generally underrepresented in study samples but are in particular need due to their higher prevalence of psychological distress (De Graaf et al., 2010). Interventions specially tailored to such groups therefore ought to be developed and studied.

Conclusion

Despite the limitations of the present study, our findings suggest that adolescents and young adults with depressive symptoms can benefit from an Internet-based CBT group course. In our intervention, with a level of professional support per person roughly equivalent to that in other facilitated Web-based self-help interventions for depression, we found a relatively large effect size. The group aspect of our intervention may have accounted for this. Along with the individual approaches developed so far, online CBT group courses for depression may open additional opportunities to reach people who might otherwise remain untreated, thus achieving long-term cost savings. Future research should focus on economic evaluations of Internet-based interventions for depression in youth.

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Chapter 5 Mechanisms of change¹

Abstract

Background This study investigates possible circularity in mechanisms of change in participants of Master Your Mood (MYM), a cognitive-based, online intervention for young adults with depressive symptoms. A previous study showed that MYM effectively reduced depression and anxiety and strengthened mastery. **Method** We randomized 244 participants with depressive symptoms into MYM or a wait-list control condition. We explored the circularity hypothesis by several analyses. Correlations were computed to determine the association between (change in) depression and anxiety. Path analysis mediation models were used to explore whether change in anxiety and mastery mediated the intervention effect on depression, whether depression and mastery mediated the effect on anxiety and whether depression and anxiety mediated the effect on mastery. We used linear regression to explore whether early changes in anxiety predicted later changes in depression, and whether early changes in depression predicted later changes in anxiety. **Results** Co-morbidity between depression and anxiety was high (69.2%) and the association between depression and anxiety change was strong ($r = 0.677$, $p < 0.01$). Changes in anxiety and mastery mediated change in depression (mediation proportion 44%); changes in depression mediated change in anxiety (79%) and mastery (75%). We did not find an early change in anxiety predictive for a late change in depression, and vice versa. **Conclusions** This study appears to confirm the hypothesized circularity in the recovery process. We found high comorbidity and strong correlation between depression and anxiety levels and bi-directional relationships between potential mediators and outcomes. Early anxiety change scores were not predictive of late depression change scores, and vice versa.

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Introduction

Cognitive behavioural therapy (CBT) interventions have been shown in a multitude of studies to be an effective treatment for depression in adults and adolescents (Weisz et al. 2006; Calear & Christensen, 2010; Cuijpers et al. 2011). However, our knowledge of mechanisms that could explain this recovery is still limited (Lemmens et al. 2011; Kazdin, 2007). To evaluate how change comes about, research may focus on mediators. Kazdin (2007) defines a mediator as an intervening variable that may statistically account for the relationship between the independent and dependent variable. He sees assessing mediation as an important intermediate step between showing a causal relationship and correctly understanding the mechanisms through which the effect occurs. Identifying mediators is important to the further improvement of treatments and their clinical and cost-effectiveness. It enables components to be included that are crucial to recovery (Lemmens et al. 2011; Kazdin, 2007). Our present study will focus on the possible mediating role of changes in perceived control, anxiety and depression in the recovery process of participants with symptoms of depression that followed the CBT-based online Master Your Mood (MYM) intervention.

Perceived control

In previous mediation studies on CBT interventions perceived control has been explored as a possible mediator (Meulenbeek et al. 2010; Warmerdam et al. 2010). Perceived control refers to beliefs about one's own ability to control one's environment (Thompson et al., 2008). People have a sense of control when they believe that personal action generally controls outcomes (internal locus of control) and that they have the personal skills (self-efficacy) to carry out those actions (Thompson et al., 2008). 'Mastery' is a similar concept and is defined as the feeling of the extent to which a person perceives himself to be in control of events and ongoing situations (Moser et al., 1995). As both concepts are often used indiscriminately, no distinction had been made between perceived control and mastery in this study.

Perceived control seems to be a crucial element in understanding anxiety and depression. Low perceived control predicts anxiety and depression symptoms (Rivard et al., 2007; Chaney et al. 1996). Other research has demonstrated an inter-relationship between stress, perceived control and emotional disturbances (Rosenbaum et al. 2012; Mausbach et al. 2007, 2006; Thompson et al. 2006; Lachman et al., 1998). For example, in the study of Rosenbaum et al. (2012) in patients with non-cardiac chest pain, it was hypothesized that per-

ceived control would mediate the relationship between stress and anxiety disorder severity and between stress and mood disorder severity. This study showed that stress and perceived control were both associated with severity of anxiety and mood disorder. It appeared that perceived control fully mediated the relationship between stress and mood disorder severity, but not the severity of anxiety disorder. Furthermore, a few studies were found in which perceived control was examined as a possible mediator in the intervention effect on depression or anxiety. A study on a CBT intervention for depression demonstrated that perceived control mediated the intervention effect on depression (Warmerdam et al. 2010). Another study identified perceived control as a mediator in the recovery from anxiety (Bakker et al. 2002). A study on panic disorder did not find that feelings of mastery in general mediated the effect of the CBT-based intervention on panic symptomatology; however, perceived self-efficacy in coping with panic did have a mediating effect (Meulenbeek et al. 2010).

Our own previous trial on the CBT-based MYM intervention (Van der Zanden et al. 2012) suggested that a sense of control may mediate recovery from depression. In that study, the experimental group included people who did not attend a single session, but who nonetheless showed favourable intervention effects. We surmised that this might be explained by the difference in study conditions to which the experimental group and the wait-list group had been assigned: though both groups attended no sessions, the experimental group made an active decision on it, and thus might have experienced a sense of control, while the wait-listed group did not. Finally, we found studies reporting apparent bi-directional relationships between change on cognitive measures and perceived control and changes on symptom measures for depression and anxiety, indicating that the change process might be circular in nature (Meulenbeek et al. 2010; Anholt et al. 2008; Jarrett et al. 2007).

Summarizing, it seems relevant to investigate the mediating role of perceived control in the intervention effect on depression and anxiety symptoms. In the light of possible circularity in the process of change, it seems also relevant to investigate the reversed condition, that is the mediating role of changes in depression and anxiety symptoms in the intervention effect on perceived control.

Anxiety and depression

Another issue to analyse in building knowledge on mediators and possible circularity in change processes is the strong relationship between depression and anxiety (Hoek et al. 2012; Hale et al. 2009; Axelson et al., 2001). As anxiety

and depression are strongly associated and processes of change may occur in a circular manner, it is worthwhile to investigate not only perceived control as a mediator for depression and anxiety recovery (and vice versa) as stated before, but also whether change in anxiety mediates depression change and whether change in depression mediates anxiety change. Although we did not find previous mediation studies on this topic, we did discover other research on depression and anxiety that may help in building knowledge on mechanisms of change. Research has shown that a co-morbid anxiety disorder is noted in 25% to 50% of depressed adolescents and 10% to 15% of adolescents with an anxiety disorder have a co-morbid depressive disorder (Axelson et al., 2001; Cole et al. 1998; Brady et al., 1992). Most studies of adolescents have found evidence that anxiety disorder symptoms precede symptoms of depressive disorder (Cole et al. 1998), whilst results on the converse relationship are less conclusive (Axelson et al., 2001). A longitudinal study by Hoek et al. (2012) of 497 teenagers drawn from the general adolescent population has found, using non-diagnostic instruments, that symptoms of depression and anxiety developed simultaneously.

As research indicates a strong relationship between depression and anxiety, it has been questioned whether anxiety and depression actually represent two distinct syndromes, or simply the same disorder on a continuum of severity (Lee et al., 2002). More recent research, however, suggests that depression and anxiety do develop as two distinct disorders with parallel growth processes, each with its own unique growth characteristics (Hale et al. 2009).

Regarding the strong relationship between depression and anxiety, and possible circularity in processes of change, it seems relevant to explore in the present study the associations between anxiety and depression and the possible mediating roles played by anxiety reduction in depression recovery and vice versa.

Study object and hypotheses

This paper focuses on the mechanisms of change in participants receiving the MYM intervention, an online CBT-based group course for young adults with depressive symptoms. MYM has been shown effective in reducing depressive and anxiety symptoms and increasing mastery (Van der Zanden et al. 2012). To explore the hypothesized circularity in the recovery process, we first analyse the relationship between depression and anxiety in our sample. We then perform mediation analyses to detect: (1) any mediating role of changes in anxiety and mastery in changes in depression; (2) any mediating role of changes in depression and mastery in changes in anxiety; and (3) any mediat-

ing role of anxiety and depression in changes in mastery. We finally explore whether early changes in anxiety predict later change in depression and whether early changes in depression predict later change in anxiety.

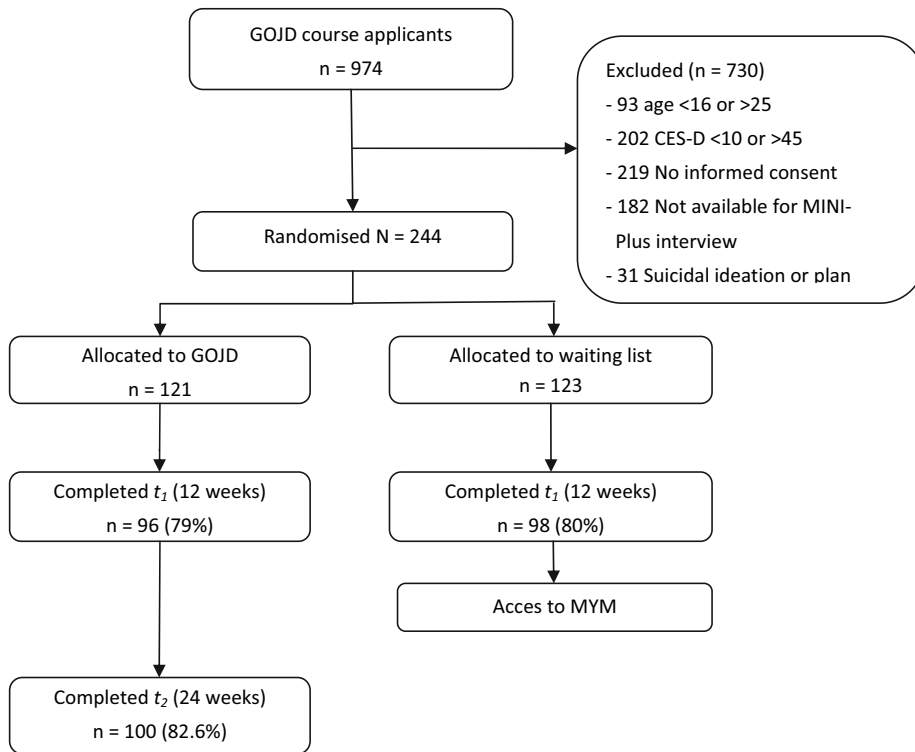
Assuming possible circularity in the recovery process, we expect: (a) high co-morbidity and a strong association between depression and anxiety symptom levels, and changes in them, in our sample; (b) bi-directional changes in mediators and outcomes; and (c) no prediction of late change in depression by early change in anxiety and no prediction of late change in anxiety by early change in depression. The latter expectation is based on the assumption that when relationships are bi-directional and the process of change is circular in nature, it is less likely to find in a period of time that early mediator change is predictive for later change in outcome.

Method

Participants and procedures

A comprehensive description of the participants and procedures can be found in a previous publication (Van der Zanden et al. 2012). Participants were recruited from the general population using promotional materials in general practitioner (GP) offices and educational institutions. Banners and links were placed on mental health websites and on websites popular with youth. Inclusion criteria were: age 16–25 years, informed consent (including parental consent for those aged under 18 years) and a Center for Epidemiologic Studies Depression Scale (CES-D) score of 10–45 (Bouma et al. 1995). Applicants were excluded on indications of suicidal ideation with intent and plan, as assessed with the Mini-International Neuropsychiatric Interview (MINI-Plus; Van Vliet et al. 2000; Sheehan et al., 1998). Assessments took place before randomization (baseline), 12 weeks later (postintervention) and 12 weeks after that (follow-up). Questionnaires were completed online; the MINI-Plus was administered in online chat sessions. A total of 244 participants were randomized to the MYM course (n=121) or a wait-list control group (n=123). A flow chart of the sample selection is shown in Fig. 1 (Van der Zanden et al., 2012).

Fig. 1. Flow chart of respondent selection. MYM, Master Your Mood; CES-D, Center for Epidemiologic Studies Depression Scale; MINI-Plus, Mini-International Neuropsychiatric Interview.



Intervention

The online MYM group course is a structured form of CBT for depression. At the core of MYM is the cognitive restructuring of thinking patterns. Course participants are encouraged to detect their own unproductive, unrealistic thoughts, and they are then taught to transform these into realistic, helpful thoughts. Performance of pleasant daily activities is also encouraged, and a mood measure is completed daily to clarify the connection between pleasant activities and mood. The course we evaluated took place at fixed times in a secured chatroom, which participants entered with usernames and passwords. Anonymity was ensured by self-chosen nicknames. The course comprised six 90-min sessions, at set times every week, and home exercises. The sessions were structured around six themes (Van der Zanden et al., 2012). During the

sessions, course material was introduced by the facilitators and displayed in the chatroom using text and images. Participants could respond, share experiences and ask questions. Emoticons could be used to express feelings. Participants and professionals could read session transcripts afterwards. The course was guided by one or two trained professionals, depending on group size (six participants maximum).

Outcome measures

Depressive symptoms

Symptoms of depression were assessed with the 20-item CES-D (Bouma et al. 1995; Radloff, 1977), which measures the frequency of 20 depressive symptoms over the past week using four-point Likert scales. Total score range is 0–60, with higher ratings indicating more depressive symptoms. Computerized and paper CES-D versions correlate at a very high level (Ogles et al. 1998). The web-based CES-D has proved a reliable, valid screening instrument in a Dutch adolescent population (Cuijpers et al., 2008).

Anxiety symptoms

The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond et al., 1983) was used to assess anxiety symptoms. The Dutch version of HADS has been validated (Spinhoven et al., 1997). The anxiety subscale consists of seven items measuring anxiety symptoms on a four-point Likert scale, with a 0–21 score range, and with higher ratings indicating higher states of anxiety.

Perceived control

The Dutch version of the five-item Mastery Scale was used to assess perceived control (Pearlin et al., 1978). Mastery refers to beliefs about one's own ability to control one's environment. Responses are rated on a five-point Likert scale, with a total score range of 5–25, and higher scores indicating a greater sense of mastery. The Mastery Scale has good psychometric properties (Pearlin et al., 1978).

Statistical analysis

All analyses were based on an intention-to-treat sample (including data from all participants, whether or not they received the intervention). The expectation-maximization method was used to impute data missing at post-treatment and follow-up (Van der Zanden et al., 2012). It imputes values by maximum-

likelihood estimation using the observed data in an iterative process (Dempster et al., 1977). The 12-week assessment was used as the posttreatment measurement and the 24-week assessment as the follow-up. The follow-up was performed in the experimental group only, as the control group had access to the course after post-treatment. Baseline between-group differences in demographics and potential mediators were investigated using χ^2 and t tests. Correlation analysis was used to investigate associations between levels of anxiety and depression at baseline and post-treatment. For the calculation of the comorbidity rate of depression with anxiety, we used the cut-off scores CES-D 522 (Cuijpers et al., 2008) and HADS 511 (Crawford et al., 2001).

Mediation analysis was then conducted, to investigate the mechanisms through which the treatment affects the outcome variable(s), following the steps for testing multiple mediators outlined by Baron & Kenny (1986):

1. Treatment condition should predict change in the outcome variable.
2. Treatment condition should predict change in the possible mediators.
3. Change in possible mediators should predict change in the outcome variable.
4. The effect of treatment condition on change in outcome should be attenuated when the effect of mediators is statistically controlled.

Path analysis mediation models (MacKinnon, 2008) were used to explore the relationship between the outcome variable and two potential correlated mediators. To investigate possible circularity in the recovery process, in our study each of the variables depression, anxiety and mastery was tested alternately as an outcome variable and as a potential mediator. In the first analysis, the outcome was the difference between baseline and post-treatment scores for depression, and potential mediators were baseline to post-treatment differences in anxiety and mastery scores. In the second analysis, the outcome was anxiety differences, with depression and mastery differences as possible mediators. In the third analysis, the outcome was differences in mastery and potential mediators were differences in depression and anxiety.

Univariate analyses were performed with SPSS 19 (SPSS Inc., USA) and mediation analyses with Mplus (Muthén and Muthén, USA). A two-sided significance level of $p=0.05$ was used. Mediation proportions for each mediator were computed by dividing the absolute value of the indirect effect, $ABS(a_1*b_1)$, by the total effect, $ABS(c)+ABS(a_1*b_1) +ABS(a_2*b_2)$ (Bate et al. 2009). In the mediation models, the a-path refers to the effect of the independent variable on the mediator, the b-path represents the effect of the mediator on the dependent variable after controlling for the effect of the independent variable, and

the c-path refers to the direct effect of the independent variable on the dependent variable after controlling for mediators (see Figs 2–4). Variance inflation factors (VIFs) were calculated to assess possible collinearity effect in multiple mediation analysis, meaning that the indirect effect attenuates to the extent that the mediators are correlated in the model (Preacher et al., 2008; Belsey et al., 1980).

Results

Baseline participant characteristics

Demographic and clinical characteristics of experimental and control group members are shown in Table 1 (Van der Zanden et al., 2012). At baseline, t tests for independent groups and χ^2 tests revealed no significant between-group differences on demographic and outcome variables (CES-D, HADS-A, mastery).

Co-morbidity and association between depression and anxiety

We first analysed co-morbidity – defined as the presence of one or more disorders in addition to a primary disease or disorder – of depression with the additional disorder anxiety. For clinical depression we used a CES-D cut-off score of ≥ 22 (Cuijpers et al., 2008) and for anxiety disorder a HADS cut-off score of ≥ 11 (Crawford et al., 2001). Although the inclusion criterium was set on CES-D > 10 , 86.5% (211/244) of the participants had a CES-D score ≥ 22 . Furthermore, 85.2% (208/244) had a HADS score ≥ 11 .

Then we calculated the co-morbidity rate of depression with anxiety, according to the given definition. At baseline we found a co-morbidity rate of 69.2% (146/211), meaning that of the group with a CES-D score ≥ 22 ($n=211$), 146 respondents had a HADS score ≥ 11 .

Next, we computed the association between depression and anxiety scores at baseline and at posttreatment, finding strong correlations between depression and anxiety at both assessments ($r = 0.60$, $p < 0.001$; $r = 0.71$, $p < 0.001$). Finally, we computed correlations between the baseline to post-treatment change scores in depression and anxiety. The correlation between the changes was strong ($r = 0.68$, $p < 0.01$) and in the expected direction: greater changes in depression corresponded with greater changes in anxiety.

Table 1. Baseline characteristics of the 244 participants

	Experimental <i>n</i> =121	Control <i>n</i> =123	All <i>N</i> =244	Statistics
Female gender	101 (83.5)	105 (85.4)	206 (84.4)	$\chi^2(1)=0.17, p=.68$
Age, mean (SD)	20.8 (2.2)	21.0 (2.3)	20.9 (2.2)	$t(242)=0.64, p=.53$
Age groups				$\chi^2(2)=0.16, p=.92$
16–17	5 (4.1)	4 (3.3)	9 (3.7)	
18–21	66 (54.5)	69 (56.1)	135 (55.3)	
22–25	50 (41.3)	50 (40.7)	100 (41.0)	
Education level ^a				$\chi^2(2)=0.63, p=.73$
low	10 (8.2)	10 (8.1)	20 (8.1)	
middle	50 (41.3)	45 (36.6)	95 (38.9)	
high	61 (50.4)	68 (55.3)	129 (52.8)	
Daily activities				$\chi^2(2)=1.90, p=.38$
study	83 (68.6)	85 (69.1)	168 (68.9)	
paid employment	32 (26.4)	27 (22.0)	59 (24.2)	
other	6 (4.9)	11 (8.9)	17 (7.0)	
Living situation				$\chi^2(3)=3.54, p=.32$
with parents	56 (46.3)	59 (48.0)	115 (47.1)	
with partner	13 (10.7)	18 (14.6)	31 (12.7)	
alone	26 (21.5)	16 (13.0)	42 (17.2)	
with others	26 (21.5)	30 (24.4)	56 (23.0)	
Experienced in web-chatting	63 (52.1)	64 (52.0)	127 (52.0)	$\chi^2(1)=0.00, p=.99$
Prior professional help	75 (62.0)	76 (61.8)	151 (61.9)	$\chi^2(1)=0.00, p=.98$
Current professional help at baseline	36 (29.8)	39 (31.7)	77 (31.6)	$\chi^2(1)=0.11, p=.74$
CES-D depression score, mean (SD) ^b	32.5 (8.4)	32.3 (8.2)	32.3 (8.3)	$t(242)=0.28, p=.77$
HADS-Anxiety, mean (SD) ^c	11.2 (3.6)	11.8 (3.7)	11.5 (3.6)	$t(242)=1.27, p=.21$
Mastery, mean (SD) ^d	12.8 (3.4)	12.8 (3.6)	12.8 (3.5)	$t(242)=0.17, p=.86$

^a Highest completed or present education: low = primary or lower secondary school or less; middle = secondary school or intermediate vocational school; high = professional school or university

^b Dutch version of 20-item Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995)

^c Dutch version of 7-item Hospital Anxiety and Depression Scale (Spinhoven et al., 1997)

^d 5-item Mastery Scale (Pearlin & Schooler, 1978)

Association between treatment and outcomes

As previously reported (Van der Zanden et al., 2012), MYM participants showed significantly greater improvements at 12 weeks than controls, with a large between-group effect size for depressive symptoms [CES-D, $d=0.94$, 95% confidence interval (CI) 0.64– 1.23] and moderate effect sizes for anxiety

(HADS-A, $d=0.49$, 95% CI 0.24–0.75) and mastery ($d=0.44$, 95% CI 0.19–0.70). Improvements in the MYM group were maintained at 24 weeks. In the present study, the outcomes depression, anxiety and mastery were also considered as possible mediators, which means that the same estimated treatment effect applies to the association between treatment and mediators as well (Table 2).

Table 2. *Estimated treatment effect on outcome variables and estimated treatment effect on potential mediators from baseline to post-measurement*

Variable	Group × time		Between-group effect size	
	<i>Est</i>	<i>t</i>	<i>P-value</i>	<i>Difd</i> (95% CI)
Depression MYM vs WL	−7.804	−7.184	<.001	0.94 (0.64–1.23)
Anxiety MYM vs WL	−2.051	−5.070	<.001	0.49 (0.24–0.75)
Mastery MYM vs WL	1.438	3.508	.001	0.44 (0.19–0.70)

Abbreviations: MYM = Master Your Mood course; WL = waitlist control group; Est = estimates; CI = confidence interval; Difd=effectsize differences between MYM-group and wait-list control group

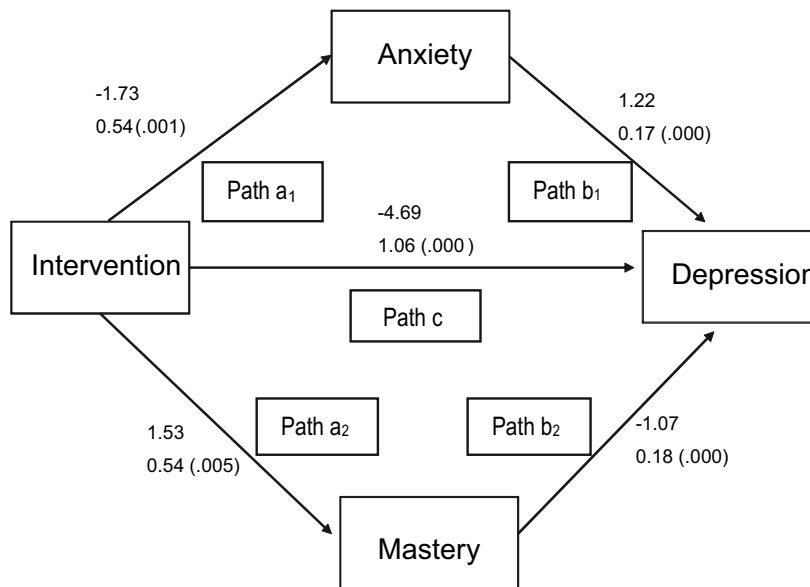
Associations between treatment and mediating variables

The next step in examining the hypothesized bidirectional relationships between change in outcomes and change in mediators was to analyse the various associations between treatment, potential mediators and outcomes. The first and second requirements for mediation analysis of Baron and colleague (1986) were checked, and had been fulfilled (Table 2). The check of the third and fourth requirements was performed in the same equation. We studied three possible mediation models (Figs 2–4). Table 3 summarizes the indirect effects (or mediation effects) and the mediation proportions.

Model 1: depression as mediated by anxiety and mastery

As Fig. 2 shows, the association between treatment and change in depression decreases from -7.804 to -4.69 after control for anxiety and mastery, but remains significant ($p < 0.001$). Table 3 reveals a significant indirect effect of anxiety (-2.11 , 95% CI -03.64 to -0.80); the mediation proportion is 0.25, meaning that 25% of the effect of treatment on depression is explained by the change in anxiety. The indirect effect of mastery is also significant (-1.63 , 95% CI -2.93 to -0.48), with a mediation proportion of 19%. Altogether, then, the mediators anxiety and mastery explain 44% of the intervention effect on depression.

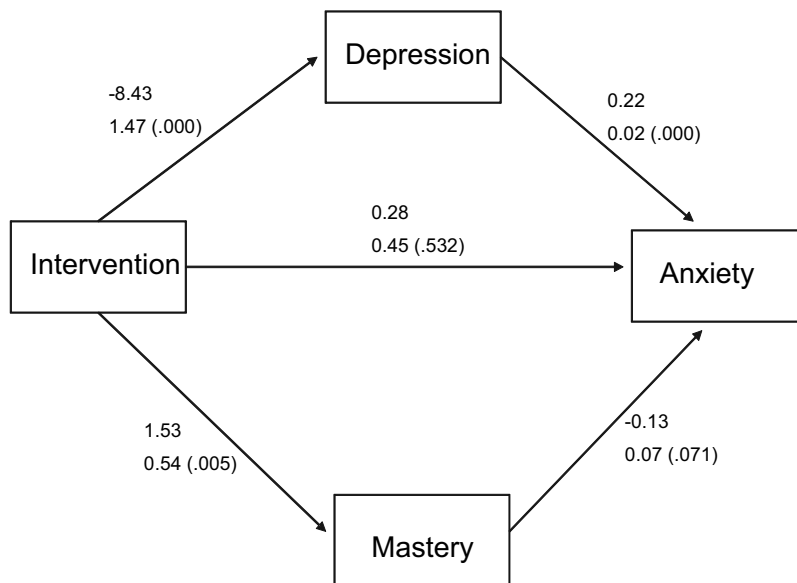
Figure 2. Graphic display of the estimated path analysis model. The two regression equations, with depression as outcome and anxiety and mastery as potential mediators, are represented by single headed arrows. Parameter estimates, standard errors (and p-values) are reported for each regression equation.



Model 2: anxiety as mediated by depression and mastery

As Fig. 3 shows, the association between treatment and anxiety is no longer significant after control for depression and mastery, with the regression coefficient decreasing from -2.051 to 0.28 ($p=0.532$). Table 3 shows the mediating effects of depression and mastery. Only the depression effect is significant ($p<0.001$). The mediation proportions are 0.79 for depression and 0.08 for mastery. Altogether, the mediators depression and mastery explain 87% of the intervention effect on anxiety. The VIF for depression and anxiety was 1.79 , meaning that there is no collinearity effect.

Figure 3. Graphic display of the estimated path analysis model. The two regression equations, with anxiety as outcome and depression and mastery as potential mediators, are represented by single headed arrows. Parameter estimates, standard errors (and p-values) are reported for each regression equation.



Model 3: mastery as mediated by anxiety and depression

Fig. 4 shows that the association between treatment and change in mastery is no longer significant after control for anxiety and depression. The coefficient decreases from 1.44 to -0.31 ($p=0.512$). Table 3 reveals a significant indirect effect of depression (1.61, 95% CI 0.91–2.46), with a mediation proportion of 0.75, and a non-significant indirect effect of anxiety (0.22, 95% CI -0.02 to 0.57), with a mediation proportion of 0.10. Altogether, the mediators anxiety and depression thus explain 85% of the intervention effect on mastery. The VIF for depression and mastery was 1.65, meaning that there is no collinearity effect.

Figure 4. Graphic display of the estimated path analysis model. The two regression equations, with mastery as outcome and anxiety and depression as potential mediators, are represented by single headed arrows. Parameter estimates, standard errors (and p-values) are reported for each regression equation.

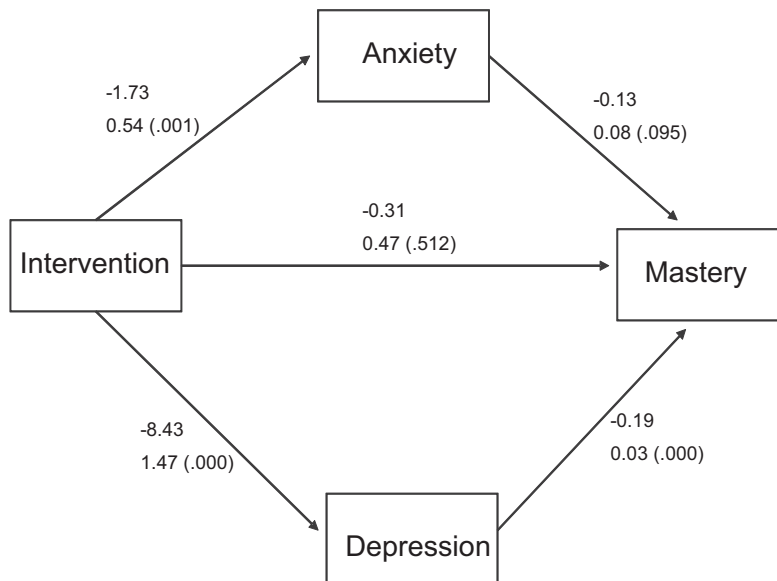


Table 3. Intervention effects on depression, anxiety and mastery as mediated by changes in depression, anxiety and mastery. Indirect effects of the intervention on outcomes through proposed mediators (a*b paths)

Mediators	Depression outcome					Anxiety outcome					Mastery outcome				
	Est	LCI	UCI	p	Prop	Est	LCI	UCI	p	Prop	Est	LCI	UCI	p	Prop
Depression	-	-	-	-		-1.81	-2.65	-1.10	.000	.79	1.61	0.91	2.46	.000	.75
Anxiety	-2.11	-3.64	0.80	.002	.25	-	-	-	-	-	0.22	-0.02	0.57	.151	.10
Mastery	-1.63	-2.93	0.48	.009	.19	0.192	-0.01	0.48	.15	.08	-	-	-	-	-
Both	-3.74	-1.65	5.88	.000	.44	2.00	1.24	2.92	.000	.87	1.83	1.12	2.70	.000	.85

Abbreviations: Est = estimates; LCI = lower bound of 95% confidence interval; UCI = upper bound of 95% confidence interval; p = p-value; Prop = mediation proportion; A p-value of 0.000 means the p-value is <.001

Relationship between early changes in anxiety or depression and late changes in depression or anxiety

To detect whether an early change in anxiety was predictive of a late change in depression, we first calculated correlations of baseline to post-treatment change scores on these measures. The correlation was strong ($r=0.68$, $p<0.01$) and in the expected direction. We then calculated correlations between ‘early’ change in anxiety from baseline to post-treatment and ‘late’ change in depression between post-treatment and follow-up. The correlation was significant but weak ($r=-0.231$, $p<0.01$) and not in the expected direction, indicating that a greater reduction in anxiety scores during the first 12 weeks corresponded to a smaller reduction in depression scores in the following 12 weeks. We next computed the reverse relationship: whether early change in depression predicted later change in anxiety. Again, the correlation was significant but weak ($r=-0.288$, $p<0.001$) and in the unexpected direction: a greater early decrease in depression scores corresponded with a smaller late decrease in anxiety scores. As early changes in anxiety or depression were negatively related to late changes in the other condition, no additional regression analyses were performed.

Discussion

Main results

The purpose of this study was to help clarify mechanisms of change in online CBT for depression. We analysed the process of change in participants in the MYM intervention, an online CBT-based group course for adolescents with symptoms of depression. A randomized controlled trial of MYM had already shown a significant reduction in depressive and anxiety symptoms in the intervention participants and an increase in their sense of control, or mastery (Van der Zanden et al. 2012). To gain further insights into the process of change, which we expected to be circular in nature, we analysed the relationship between depression and anxiety in our sample and conducted mediation analyses using three different models. These explored possible mediators and outcomes and their interrelationships. We also analysed whether changes in the mediator anxiety preceded changes in the outcome depression, and vice versa.

The co-morbidity of depression with anxiety was high and changes in depression and anxiety were strongly intercorrelated. The results of the multiple mediation analyses indicated that changes in anxiety and mastery mediated change in depression (mediation proportion 44%); changes in depression mediated anxiety change (79%) and mastery change (75%). Mastery change appeared not to mediate significant change in anxiety and vice versa (8% and 10%). We did not find that early changes in anxiety or depression scores predicted late changes in the other condition.

Comparison with other research

This study appears to confirm the hypothesized circularity in the recovery process in online CBT interventions. First, we detected a strong intercorrelation between the changes in depression and anxiety occurring in our sample. Although our participants had been recruited and selected exclusively on depressive symptoms and not on anxiety, we found high co-morbidity between the two, at a baseline rate of 69.2%, exceeding that reported for the general youth population (Axelson et al., 2001). However, it seems in line with a study of Birmaher et al (1996) on clinical youth samples, in which a co-morbidity rate up to 70% was reported for depression with anxiety. The MYM trial participants seemed to fit well into the group of at-risk adolescents with the highest symptom severities who are most vulnerable to increasing levels of the other disorder, as described by Hale et al (2009). It should be noticed that the

latter and current study were based on self-report screening instruments (which may generate false-positive diagnosis) and that Axelson et al (2001) and Birhamer et al (1996) based their results on (diagnostic) interviews. Nevertheless, the co-morbidity rate in our study seems to be substantial, which makes it worthwhile when recruiting adolescents for CBT interventions like MYM not to focus exclusively on those with depressive symptoms, but on those with anxiety as well.

A second indication of circularity in the recovery process is that the three mediating models revealed bi-directional relationships between changes in mediators and outcomes, consistent with other studies (Meulenbeek et al., 2010; Anholt et al., 2008; Jarrett et al., 2007). Depression was the mediator that exhibited the largest mediation proportion in the three models, explaining 79% of the intervention effect on anxiety. This suggests that anxiety reduction is explained largely by improvement in depression. Change in anxiety explained 25% of the intervention's effect on depression.

The result that the mediating impact of anxiety change on depression change was less than the reverse condition might have been affected by the fact that the MYM intervention was originally designed to reduce depression symptoms and that the effect size for anxiety was less than that for depression (see Table 2). Nevertheless, the results of the mediation analyses suggest that targeting depressive symptoms can be a way of alleviating anxiety symptoms.

Another finding was that change in mastery appeared to explain a larger proportion of the effect on depression (19%) than of that on anxiety (8%). This is roughly in line with other studies: the mediating role of mastery in the change in depression seems to be more consistent (Rosenbaum et al., 2012; Warmerdam et al., 2010) than the mediating role of mastery in anxiety change (Rosenbaum et al., 2012; Meulenbeek et al., 2010). This might be explained by the scales for assessing perceived control used in our and the other studies, which seems to be focused predominantly on mastery of depression (sense of control) and not on mastery as it is required to master anxiety. While mastery of anxiety does require a sense of control, it also requires the ability to experience anxiety-provoking situations without avoiding them (Meulenbeek et al., 2010). In the MYM intervention, the last aspect is targeted by stimulating participants to enhance pleasant activities in daily life, which may include anxiety-provoking activities that were found pleasant before participants' distress emerged.

A third indication of circularity is our finding that early changes in anxiety or depression did not predict later changes in the other disorder. This was consistent with findings by Warmerdam et al (2010) and with our expectation that when relationships are bi-directional and the change process is circular in

nature, it is less likely to find in a time schedule one variable is predictive for the other. The result could, however, also be due to the fact that most of the change in our sample took place between baseline and post-treatment, leaving little change to detect from post-treatment to follow-up.

Limitations

In addition to the limitations described in our previous publication on the randomized controlled trial of MYM (Van der Zanden et al., 2012), the current study may have several other limitations. First, the absence of assessments during the course of the intervention prevented us from analysing the precise sequence of changes. Our study contained three assessments: baseline, post-intervention and follow-up. Additional interim measurements could have given more detailed insights into the process of recovery from the beginning (when most changes appear to occur; Garratt et al. 2007; Warmerdam et al. 2010) to the end of the intervention and follow-up. A more rigorous test of mediation would require that changes in specific mediatory variables temporally precede changes in the outcome variables. The best design for mediation analysis would entail a fine-grained analysis of changes in mediators and symptoms, based on several interim measurements. This would allay concerns that both the mediator and the symptoms changed simultaneously or due to a third variable (Kazdin, 2007).

Second, the study population was selected on depressive symptoms, and not on levels of anxiety or mastery. Although a majority of the participants (69.2%) had co-morbid anxiety, the inclusion criteria could have still affected the outcomes of the three mediation models. Whereas respondents with low scores on depression (CES-D < 10) were excluded from the trial, those with low anxiety scores were not. For the latter, there was not much room or need to reduce their anxiety symptoms. This could have led to the smaller mediating impact of the anxiety change score on depression as compared with the other direction. Otherwise, respondents with CES-D scores > 45 were excluded, but not those with high HADS-A scores.

Third, only a limited set of potential mediators was available in this study. The three mediating models containing the variables mastery, anxiety and depression were set up to analyse statistical connections between these variables, and thereby to enhance knowledge about mediation and mechanisms of change. The high co-morbidity between depression and anxiety and the substantial effects of the intervention on both disorders may prompt more active recruitment of people with anxiety, in addition to those with depression. Nevertheless, no clues for concrete improvements in the intervention's com-

ponents emerged. Therefore, future research with more potential mediators is necessary.

Future directions

In the field of psychological treatment, knowledge of mediators and mechanisms of change is still very limited. Next-step' research is recommended to help unfold such mechanisms. As Kazdin (2007, p.6) has emphasized, 'the case for a mediator is built by a sequence of studies that may vary in the set of criteria they address and the clarity of the demonstration'. He underlined that several studies are needed, meeting a range of criteria (strong associations, specificity, consistency, experimental manipulation, gradient, demonstrated timelines and plausibility), before one can conclude that an intervening process explains change.

In research on CBT interventions like MYM, such 'next-step' research might include more frequent assessments of symptoms and potential mediators, in order to build knowledge on the sequence of change. Special points of interest would be how to prevent attrition caused by the more frequent assessments during the intervention and what influence the assessments themselves might have on the intervention effect.

Since specific mediators like cognitions and perceived control may not account for the full effect in CBT interventions (Warmerdam et al., 2010; Longmore et al., 2006), future research should include non-specific variables as well. These could help uncover underlying mechanisms (Stephen et al., 2006). Previous studies (Van der Zanden et al., 2012; Spek et al., 2007) have implied that social support from professionals or course participants could be a relevant mediator. Perceived stress, which could itself be affected by feelings of support, might also mediate the intervention effect (Mausbach et al., 2007). Feelings of hope and expectation (Stephen et al., 1995) or a feeling of control derived from the mere act of applying for the intervention (even if the applicant ultimately does not attend any session; Van der Zanden et al., 2012) could further explain intervention effects.

The strong connection between anxiety and depression, though these appear to be different disorders (Hale et al., 2009), suggests underlying dimensions involving factors such as the psychobiological response to threat and stress. Repeated dysregulation of those systems may result in arousal and emotional reactions like depression (Cole et al., 1998; Dubovsky, 1990). Future research should therefore incorporate physiological outcomes into the total concept of change mechanisms, in addition to the psychological outcomes

discussed so far. Interdisciplinary research will therefore be of interest in future work.

Given the strong association between depression and anxiety, a final recommendation would be to develop and evaluate treatment approaches that target both conditions simultaneously.

Conclusions

This study appears to confirm the hypothesized circularity in the recovery process. Depression change scores corresponded strongly to the change scores of co-morbid anxiety. Furthermore, depression change scores mediated significantly anxiety and mastery change scores, anxiety change scores mediated significantly depression change scores and mastery change scores mediated significantly depression change scores. Because specific mediators such as cognitions and sense of control do not appear to explain the entire effect of CBT interventions, and because underlying psychological and physiological mechanisms may play a role in the recovery process, future research should include non-specific and physiological variables. A more profound understanding of mediators will further the refinement of theoretical notions relating to the complex mechanisms of change. This will help to optimize treatment and improve its (cost) effectiveness.

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Chapter 6 Word use predictors of depression outcome¹

Abstract

Background The growing number of web-based psychological treatments, with their textual communication, generate a wealth of data that can contribute to knowledge of online and face-to-face treatments. We investigated whether clients' language use predicted treatment outcomes and adherence in Master Your Mood (MYM), an online group course for young adults with depressive symptoms. **Methods** Amongst 234 participants from a randomised controlled trial of MYM, we tested whether their word use on course application forms predicted baseline levels of depression, anxiety and mastery, or subsequent treatment adherence. We then analysed chat session transcripts of course completers ($n = 67$) to investigate whether changes in word use predicted changes in treatment outcomes. **Results** As hypothesised, the use of the pronoun 'I' declined from course application onwards. Depression improvement was predicted by an increasing use of discrepancy words (e.g. should). Adherence was predicted by more total words at application, more social words and fewer discrepancy words. **Limitations** Many variables were included, thus increasing the chance of coincidental results. This risk was restrained by examining only those word categories shown by previous research to have associations with depression. **Conclusions** This is the first study to link word use in psychological treatment to outcomes of treatment, that has proven to be effective in an RCT. The results suggest that paying attention to the length of problem articulation at application forms and to the word 'I' and 'discrepancy words' may be wise, as these seem to be psychological markers. To expand knowledge of word use as psychological marker, research on web-based treatment should include text analysis.

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Introduction

The growing number of web-based psychological treatments, with their predominantly textual communication, generate a wealth of data that can contribute to knowledge of treatments in a way that is difficult to realize with face-to-face treatments. Text analysis opens new ways to examine e.g. the association between clients' word-use and treatment outcome or treatment adherence. If mental health improvement and treatment adherence can be predicted by the clients' word use, then paying attention to certain word use could be added to the tools that mental health professionals can use in guiding clients during web-based and off-line treatments. This paper explores the associations between client's word use and mental health symptoms (particularly depression) and between word use and treatment adherence.

Over decades, research has shown an association between people's physical or mental health and the words they use (Chung et al., 2008; Fast et al., 2008; Campbell et al., 2003; Pennebaker et al., 1999, 1996; Weintraub, 1981, 1989; Gottschalk et al., 1969). We focus here on word use studies related to depression (and secondarily to anxiety and mastery) and to adherence. The studies we located used different text analysis methods and programs. A considerable number, mostly analysing written essays about personal life, showed that depressed people used more first-person singular words than non-depressed people (Pennebaker et al., 2003; Bucci et al., 1981; Weintraub, 1981). It has been suggested that this may be because the psychological distress of depression leads to greater self-focused attention (Molendijk et al., 2010; Pyczsinski et al., 1987).

According to a study by Watkins and Brown (2002), depressed patients tend to focus on and think about their symptoms and problems (ruminate) more than non-depressed controls. This was confirmed by Rude and colleagues (2004), who had currently depressed, formerly depressed and never depressed college students write several essays about their thinking and feeling in the first year of study. Text analysis found that depressed participants were more likely to use the word 'I', and also negative emotion words, than never depressed or formerly depressed participants. The three groups did not differ on social word use (words referring to others). Baddeley and colleagues (2011) analysed the journals of a person who had completed suicide and found increasing use of the word 'I', decreasing use of 'we' and an increase in negative emotion words. A study by Molendijk and colleagues (2010) compared essays of outpatients with a personality disorder and a comorbid disorder (e.g. depression, anxiety) to healthy controls and found that psychiatric outpatients used more words referring to the self, more negative emotion words and fewer

positive emotion words. Word use proved unrelated to any specific disorder, suggesting that a negative thinking style is common to a range of psychiatric disorders. The study further indicated that discrepancies between actual and ideal selves were related to negative thinking styles and to current depression.

A study by Vanheule and colleagues (2009) of mental health outpatients found that different facets of depression had specific word use correlates: affective depressive symptoms correlated with affective word use, whilst cognitive depressive symptoms were related to cognitive word use combined with affective word use. A study by Pennebaker and colleagues (1997) of people who had lost a partner indicated that increased use of insight words and causation words was associated with a decline in post-bereavement distress, but that it was also significantly correlated with lower levels of positive states of mind. Finally, a study by Campbell and colleagues (2003) in different study populations suggested that flexible word use, particularly pronoun use, was associated with better health (fewer visits to doctors). We did not find studies relating word use to anxiety or mastery, except the aforementioned study by Molendijk and colleagues (2010).

Regarding treatment adherence in relation to word use, we encountered a study on guided self-help (not web-based) for anxiety and depression involving 97 people, randomly drawn from 800 cases in a primary mental health care service (Zinken et al., 2010). It found that the use of non-finite complement clauses was predictive of adherence, but not of treatment benefit (e.g. well-being). The use of complex syntax (adverbial clauses) and causation words (e.g. because) was not predictive of adherence, but among the completers it was predictive of treatment benefit. For a comprehensive description of complement and adverbial clauses, we refer to the publication by Zinken and colleagues (2010).

In summary, the cited studies are based on different designs and study populations and the outcomes are not entirely conclusive. Nevertheless, the following rough picture emerges with regard to depression-related word use. It appears that depression improvement is associated with a decreased use of the pronoun 'I' and with words referring to emotional processes (more positive emotion words like 'happy' and fewer negative ones like 'sad'). Depression improvement also appears to be associated, though less conclusively, with words referring to cognitive processes (fewer causation words like 'because', fewer insight words like 'think' and fewer discrepancy words indicating actual-ideal self differences like 'should'). Social words (referring to others such as 'they') do not appear to differentiate between depressed and non-depressed persons. And better course adherence does not seem to be predicted by more causation words.

Objective

In this paper we evaluate and discuss clients' word use in relation to treatment adherence and outcome in participants in a randomised controlled trial of Master Your Mood (MYM). MYM is a guided, online cognitive-behavioural group therapy course for depression, which has been shown effective in reducing depression and anxiety and increasing mastery in young adults with depressive symptoms (Van der Zanden et al., 2012). This is the first study to link word use during psychological treatment to outcomes of treatment, that has proven to be effective in an RCT. We analysed the use of language on application forms (baseline word use) and in transcriptions of chat sessions, focusing on the outcomes depression, anxiety and mastery.

The aim of this study was to identify if baseline word use is predictive of (a) course adherence, (b) baseline symptom levels, and (c) change in symptom levels. The current study also aimed to identify if change in word use is predictive of change in symptoms levels. On the basis of the previous research summarised above, we expected that depression decline would be predicted by decreases in word use involving the first-person singular, negative emotions, causation, insight and discrepancy, and by increased word use concerning positive emotions. We did not expect social words to be associated with depression level nor causation words to be predictive of adherence.

Method

Study design

Data were derived from a randomised controlled trial on MYM (Van der Zanden et al., 2012; Van der Zanden et al., 2011) in which a total of 244 young people with depressive symptoms had been randomly assigned to MYM or a waiting-list control condition. The primary outcome measure was treatment outcome after 3 months on the Center Epidemiologic Studies Depression Scale (CES-D; Bouma et al., 1995). Secondary outcome measures were anxiety (Hospital Anxiety and Depression Scale, HADS-A; Zigmond et al., 1983) and mastery (Mastery Scale; Pearlin et al., 1978). Six months after baseline, the maintenance of effects was studied in the MYM group. The waiting-list group received access to the course three months after baseline. Missing data were imputed using the expectation-maximisation (EM) method. In the present study, the transcripts of application forms and chat sessions of 234 of the 244 trial respondents (including waitlisted participants who started the course la-

ter) were analysed with the digital text analysis program LIWC and compared to the outcomes.

Intervention

The online MYM group course is a structured form of cognitive-behavioural therapy for depression. At the core of MYM is the cognitive restructuring of thinking patterns. Course participants are encouraged to detect their own unproductive, unrealistic thoughts; they are then taught to transform these into realistic, helpful thoughts. Performance of pleasant daily activities is also encouraged, and a mood measure is completed daily to clarify the connection between pleasant activities and mood. The course we evaluated took place at fixed times in a secured chatroom, which participants entered with usernames and passwords. Anonymity was ensured by self-chosen nicknames. The course comprised six 90-minute sessions, at set times every week, and home exercises. The sessions were structured around six themes: (1) your mood, (2) your mood and being active, (3) tracing negative thoughts, (4) new ways of thinking, (5) more action with positive thinking, and (6) preventing relapse in the future (Van der Zanden et al., 2012). During the sessions, course material was introduced by the facilitators and displayed in the chatroom using text and images. Participants could respond, share experiences and ask questions. Emoticons could be used to express feelings. The course was guided by one or two trained professionals, depending on group size (6 participants maximum).

Study population

A comprehensive description of the participants and procedures in the RCT can be found in Van der Zanden and colleagues (2012, 2011). Ethical approval was granted by an independent medical ethics committee (CCMO no. NL18984.097.07). Participants were recruited from the general population using promotional materials in GP offices and educational institutions. Banners and links were placed on mental health websites and on websites popular with youth. Inclusion criteria were: age 16 to 25, informed consent (including parental consent for under-18s) and a CES-D score of 10 to 45. Applicants were excluded on indications of suicidal ideation with intent and plan, as assessed with the Mini-International Neuropsychiatric Interview (MINI-Plus; Van Vliet et al., 2000; Sheehan et al., 1998;). Questionnaires were completed online; the MINI-Plus was administered in online chat sessions. A total of 244 participants were randomised to the MYM course ($n = 121$) or a waitlist control

group ($n = 123$). For the flow-chart of the sample selection, we refer to Van der Zanden and colleagues (2012).

In the current study, 10 of the 244 course participants were excluded as a consequence of incomplete application forms or technical errors that prohibited text analysis. Of the 234 respondents in the current sample, 199 were female and 35 male, with a mean age for both sexes of 20.9 years (female $SD = 2.26$; male $SD = 2.17$). Respondents attended 2.4 chat sessions on average. Text analysis of the application forms was conducted on this full sample ($N = 234$). In the full sample, 40.2% (94/234) of the respondents did not attend any session, 30.4% (71/234) attended one to four sessions, and 29.5% (69/234) attended five or six sessions. To analyse changes in word use during the intervention, we studied chat transcripts for the group that attended five or six sessions, respectively 13.7% (32/234) and 15.8% (37/234) of the respondents. Transcripts for two such respondents were not suitable for textual analysis due to technical errors. We thus analysed chat session transcripts for 67 respondents who attended five or six sessions (59 females and 8 males). Their mean age was 21.3 (female $M = 21.4$, $SD = 2.16$; male $M = 21.1$, $SD = 1.96$).

Measures and instruments

Depressive symptoms

Symptoms of depression were assessed with the Center for Epidemiological Studies Depression Scale (CES-D; Bouma et al., 1995; Radloff, 1977). It measures the frequency of 20 depressive symptoms over the past week using 4-point Likert scales. Total score range is 0 to 60, with higher ratings indicating more symptoms. Computerised and paper CES-D versions correlate at a very high level (Ogles et al., 1998). The web-based CES-D has proved a reliable, valid screening instrument in a Dutch adolescent population (Cuijpers et al., 2008).

Anxiety symptoms

The Anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond et al., 1983) was used to assess anxiety symptoms. The Dutch HADS version has been validated and has good psychometric properties (Crawford et al., 2001; Spinhoven et al., 1997). The Anxiety subscale consists of seven items measuring anxiety symptoms on a 4-point Likert scale, with a 0-to-21 score range, and with higher ratings indicating higher states of anxiety.

Perceived control

The Dutch version of the 5-item Mastery Scale was used to assess perceived control (Pearlin et al., 1978). Mastery refers to beliefs about one's own ability to control one's environment. Responses are rated on a 5-point Likert scale, with a total score range of 5 to 25, and higher scores indicating a greater sense of mastery. The Mastery Scale has good psychometric properties (Pearlin et al., 1978).

Application forms

The answers of 234 respondents on two open questions in the application form were used for the baseline text analysis. The questions were as follows: 'What is your reason for applying for MYM?' and 'Please briefly describe the kinds of problems or symptoms you've been having.' Respondents could type as many words as they wanted (the limit was set at 65,000 characters).

Transcripts of chat sessions

The chat session transcripts of 67 respondents who attended five or six sessions were used to analyse changes in word use during the course. The text lines of each respondent were concatenated per session. In preparation for the text analysis, all texts were adapted where necessary: abbreviations in the text were written out in full, typing errors were corrected and missing full stops were added. The emoticons that participants could use to express emotions in the chat texts were also deleted. After screening for emoticons in 20 random transcripts, we decided not to translate them into words (e.g. replacing '😊' with 'happy'), as that would have caused an unwarranted increase in emotion words. We found an average of 5.9 emoticons per respondent per session, 89% of which did not replace emotion words, but had been added for extra emphasis (e.g. I am happy 😊).

Linguistic Inquiry and Word Count (LIWC)

We analysed word use with the validated Dutch version of the Linguistic Inquiry and Word Count 2007 program (LIWC; Pennebaker et al., 2007; Zijlstra et al., 2004, 2005). The LIWC analyses text on a word-by-word basis and calculates the percentages of words that match particular language dimensions. The Dutch LIWC contains five dimensions, including linguistic processes and psychological processes. Dimensions are subdivided into twelve main categories, such as pronouns and emotional, cognitive and social processes. Each category contains subdictionaries, 66 in total. Words can represent more than one category, and the main categories contain all words of the subcategories as well as words assigned to the main category only. On the basis of previous

research as summarised in the Introduction, we used seven LIWC word categories in the present study (see table 1): first-person singular pronouns, positive and negative emotions, cognitive processes (causal and insight thinking and discrepancy) and social processes (main category).

Table 1. *LIWC categories used in the present study (Zijlstra et al., 2004)*

Standard linguistic dimension	Psychological dimension
Pronouns 1st-person singular (<i>I, me, mine</i>)	Emotional processes Positive emotions (e.g. <i>happy, brave, grateful</i>) Negative emotions (e.g. <i>sad, hostile, desperate</i>) Cognitive processes Causation (e.g. <i>because, why, therefore</i>) Insight (e.g. <i>consider, explain, realise</i>) Discrepancy (e.g. <i>would, should, conflict, wish</i>) Social processes (e.g. <i>communicate, share, help, we, they, friend, mother, people</i>)

Analyses

In the full sample of 234 respondents, we first determined whether words they used at the time of application for the course were predictive of their baseline depression, anxiety and mastery levels. We first performed bivariate correlation analysis, followed by linear regression analysis on the significantly correlated variables. Independent variables were word use at application in the selected LIWC categories; dependent variables were the baseline (t_0) scores on the three outcome scales. The same procedure was followed to determine whether baseline word use was predictive of course adherence; in the linear regression, word use at application was again the independent variable and the number of sessions attended (as the measure of course adherence) was the dependent variable.

For the ‘completers’ group’ (having attended 5 or 6 sessions; $n = 67$), we carried out a further series of analyses to assess whether baseline word use, and changes in word use during the intervention, predicted changes in the three outcome variables.

First, to determine whether the completers differ at baseline on key variables from the non-completers who attended four or less sessions ($n=167$), we used t tests, chi-square tests, and logistic regression. Next, to determine whether change in word use appears from baseline to session six, paired t -tests were performed. Word use in session one was compared with baseline word use (application) and word use in session six was compared with session one.

Finally, to determine if baseline word use respectively change in word use predicted change in the three outcome variables, bivariate correlation analyses were performed, followed by regression analyses on variables that showed a significant correlation. The change in the three outcomes was calculated by the difference scores between the t1-to measurements (post-minus pre-measurements). Change in word use was assessed calculating the difference between mean percentages on the LIWC categories in session six and session one.

Missing LIWC values for respondents who attended five of the six sessions were imputed by the series mean method, based on the average score on each particular LIWC variable. All analyses were performed with SPSS-19 (SPSS, Chicago) using a two-sided significance level of $p < .05$.

Results

Participants

Table 2 shows baseline demographic and psychosocial characteristics of the 234 participants in the present study. No significant differences were found between the completers (≥ 5 sessions; $n = 67$) and non-completers (≤ 4 sessions; $n = 167$) on the parameters depression, anxiety or mastery, nor on gender, age or professional help (current or past).

Association of baseline word use with baseline outcome variables

At baseline, respondents ($N = 234$) used an average of 63 words ($SD = 44.9$) on the two open questions on the application form. Some 76% of the words were captured by the Dutch LIWC dictionary. Table 3 (first to third columns) shows the correlation coefficients between baseline word use in the selected LIWC categories and the baseline outcome scores. No significant correlations were found between word use at baseline and baseline depression or anxiety levels. For mastery level at baseline, three weak but significant correlations with word use were found (negative emotion, insight and discrepancy). Regression analyses indicated that two of these word categories were predictors: fewer negative emotion words at baseline ($b = 0.12$, $t(232) = -2.07$, $p = .04$) and more discrepancy words ($b = 0.23$, $t(232) = 2.51$, $p = .01$) predicted higher baseline mastery levels.

Table 2. Baseline demographic and psychological characteristics of the full sample, the non-completers and the completers

	All (<i>N</i> = 234)	Non-completers ^a (<i>n</i> = 165)	Completers ^b (<i>n</i> = 69)	Significance (<i>p</i> , 2-sided)
Gender, n (%)				.90
1 = male	35 (15%)	25 (15.2%)	10 (14.5%)	
0 = female	199 (85%)	140 (84.8%)	59 (85.5%)	
Age (years), mean (SD)	20.93 (2.42)	20.75 (2.28)	21.33 (2.12)	.06
Professional help current or past, n (%)				.61
0 = no	89 (38%)	61 (37%)	28 (40.6%)	
1 = yes	145 (62%)	104 (63%)	41 (59.4%)	
Professional help at baseline, n (%)				.78
0 = no	74 (32%)	54 (32.7%)	20 (29%)	
1 = yes	72 (31%)	51 (30.9%)	21 (30.4%)	
Number of completed sessions, mean (SD)	2.42 (2.39)	1.12 (1.49)	5.54 (0.50)	.00
Test scores, mean (SD)				
<i>t</i> ₀ CES-D ^c	32.46 (8.14)	32.39 (8.11)	33 (3.38)	.85
<i>t</i> ₀ HADS ^d	11.59 (3.58)	11.55 (3.52)	11.9 (3.63)	.75
<i>t</i> ₀ Mastery ^e	12.8 (3.48)	12.67 (3.48)	13.04 (3.38)	.37

^a Non-completers: attended four chat sessions or fewer (including zero sessions)

^b Completers: attended five or six chat sessions

^c Dutch version of the Center for Epidemiologic Studies Depression Scale (Bouma et al., 1995).

^d Dutch version of the Hospital Anxiety and Depression Scale (Spinhoven et al., 1997)

^e 5-item Mastery Scale (Pearlin et al., 1978)

Association of baseline word use with adherence

Table 3 (last column) shows the correlation coefficients between baseline word use and the number of attended sessions. Two weak but significant correlations were found, and subsequent regression analysis showed that those variables were also predictors of attendance: more social words and fewer discrepancy words predicted better treatment adherence ($b = 0.11$, $t(232) = 1.99$, $p = .048$; $b = 0.30$, $t(232) = 2.1$, $p = .040$). We also found an unexpected significant correlation: more words used on the application form correlated significantly with adherence and could also predict adherence ($b = 0.01$, $t(232) = 2.60$, $p = .01$). This variable was included because it is part of the standard output of LIWC analyses. Analysis with an independent t -test showed that completers had a mean of 74 words ($SD = 52.01$), versus 59 words ($SD = 40.92$) for non-completers ($p = .02$).

Table 3. Correlation coefficients of word use on application forms in LIWC categories with baseline depression (CES-D), anxiety (HADS-A) and mastery scores and with number of attended sessions, $N = 234$

LIWC variable	t_o CES-D	t_o HADS-A	t_o Mastery	Number of attended sessions
Number of words	-.04	.03	.06	.16*
1st-person singular	-.01	-.01	.09	.02
Positive emotion	-.01	.02	.09	-.03
Negative emotion	.11	.00	-.14*	-.03
Causation	-.13	-.09	.08	-.11
Insight	-.08	-.05	.16*	.02
Discrepancy	-.12	.01	.14*	-.14*
Social processes	.04	.05	-.05	.13*

* $p < .05$; ** $p < .01$

Associations of baseline and changing word use with outcome changes

Table 4 shows baseline word use and changes in word use during treatment in the completers' group (≥ 5 sessions; $n = 67$). On average, the completers used 73 words ($SD = 51$) at application, 426 words ($SD = 210$) in session 1 and 464 words ($SD = 241$) in session 6. The numbers of words did not significantly differ between sessions 1 and 6 ($p = .17$; not shown in table). Using paired t -tests, we compared 1st-session word use to that on the application form (table 4, left columns) and 6th-session word use to that in the 1st session (right columns). We should note that the left-hand columns compare two different types of texts (individual application form versus group chat). Comparing word use in session 1 with baseline (the course application), we found decreases in the word categories first-person singular ($p < .01$) and negative emotion ($p < .01$) and increases in the categories positive emotion ($p < .05$), insight ($p < .05$) and social processes ($p < .01$). Fewer significant word use changes were found between sessions 1 and 6: declines in the use of first-person singular words ($p < .01$) and causal thinking words ($p < .05$).

Table 4. Changes in word use from application to session 1 (three left-hand columns) and from sessions 1 to 6 (three right-hand columns): differences in mean word percentages in seven LIWC categories, $N = 67$

LIWC category	Changes in word use from application (t_0) to session 1 (t_1)			Changes in word use from session 1 (t_1) to session 6 (t_2)		
	Application form Mean word % in LIWC category (SD)	Session 1 Mean word % in LIWC category (SD)	p -value	Session 1 Mean word % in LIWC category (SD)	Session 6 Mean word % in LIWC category (SD)	p -value
Positive emotion	2.35 (2.40)	3.04 (1.19)	.04*	3.03 (1.19)	2.88 (0.99)	.39
Negative emotion	4.65 (3.46)	1.76 (0.81)	.00**	1.76 (0.81)	1.82 (0.84)	.63
Causation	0.86 (1.21)	0.93 (0.58)	.62	0.93 (0.58)	0.71 (0.54)	.02*
Insight	2.32 (2.15)	3.12 (1.04)	.01*	3.12 (1.04)	3.26 (1.03)	.36
Discrepancy	2.32 (2.13)	2.60 (0.88)	.34	2.60 (0.88)	2.58 (0.92)	.91
Social processes	2.61 (2.88)	4.81 (1.93)	.00**	4.81 (1.93)	4.93 (1.88)	.65

* $p < .05$; ** $p < .01$

The left-hand columns of table 5 show the results of bivariate correlation analyses of baseline word use with changes in the outcome variables depression, anxiety and mastery. Mastery was significantly correlated ($p < .01$) with word use that reflected discrepancies. Regression analysis indicated that discrepancy words were also predictive of changes in mastery: fewer discrepancy words at baseline predicted greater mastery improvement ($b = -0.64$, $t(65) = -3.03$, $p = .00$). No significant correlations were found between baseline word use and changes in depression or anxiety.

The right-hand columns reflect bivariate correlation analyses of changes in word use with changes in depression, anxiety and mastery. The results show a weak but significant correlation between change in the word category discrepancy and change in depression. Regression analysis indicated that increasing use of discrepancy words predicted depression decline during treatment ($b = 2.89$, $t(65) = 2.17$, $p = .03$). No significant correlations appeared between word use changes during the course and changes in anxiety or mastery.

Table 5. Correlation coefficients of word use at application and word use changes during treatment in seven LIWC categories with changes in depression (CES-D), anxiety (HADS-A) and mastery, $N = 67$

	Correlation coefficients between word use at application and changes in outcome ^a			Correlation coefficients between changes in word use ^b and changes in outcome ^a		
	CES-D decrease	HADS decrease	Mastery increase	CES-D decrease	HADS decrease	Mastery increase
1st-person singular	-.01	.02	.02	.05	.10	.09
Positive emotion	.07	-.03	.03	.12	.01	-.11
Negative emotion	.20	.20	.23	.08	-.03	.12
Causation	-.16	-.15	-.07	-.02	.13	.10
Insight	-.10	-.15	-.05	.21	.17	.13
Discrepancy	-.21	-.22	-.35**	.26*	.08	.16
Social processes	-.05	-.04	-.15	.02	-.06	.07

* $p < .05$; ** $p < .01$

^a Changes in outcome were expressed by $t_2 - t_0$ scores on CES-D, HADS-A and Mastery Scale.

^b Changes in word use were expressed by difference scores between word use percentages in LIWC categories at sessions 6 (t_2) and 1 (t_1).

Discussion

Main results

Our study has revealed significant associations between the word use of young adults with depressive symptoms and the outcomes of their online treatment, as well as between their word use and their treatment adherence.

Analyses with paired *t*-tests detected more instances of significant word use change between the course application and the first session than between the first and sixth sessions. Between application and the first session, negative emotion words decreased and positive emotion and social process words increased; those levels were maintained at the final session. Only the use of the word 'I' showed continuing significant declines from application to first session and on to the final session. We also saw a declining tendency in causation words (e.g. 'because') and an increasing tendency in insight words (e.g. 'think') between application and final session.

Using correlation and linear regression analyses, we also analysed whether word use at application could predict baseline levels of depression, anxiety or mastery. Only for mastery was this the case: more discrepancy words (e.g. 'should', 'wish') and fewer negative emotion words predicted higher mastery levels.

Subsequently, we analysed whether changes in word use during treatment could predict changes in outcome. Increases in discrepancy words were found to be predictive of depression improvement; as expected, social process words were not associated with outcome. We further analysed whether word use at application could predict treatment adherence. Participants attending more sessions had used more words at application, more social words and fewer discrepancy words; as expected, causation words were not predictive of adherence.

Comparison with other work

This study was the first to link word use in psychological treatment to outcomes of treatment, that has proven to be effective in an RCT. Below, we discuss the significant findings of the present study in the light of the hypothesised associations between word use and outcome as set out in the Introduction. Many researchers (e.g. Molendijk et al., 2010; Watkins et al., 2002) have suggested that less focus on the self, represented by the word 'I', may be a characteristic of better mental health, while a greater focus on oneself may reflect rumination about personal problems and self-ideal discrepancies.

As measured in our study, the use of the pronoun 'I' at baseline could predict neither baseline depression levels nor depression decline during treatment. This was contrary to our initial hypothesis. However, the use of 'I' did decline significantly from application to session 1 and further to session 6, which may give some support after all to the suggestion by many researchers that a decreasing use of the first-person reflects better mental health.

An unexpected finding was that an increasing use of discrepancy words (e.g. 'should', 'hope') predicted depression improvement. We expected the opposite, based on Molendijk and colleagues' (2010) finding that greater discrepancy between actual and ideal self was associated with more depression symptoms. Although discrepancy in that study was not assessed by LIWC but by a self-ideal discrepancy scale, we assumed that self-ideal discrepancies would be reflected in discrepancy word use. An explanation for our unexpected association between increasing discrepancy words and depression improvement could be that this word category, containing words such as 'should', 'hope' and 'wish', may express aspirations for the future and not merely shortcomings in the present. Since higher discrepancy word use was also predictive of higher mastery scores in our study, this word category may indeed turn out to be a relevant marker of mental health improvement.

Our expectations were also not fully confirmed for the categories of causation words (e.g. 'because') and insight words (e.g. 'think'), whose use we had expected to decrease as depression improved. We had based our hypothesis on the study by Pennebaker and colleagues (1997), where greater use of causation and insight words was associated with less positive mind states. We hypothesised that such cognitive words may reflect rumination about internal problems and could thus be associated with mental health problems. In our findings, however, causal and insight words were not predictors of outcome; and in terms of changing word use from application to the final session, we saw that causal thinking decreased during treatment (as expected), but that the use of insight words trended upwards. We conclude that unambiguous interpretation of these and other research results is still lacking when it comes to the specific relationships of causation and insight language to mental health.

Worth mentioning were the several significant changes in language use we observed between the course application and the first session. These included increases in the use of positive emotion words and social process words and decreases in the use of negative emotion words and the pronoun 'I'. Some changes, particularly the increase in social words, might be explained by the different types of text compared. The individual application texts were intended for informative interaction whereas the group chat transcripts involved social interaction (Biber, 1989). Another possible explanation is that the early

word use changes may reflect an ‘early rapid response phenomenon’, whereby the greatest improvement in depressed clients takes place at the beginning of treatment, before the treatment components have been provided. This phenomenon has been discussed by several researchers (e.g. Warmerdam et al., 2012; Longmore et al., 2007).

Three interesting predictors of course adherence emerged. First, the more words that were used at application, the more sessions that were attended. A logical explanation is that highly motivated respondents took more time to describe their problems and motivations to apply and therefore used more words. Second, participants who attended more sessions used more social words at application. This also seems logical, in that MYM is a group course where social interactions take place. The course may thus attract and hold respondents who like socialising, as reflected by their social word use. Third, the use of more discrepancy words at application was a predictor of poor adherence. Feelings of doubt about the intervention may have been mirrored in this use of language. Another explanation may be that participants who used more discrepancy words – associated in our study with diminishing depression and higher mastery – recovered more rapidly and consequently attended fewer sessions. This seems in line with a previous study on MYM that found no relation between adherence and outcome (Van der Zanden et al., 2012).

Limitations

Our study may have several limitations beyond those described in our earlier publication on the MYM randomised controlled trial (Van der Zanden et al., 2012). First, the LIWC text analysis program is not able to contextualise word use or to detect certain word nuances such as understatement or cynicism. We do not think the nuances were a serious problem in our study. Screening of the transcripts revealed rather straightforward word use, as illustrated by the emoticons removed because they merely provided emphasis and not additional nuances. Second, we included many variables in our study, thus increasing the chance of coincidental results. We tried to limit that risk by carefully selecting only those word categories shown by previous research to have significant associations with mental health problems, particularly depression. A third limitation is that our correlational analyses allow no conclusions about cause-effect relationships between word use and outcome. We cannot be sure whether changes in depression level preceded changes in word use or vice versa, nor whether mediating factors played a role. To determine cause-effect relationships, longitudinal studies would be necessary with more assessments over

time. A further constraint in some of our analyses is that the chat transcripts (reflecting social interaction) were compared with the individual informative interaction on the application form, possibly affecting the results. A final limitation concerns the extent to which results of the present study can be generalised to other types of treatment (online or off-line), such as variants in which no group communication takes place, or to other populations such as persons with severe depression symptoms (CES-D scores above 45).

Future research directions

Future research on the effectiveness of web-based psychological treatment should include text analysis. That could expand our knowledge of word use as a marker of psychological processes. Textual analysis of clients' language use might potentially provide detailed insights into recovery processes during treatment, without burdening clients with invasive questionnaires. The language used by mental health professionals would also be an interesting research focus. Word use analysis may thus open new ways of obtaining insights into client-therapist interaction patterns as well as into client recovery processes.

Finally, our study results gave rise to the question of whether clients' principal improvement might have occurred between their application for treatment and their first treatment session. This indicates that research on psychological treatment should not focus exclusively on pre-, post- and interim assessments, but should also analyse the process between when people apply for treatment and when the treatment starts. Analysis of texts such as those on application forms or in transcriptions of intake interviews and initial treatment session(s) may provide detailed insights into recovery processes.

Conclusion

This study has shown that the word use of clients in psychological treatment can predict both treatment outcome and adherence. Although the results are too preliminary yet to support widespread implementation in clinical practice, our study gives rise to the following suggestion. Therapists may pay attention to the length of client's problem articulation in his or her application form, since a larger number of words used at application appeared to be a marker of better treatment adherence. Furthermore, it seems wise to pay attention to clients' use of the word 'I' and to discrepancy words (should, wish, hope) since decreasing use of 'I' and increasing use of discrepancy words may reflect better mental health. To expand our knowledge on word use as a psychological

marker, future research on web-based treatment should therefore include text analysis.

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Chapter 7 Articulation of depressive feelings¹

Abstract

Objective Early detection of depressive symptoms in primary care patients is necessary for timely intervention. However, subclinical to mild depression is commonly underrecognised. To facilitate early detection, we investigated how young people put their depressive feelings into words when applying for an online depression intervention known as Master Your Mood (MYM). **Method** For 414 adolescents and young adults applying for MYM in a randomised controlled trial, we encoded their paraphrases of their state of mind as they described it on their application forms. We classified these in terms of DSM-IV depression symptoms, using the MAXQDA program. In a mixed-methods design, we investigated whether the expressed DSM symptoms were associated with depression level and with subgroups manifesting subclinical (SL; $n = 31$), moderate (ML; $n = 203$) or high depression levels (HL; $n = 180$), as measured by the CES-D depression scale. **Results** Applicants' articulation of symptoms corresponded well with the DSM depression symptoms. The majority in all subgroups articulated the key symptom depressed mood, followed by feelings of worthlessness and guilt. Almost exclusive for HL were expressions of suicidal thinking and comorbid disorders. Predictive of higher depression levels were articulations of depressed mood, insomnia or hypersomnia and suicidal ideation; the number of symptoms expressed was not predictive. **Conclusion** Young adults' articulation of their state of mind on MYM application forms corresponded well with DSM-IV depression symptoms and predicted their level of depression. Recognition of subclinical and more serious depression in young adults could be improved by informing primary care professionals to pay attention not just to numbers of symptoms, but also to expressions of depressed mood, sleep disturbances, suicidal thinking or comorbid problems.

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Introduction

Depression is the fourth-ranked disorder worldwide in terms of disease burden, and by 2030 it is expected to carry the highest burden of disease in high-income countries (WHO, 2011; Mathers et al., 2006). In adolescents and young adults, depression is a common disorder, affecting 5.6% of 13- to 18-year-olds (Costello et al., 2006) and 6.7% of 18- to 25-year-olds (De Graaf et al., 2010) every year, according to US or Dutch nationwide surveys. First onset of depression is usually in adolescence (Birmaher et al., 1996). Depression in young people is associated with serious personal problems, including poor school performance (Meijer et al., 2006), school absenteeism and dropout (Dopheide, 2006), problematic relations with parents and peers (Cicchetti et al., 1998), excessive tobacco and alcohol use (Glied et al., 2002) and suicidal behaviour (Ferguson et al., 2000).

Subclinical or minor depression is likewise common in young people. It is defined as having some depressive symptoms that together do not meet the full criteria for major depression as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; Fourth Edition, American Psychiatric Association, 1994; see also Cuijpers et al., 2008a). The estimated prevalence of subclinical depression in a Dutch population is 17% to 21% (Smit et al., 2003; Ter Bogt et al., 2003). Subclinical depression has been found to be a strong predictor of the onset of a major depression within the near future (Cuijpers et al., 2008a, 2004; Georgiades et al., 2006), and the associated psychosocial functional impairment is similar to that of major depression (Wagner et al., 2000; Gotlib et al., 1995). The economic costs of depression and subclinical depression for adults are substantial, owing to health care costs and production losses in paid and unpaid work (Cuijpers et al., 2006; Smit et al., 2006). The economic costs of depression in adolescence are not yet clear.

The World Health Organization has called for the development of preventive interventions to reduce the burden of depression (Moussavi et al., 2007; Saxena et al., 2006) and it has prioritised research on early detection of mental health problems (Fiorillo et al., 2013). Research has shown that early detection and intervention in cases of depression and subclinical depression can lighten the burden. Meta-analyses of depression prevention trials amongst adolescents and adults have indicated that the risk of developing a first-onset major depression drops by 10% to 30% when indicated prevention is provided at an early stage of the symptoms (Dennis et al., 2013; Munoz et al., 2010; Cuijpers et al., 2008b). Delivery of indicated prevention to 8 to 13 people may prevent one new depression case (Cuijpers et al., 2008b), a relatively favourable outcome in the field of preventive medicine (Thompson et al., 2011).

The early detection of patients' depression symptoms presents a complicated challenge to general health care practices, where most of the diagnostics and treatment of depression takes place (Terluin et al., 2004; Katon et al., 1992). A study by Kamphuis et al. (2012) among 1293 patients of general practitioners (GPs) has found underrecognition of mild depression in patients, whereas more severe depression was less underrecognised. Only 36% of the patients with depression were detected by the GPs. Detected patients had relatively more depressive symptoms and poorer mental functioning than those with unrecognised depression; they were more likely to be male, to have a history of depression and to have made more frequent visits to the GP. Early detection appeared important for patients with a first depressive episode, as their symptoms and mental functioning showed greater improvement after 12 and 39 months in comparison with patients whose depression was not recognised. A study by Piek et al. (2012) in primary care patients similarly found underrecognition of depression. Lower recognition was associated with lower numbers of depression symptoms, absence of comorbid anxiety disorders, absence of consultations for mental health problems and increased appetite. In a study by Terluin et al. (2004), the test-retest reliability of recognition of patients' depression symptoms and of the depression diagnosis in GP practices was highest for severe depression (Cohen's kappa .70) and lowest for mild depression (.26); GPs readily overlooked one or two symptoms.

In support of the early recognition of depression symptoms, it is important for primary care providers to be aware of how patients articulate their depressive feelings when seeking professional help. Do the health symptoms they express correspond to DSM-IV symptoms? Are their articulations associated with their level of depression and can we, based on their expressions, differentiate between patients with subclinical, moderate or high levels of depression? This paper examines these questions by analysing how adolescents and young adults aged 16 to 25 who have feelings of depression expressed their state of mind on an open application form for the online depression treatment called Master Your Mood (MYM).

Method

Design

To develop systematic knowledge on how people articulate depressive feelings when seeking professional help, we examined the language used by young adults to express their state of mind as they applied for online depression

treatment through the website Master Your Mood (MYM). MYM is a guided cognitive-behavioural group course for young adults with depression symptoms. Our respondents were recruited from the general population through advertisements in GP offices, educational institutions, mental health websites and websites popular among youth. To apply for the web-based treatment, candidates filled in an online form that included two open questions asking them to describe their problem in brief and their reasons for applying to MYM. They also completed online questionnaires to measure depression levels according to the Center for Epidemiologic Studies Depression Scale (CES-D; Bouma et al., 1995). The present study analyses their problem articulations on the application forms and their CES-D scores. The paraphrases they used on the forms to refer to depressive feelings were encoded into DSM-IV depression categories, using the MAXQDA digital language program (see Methods). Qualitative and quantitative analyses were carried out in a mixed-methods design (Creswell, 2003) to compare groups with subclinical, moderate and high depression levels in terms of how they expressed their state of mind at application.

The data used in the present study were gathered in the context of a randomised controlled trial on MYM. A comprehensive description of the design and procedures in the RCT can be found in Van der Zanden and colleagues (2012, 2011). Ethical approval was granted by an independent medical ethics committee (CCMO no. NL18984.097.07).

The MYM intervention

The online MYM intervention is a structured form of cognitive-behavioural therapy (CBT) for depression. At the core of MYM is the cognitive restructuring of thinking patterns and the integration of pleasurable activities into everyday life. The course comprises six 90-minute group sessions at set times every week, as well as home exercises. The group course takes place in a secured chatroom, which participants enter with usernames and passwords. Anonymity is ensured by self-chosen nicknames. The course is guided by one or two trained professionals, depending on group size (6 participants maximum). For a comprehensive description of the MYM course, we refer to Van der Zanden and colleagues (2012).

Sample

The sample for our text analysis derived from the original group of 974 candidates from the general population who applied for MYM as we were recruiting

for the RCT (Van der Zanden et al., 2011, 2012). For the flow chart of the RCT sample selection, see Van der Zanden and colleagues (2012). For the present study, we selected RCT applicants with CES-D scores from 10 to 45 ($n=244$) and applicants with scores higher than 45 ($n = 198$). From this group, 28 respondents were excluded as a consequence of incomplete application forms or technical errors that prevented text analysis. The remaining sample of 414 applicants was divided on the basis of the CES-D scores into three subgroups: subclinical depression (CES-D 10–21; $n=31$), moderate depression (CES-D 22–45; $n=203$) and high depression level (CES-D 46–60; $n=180$).

Of the sample members 88% (366/414) were female and 12% were male, with a mean age of 20.2 ($SD = 2.7$) for both sexes. Some 28.5% (118/414) of sample members reported they were currently receiving professional help. Table 1 shows the characteristics of our full sample and the subgroups.

Table 1. Characteristics of full sample and subgroups with subclinical, moderate and high depression

	Full sample ($N=414$)	CES-D 10-21 ($n=31$)	CES-D 22-45 ($n=203$)	CES-D 46-60 ($n=180$)
Female gender	366 (88.4 %)	25 (80.6 %)	174 (85.7 %)	167 (92.8%)
Age (years), mean (SD)	20.2 (2.7)	21 (2.5)	20.9 (2.2)	19.3 (2.9)
Professional help				
Prior	258 (62.3%)	15 (48.4 %)	130 (64%)	113 (62.8%)
Current at baseline	118 (28.5%)	8 (25.8 %)	64 (31.5%)	46 (25.6 %)
CES-D score at application ^a				
Mean (SD)	39.5 (11.7)	17.1 (3.4)	34.7 (6)	50 (3.4)

^a Dutch version of the Center for Epidemiologic Studies Depression Scale (CES-D; Bouma et al., 1995).

Measures and instruments

Depressive symptoms

Symptoms of depression were assessed with the Center for Epidemiological Studies Depression Scale (CES-D; Bouma et al., 1995; Radloff, 1977). It measures the frequency of 20 depressive symptoms over the past week using 4-point Likert scales. Total score range is 0 to 60, with higher ratings indicating more symptoms. Computerised and paper CES-D versions correlate at a very high level (Ogles et al., 1998). The web-based CES-D has been shown to be a

reliable, valid screening instrument in a Dutch adolescent population (Cuijpers et al., 2008c).

Cut-off scores for depression

Based on the cut-off point of CES-D ≥ 22 for clinical depression in an adolescent population (Cuijpers et al., 2008c), we defined subclinical depression as CES-D levels from 10 to 21 and moderate depression as levels from 22 to 45. Scores between 46 and 60 reflected high depression levels and scores below 10 indicated no elevated depression level. As validated cut-off points for subclinical and high depression were lacking, we defined the cut-off scores of >45 and <10 on the basis of MYM practice and experience (Van der Zanden et al., 2012; Gerrits et al., 2007). According to the course leaders, applicants with CES-D scores above 45 have problems too severe to benefit from the MYM intervention and need more intensive support and treatment; those with scores below 10 are considered to have insufficient problems to be motivated to attend a course of six sessions. Those cut-off points had therefore been used as exclusion criteria for the RCT (Van der Zanden et al., 2012).

Application forms

We analysed the 414 respondents' articulations of their state of mind at application for MYM, based on their answers to two open questions on the form: 'What is your reason for applying for MYM?' and 'Please briefly describe the kinds of problems or symptoms you've been having.' Respondents could type as many words as they wanted.

Qualitative data analysis

We analysed the responses using the qualitative data analysis program MAXQDA 2007 (Lewis et al., 2007). MAXQDA is a software program for organising and categorising computer-assisted qualitative data. We imported MS Word documents containing the application transcripts into MAXQDA and defined nine data categories, which corresponded to the nine main symptoms of depression in DSM-IV, including depressed mood and suicidal thinking (see table 2). Each category contains one or more themes. For example, the symptom *depressed mood* contains themes or subcategories such as feeling down, fits of weeping and feeling depressed. Each phrase on the application form that referred to the applicant's state of mind and which matched one of the subcategories was classified by MAXQDA into that subdirectory. Per DSM symptom, applicants could have codes in various subcategories of that symptom, but one or more codes in one or more subcategories of a symptom still counted as one symptom. We recorded only the presence of depression symp-

toms, irrespective of duration. We did not perform diagnostics, since criteria like duration, combinations and number of symptoms have to be taken into account in diagnosing major depression, as well as additional criteria such as clinically significant suffering or impediment to social or professional functioning.

Phrases that expressed state of mind but that could not be classified into one of the main symptom categories were coded separately. We created three such further classifications: expressions of the duration of symptoms, gravity of the cited causes, and total number of expressed symptoms per applicant. An example of an applicant who expressed zero symptoms, two causes and a duration on the application form is: 'I need help ... and hope this online course will pull me through. I'm struggling with some things that recently happened in my life. I had a temporary paresis in my arm for two months (which is over now) and I lost a dear friend in a car accident.'

Analyses

We conducted qualitative and quantitative analyses. First, each phrase reflecting a state of mind on the 414 application forms was encoded by a researcher. Next, the phrases were classified by the researcher into the DSM-IV symptom categories of depression using MAXQDA. Expressions of symptom duration (weeks, months, years), severity of causes (less severe, more severe) and number of symptoms (0 to 9) were encoded separately. To verify interrater reliability, a second researcher independently encoded and classified the phrases of 141 applicants dispersed over the different subgroups. To calculate the interrater reliability of the encoding of the separate symptoms per applicant, we used the Cohen's kappa coefficient (Cohen, 1968), a statistical measure for qualitative categorical items, and the following interpretation of values: <0 as no agreement, 0–.20 as slight, .21–.40 as fair, .41–.60 as moderate, .61–.80 as substantial, and .81–1.00 as almost perfect agreement (Landis et al., 1977).

Frequencies and percentages of symptoms were calculated for the full sample and the three subgroups. For our qualitative analyses of how applicants put their states of mind into words, we combined the SL and ML categories ($n = 234$) and compared this group with the HL group ($n = 180$) in terms of actual phrases referring to symptoms and other notable aspects.

In the full sample of 414 applicants, we determined whether the symptoms of depression as articulated on the application forms were predictive of the applicants' CES-D depression levels at application. We first performed bivariate correlation analysis, followed by multiple linear regression analysis on the significantly correlated variables. Independent variables were the symptoms at

application; the dependent variable was the baseline (t_0) score on the CES-D depression scale.

All analyses were performed with SPSS-19 (SPSS, Chicago) using a two-sided significance level of $p < .05$.

Results

Interrater reliability

The interrater reliability of the encoding of phrases into DSM depression symptoms was fair to high, with Cohen's kappas between .39 (psychomotor agitation or retardation, a symptom articulated only twice) and 1.00 (suicidal ideation). The kappa for six out of nine symptoms was greater than .70, which is substantial. The two key depression symptoms *depressed mood* and *diminished interest in pleasurable activities* had moderate to substantial Cohen's kappas of .56 and .73 respectively. Table 2 shows the interrater reliability for each symptom.

Articulations of subclinical to moderate depression levels (CES-D 10–45)

Table 2 shows the classification of phrases from the application forms of the 234 applicants with CES-D scores between 10 and 45 (subclinical and moderate depression levels combined). This SL/ML subgroup reflects the target group of the MYM intervention. Table 3 shows the numbers of symptoms expressed. The average number of symptoms articulated by members of this subgroup was 1.91 ($SD = 1.07$). All DSM symptoms were represented in the data. Some 3.0% of SL/ML applicants did not report any symptom. The most applicants (70.1%, 164/234) articulated a *depressed mood*, followed by *feelings of worthlessness or guilt* (50.9%, 119/234) and *diminished interest in pleasurable activities* (25.6%, 60/234). The most reported physical symptom was *insomnia or hypersomnia* (10.7%, 25/234). The other physical symptoms *change in appetite or weight* and *change in level of activity, restlessness or slower movements* were scarcely reported (3.4% and 0.4% respectively). *Suicidal thinking* was reported by 3.4% (8/234) of the applicants in the SL/ML subgroup.

The following picture of SL/ML emerges from an examination of the applicants' word usage. With regard to the symptom *depressed mood*, most applicants used words such as 'sad' or 'down'. They also reported 'feeling tearful' or 'bursting into tears'. Some 7.3% (17/234) reported irritable mood (articulated as

being short-tempered or easily angered), which was classified under the symptom depressed mood (APA, 1994). The symptom *diminished interest in pleasurable activities* was often articulated as ‘not feeling like doing anything’ or ‘wanting to stay in bed all day’. *Change in appetite* was mostly expressed as ‘eating more’ and almost never as ‘eating less’. *Insomnia or hypersomnia* was often articulated as ‘sleeping badly’ or ‘trouble falling asleep’. The latter phrases were often reported in combination with *ruminating*, one theme of the worthlessness and guilt symptom; an example is ‘I sleep poorly, worry a lot and can’t deal with setbacks’. Other themes within that symptom were low self-esteem and feelings of insecurity in social contacts, expressed in terms such as ‘being afraid of failure, groups, people, or situations where I need to perform well’.

Other phrases are worth mentioning in addition to those referring to depression symptoms. Within the SL/ML subgroup, 13% (31/234) of respondents cited *causes* for their symptoms. Many such causes involved ‘breaking up’ or ‘problems at school or work’, including bullying. ‘Death of a loved one’, ‘switching schools or moving house’ and ‘transition from study to work’ were mentioned by several applicants. Another theme involved *physical health symptoms* (5%, 12/234), including headache, stomach ache or heart palpitations. Finally, 3% (7/234) indicated *comorbid mental health problems or disorders*: self-injury ($n = 2$), eating disorders ($n = 2$), anxiety disorder ($n = 2$) and posttraumatic stress ($n = 1$).

Articulations of high depression levels (CES-D 45–60)

Table 2 also shows the classifications of phrases from the application forms of the 180 applicants who indicated high levels of depression (CES-D scores 45–60), and table 3 shows the numbers of depression symptoms articulated. The average number of reported symptoms in the HL subgroup (1.89, $SD = 1.15$) was virtually the same as that in the SL/ML subgroup (1.91, $SD = 1.07$). More HL applicants did not report any symptom (8.9% versus 3.0%). All DSM symptoms were represented in HL. Most HL applicants (80.0%, 144/180) indicated a *depressed mood* (including irritable mood), followed by *feelings of worthlessness or guilt* (45.6%, 82/180). This was a similar picture to that in SL/ML. However, the third place in HL was held by *suicidal thinking* (16.1%, 29/180), a percentage five times as high as in SL/ML. *Diminished interest in pleasurable activities* was reported by only half as many HL applicants (12.8%, 23/180). No clear differences between HL and SL/ML were seen on other symptoms.

Table 2. Numbers and percentages of MYM applicants expressing DSM-IV depression symptoms in the full sample and in the subclinical, moderate and high depression subgroups, with Cohen's kappas for a randomly selected subsample.

DSM-IV depression symptoms ¹	Interrater Full reliability sample (n=141) (N=414)		CES-D 10-21 (SL, n=31)		CES-D 22-45 (ML, n=203)		CES-D 45-60 (HL, n=180)	
	Cohen's Kappa ⁵	Applicants expressing the symptom ²	Applicants expressing the symptom ²	Applicants expressing the symptom ²	Applicants expressing the symptom ²	Applicants expressing the symptom ²	Applicants expressing the symptom ²	
		n %	n %	n %	n %	n %	n %	
Depressed mood ³	.56	308 74.4	22 71	142 70	144 80.0			
Diminished interest or pleasure in activities	.73	84 20.3	6 19.4	54 26.6	24 13.3			
Significant weight loss or weight gain, or decrease or increase in appetite	.79	13 3.1	0 0	8 3.9	5 2.8			
Insomnia or hypersomnia	.84	48 11.6	1 3.2	24 11.8	23 12.8			
Psychomotor agitation or retardation	.39	2 0.5	1 3.2	0 0	1 0.6			
Fatigue or loss of energy	.88	67 16.2	5 16.1	38 18.7	24 13.3			
Feelings of worthlessness or excessive or inappropriate guilt ⁴	.66	201 48.6	15 48.4	104 51.2	82 45.6			
Diminished ability to think or concentrate or indecisiveness	.81	29 7.0	5 16.1	15 7.4	9 5.0			
Recurrent thoughts of death or recurrent suicidal ideation	1.00	37 8.9	2 6.5	6 3.0	29 16.1			

¹ Intensity and duration of symptoms were not taken into account in classifying phrases into DSM-IV depression symptoms.

² For each applicant, each reported DSM symptom was coded once, meaning that an applicant can have nine symptoms at most.

³ Because irritable mood may be indicative of depression in children and adolescents, we included it under the depressed mood symptom (APA, 1994).

⁴ Feelings of helplessness, concern and/or fear were included here, in accordance with a Dutch translation of DSM-IV-TR criteria of depression (Koster van Groos, 2007).

⁵ The Cohen's kappa is based on a random selection of 141 out of 421 applicants, evenly distributed among the three subgroups.

Regarding the symptom *depressed mood*, HL applicants were twice as likely to use the words 'depression' or 'depressed' on their application forms (44.4%, 80/180) and were less likely to use 'sad' or 'down' to express their feelings. Phrases as 'feeling tearful' were used just as frequently in HL as in SL/ML. On themes referring to other symptoms, there were no clear differences between

SL/ML and HL, except for one notable finding. In contrast to the SL/ML subgroup, articulations of the symptom *feelings of worthlessness or guilt* by HL applicants included expressions as ‘hating myself’, ‘desperate’ and ‘hopeless’. Examples are ‘I hate myself and think I’m ugly’ or ‘I can’t see how to go on! Everything is hopeless.... I have no goal in life’.

Several additional findings are worth noting. Within HL, 15% (29/180) of applicants cited *causes* for their symptoms, a percentage similar to that in SL/ML. Causes mentioned were also roughly the same, including ‘breaking up’ or ‘problems at school or work’. However, HL applicants also cited two causes not mentioned in the SL/ML subgroup: sexual assault and heritability of depression. Another difference was the lower reporting in HL of *physical health problems* as headache and stomach ache and a much higher reporting of *co-morbid mental health problems and disorders* (46/180, 25.6%, versus 3% in SL/ML): self-injury ($n = 19$), eating disorders ($n = 7$), anxiety disorders ($n = 5$), posttraumatic stress ($n = 5$), borderline disorder ($n = 7$), compulsive disorder ($n = 1$) and attention deficit and hyperactivity ($n = 2$).

Table 3. Numbers and percentages of expressed symptoms in the full sample and the subclinical, moderate and high depression subgroups.

Number of reported symptoms	Full sample (N=414)		CES-D 10-21 (SL, n=31)		CES-D 22-45 (ML, n=203)		CES-D 46-60 (HL, n=180)	
	n	%	n	%	n	%	n	%
0	23	5.6	–		7	3.4	16	8.9
1	136	32.9	11	35.5	73	36.0	52	28.9
2	160	38.6	16	51.6	75	36.9	69	38.3
3	61	14.5	2	6.5	32	15.8	27	15.0
4	24	5.7	2	6.5	11	5.4	11	6.1
5	7	1.7	–		3	1.5	4	2.2
6	2	0.5	–		1	0.5	1	0.6
7	1	0.2	–		1	0.5	–	

Associations between depression level, symptoms, duration, causes and total symptoms

Table 4 shows the correlation coefficients of the symptoms within each CES-D depression level, the number and duration of symptoms and the severity of causes. Significant associations were found between depression level and the symptoms *depressed mood, insomnia or hypersomnia* and *suicidal thinking*. Significant correlations also appeared between the total numbers of symptoms

and nearly all the separate symptoms, with the highest coefficients for *fatigue or loss of energy* and *insomnia or hypersomnia* ($r = .50$ for both), meaning that applicants with one of these symptoms had greater total numbers of symptoms. A significant negative correlation emerged between the duration of symptoms and the sleep disturbances. Multiple linear regression analyses on the three variables showing significant correlations with depression level revealed that these variables were also predictors of higher levels of depression: expressions of *depressed mood* ($\beta = 0.10$, $t(3.41) = 2.06$, $p = .04$), *insomnia or hypersomnia* ($\beta = 0.20$, $t(3.41) = 4.20$, $p = .00$) and *suicidal thinking* ($\beta = 0.10$, $t(3.41) = 2.07$, $p = .04$). Together these variables explained 6,3% of the variance in depression level.

Table 4. Correlations (r) of reported symptoms with depression level, number of symptoms, symptom duration and severity of expressed causes.

	Depression level ($N=414$)		Number of symptoms ($N=414$)		Duration of symptoms ($n=79$)		Severity of causes ($n=63$)	
	r	p	r	p	r	p	r	p
Depressed mood	.11	.02*	.36	.00**	.08	.49	.00	.99
Diminished interest or pleasure in activities	-.05	.29	.45	.00**	-.11	.32	.02	.89
Significant weight loss or weight gain, or decrease or increase in appetite	.06	.21	.38	.00**	-.14	.21	-.21	.09
Insomnia or hypersomnia	.10	.04*	.50	.00**	-.32	.00**	-.05	.73
Psychomotor agitation or retardation	-.05	.30	.07	.16	⁻¹	⁻²		
Fatigue or loss of energy	-.04	.46	.50	.00**	-.06	.62	-.05	.73
Feelings of worthlessness or excessive or inappropriate guilt	-.08	.11	.38	.00**	-.00	.99	.04	.77
Diminished ability to think or concentrate or indecisiveness	-.05	.34	.34	.00**	-.04	.71	.02	.90
Recurrent thoughts of death or recurrent suicidal ideation	.21	.00**	.24	.00**	.08	.47	-.08	.55

* $p < .05$ ** $p < .01$

¹ No correlation possible because no applicant reported both duration and psychomotor agitation/retardation

² No correlation possible because no applicant reported both causes and psychomotor agitation/retardation

As table 5 shows, no significant associations emerged between depression level, number of symptoms, duration of symptoms and severity of causes. The correlation between longer symptom duration (months or years) and higher depression level tended to significance ($r = .20, p = .08$).

Table 5. Correlations (r) between depression level, number of symptoms, symptom duration and severity of expressed causes.

	CES-D depression level $N=414$		Number of symptoms $N=414$		Duration of symptoms $n=79$		Severity of causes $n=63$	
	r	p	r	p	r	p	r	p
CES-D depression level	–		.06	.25	.20	.08	.18	.15
Number of symptoms	–		–		–.15	.19	–.06	.65
Duration of symptoms	–		–		–		.50	.21 ¹
Severity of causes	–		–		–		–	

$p < .05$ ** $p < .01$

¹ Coefficient based on $n = 9$ applicants who expressed both causes and duration of symptoms

Discussion

Main results

This mixed-methods study has shown that the articulations of state of mind given by young people applying for the Master Your Mood (MYM) intervention formed a good fit with the depression symptoms as defined by DSM-IV. All DSM symptoms were represented on the application forms. The interrater reliability of most symptoms was substantial. The mean number of expressed symptoms in the subclinical-to-moderate and the high depression subgroups (SL/ML and HL) was virtually the same ($M = 1.91, SD 1.07$; and $M = 1.89, SD = 1.15$) and no correlation was found between number of symptoms and depression level. In the three subgroups, the depressed mood symptom held first place, followed by feelings of worthlessness and guilt. In the full sample, 5.6% (23/414) did not articulate any depression symptom, and the largest percentage of those articulating no symptoms was in the HL subgroup (8.9%, 16/180). In addition to expressions referring to DSM depression symptoms, applicants also articulated comorbid symptoms, duration of symptoms and self-attributed causes.

The HL group (CES-D score 46–60; $n = 180$) was characterised by the highest percentage expressing depressed mood (80.0%), followed by feelings of

worthlessness and guilt (45.6%) and suicidal ideation (16.1%). Suicidal ideation and comorbid mental health problems were virtually exclusive to this subgroup. Twice as many HL applicants used the word 'depression' or its cognates as SL/ML applicants. Exclusive to the HL subgroup were expressions of self-hatred and despair (categorised under worthlessness and guilt) and attributions of sexual assault and heritability as causes of the depression.

The SL/ML group (CES-D score 10–45; $n = 234$) was characterised by one or more of the symptoms depressed mood (70.1%), feelings of worthlessness and guilt (50.9%) and diminished interest or pleasure in activities (25.6%). The latter key symptom was expressed by twice as many SL/ML applicants as HL applicants. In comparison with HL, the word 'depression' were observed in only half as many SL/ML applicants, who were more likely to use words like 'sad' or 'down' to articulate their mood. Comorbid problems were scarcely reported by them.

Regression analyses showed that expressions of depressed mood, insomnia or hypersomnia and suicidal ideation were predictive of higher depression levels; the number of expressed symptoms was not predictive.

Comparisons with other research

This study indicates that young people's articulations of their states of mind when they experience depression symptoms and seek help are largely consistent with DSM-IV depression symptomatology.

One criterion for the DSM major depression diagnosis is the presence of the key symptom *depressed mood* or of another key symptom, *diminished interest in pleasurable activities* (APA, 1994). In our full sample, the former symptom held first place and the latter symptom third place. The symptom *depressed mood* was predictive of higher depression levels. This association seems plausible, given the structure of the CES-D, which is based on DSM criteria for depression and contains items on the key symptom depressed mood (Radloff, 1977; Bouma et al., 1995). On the other hand, the key symptom diminished interest, also part of the CES-D, was not associated with depression level in our sample.

The depressed mood symptom was articulated by roughly three quarters of the applicants in all subgroups; it included irritable mood, reported by 8.3% of applicants. Irritable mood, articulated mostly as short temper or quick anger, is a common expression of depressed mood in children and adolescents and should be taken into account when diagnosing depression in young people (APA, 1994).

The symptom *feelings of worthlessness and guilt* held second place in the full sample. This could be due to our inclusion of ‘feelings of helplessness, concern and/or fear’, in line with a Dutch translation of DSM-IV-TR criteria (Koster van Groos, 2001). Many applicants expressed low self-esteem, fear of failure, perfectionism or insecurity in social contacts, symptoms that may also be associated with DSM-IV anxiety disorder. The high percentage expressing a sense of worthlessness and guilt is consistent with a previous study on MYM, which revealed high baseline comorbidity of depression with anxiety (69.2%, 146/211) among the applicants included in the MYM trial (Van der Zanden et al., 2013). The interrater reliability of the worthlessness and guilt variable in the present study was substantial (kappa .66). However, in a study by Terluin et al. (2004) among Dutch GP patients, it was one of the two symptoms with the lowest test-retest reliability (kappa .50). This suggests that this symptom might be unclearly defined.

The DSM symptom of recurrent thoughts of death or recurrent *suicidal ideation* held third place in the HL subgroup (16.1%, 29/180). The interrater reliability for this symptom was substantial in our study and in another (Terluin et al., 2004). The present study and a previous study on MYM (Gerrits et al., 2007) suggest that suicidal ideation is common among depressed young people. Moreover, our study indicates this symptom is associated with high depression level. In this context, it should be noted that the CES-D includes no items on suicidal ideation. Also other studies indicate a strong and direct relationship between major depression and suicidal phenomena (Husky et al, 2012; Evans et al, 2004).

The number of symptoms expressed was not predictive of depression level in our study. The mean for the subgroups was between one and two symptoms, and even some HL applicants (8.9%) articulated zero symptoms; more symptoms are needed to diagnose minor or major depression via a structured diagnostic interview (APA, 1994). Our study found several variables other than the number of expressed symptoms to be associated with higher levels of depression, including the articulation of depressed mood, insomnia or hypersomnia, suicidal ideation and comorbid disorders. Given the characteristics of the HL depression group, it seems less likely than the SL/ML group to go underrecognised in primary care, as has been confirmed in studies by Kamphuis et al. (2012) and Piek et al. (2012).

Clinical implications

Our study may facilitate the early recognition of depression in young adults and the initial assessment of its severity by primary care providers. On the

basis of the present results, we would suggest not waiting for further screening on depression if a young person consults a primary health care service and expresses at least one of the symptoms depressed mood, sleep disturbances, suicidal ideation or comorbid problems.

We have several reasons for this recommendation. The first is the demonstrated importance, as documented in our Introduction above, of early detection of depression symptoms and of intervention with indicated prevention at an early stage in order to effectively lighten the disease burden (WHO, 2011; Cuijpers et al., 2008b; Moussavi et al., 2007). Second, the articulations of particular depression symptoms as described above were found to be predictive or indicative of a higher depression level; the number of symptoms articulated was less convincing. Third, young adults are not readily inclined to seek professional help for their mental health problems (Vanheusden et al., 2008; Zwaanswijk, 2005); when they take that step, it is likely that their symptoms have already become aggravated. This is in accordance with findings in the RCT on MYM: fewer than 1% of the young people that applied for MYM were found to have CES-D scores below 10 (Van der Zanden et al., 2012). This indicates that young people can gauge their problems well; they rarely seem to apply for depression treatment without an elevated depression level (and they hence seem unlikely to consult a doctor for depression complaints when having no elevated depression level).

Limitations

This study may have several limitations beyond those described in our earlier publication on the MYM randomised controlled trial (Van der Zanden et al., 2012). The first concerns the generalisation of the results of the present study to another population or context, such as GP patients or practices. Our respondents were prepared to apply anonymously for online depression treatment and our results were based on their written answers to two open questions. This context differs from a primary care consultation, where symptoms would be screened in face-to-face interaction. Young people with depression symptoms may be more reticent about articulating for example suicidal ideation in a GP consultation (see for example Husky et al., 2012), than on an online treatment application. This means we should be cautious about generalising the present outcomes to another context.

Another limitation is that results are based on a screening instrument for depression and not on diagnostic interviews. That enabled us to draw conclusions about how young people express higher or lower levels of depression

symptomatology, but not about what expressions might reflect a diagnosed clinical or subclinical condition.

Future research

Future research should focus on improving early recognition of subclinical and mild to moderate depression by primary care providers. This is because most depression diagnoses and treatments take place in primary care practices (Terluin et al., 2004) and because it is important to detect depression at early stages (Cuijpers et al., 2008b), especially in first-onset cases (Kamphuis et al., 2012). As first episodes of depression usually emerge in adolescence and young adulthood, this is a highly relevant target group for continued research (De Graaf et al., 2010; Costello et al., 2008, 2006; Birmaher et al., 1996).

To improve early recognition, research should focus on developing reliable screening instruments for clinical as well as subclinical depression that would be suitable for use in primary care without entailing extensive diagnostic interviews.

It would also be important to perform language analysis of how people express subclinical and clinical depression and of how such articulations are interpreted and classified by primary health care professionals in relation to DSM depression symptoms. It would be a challenge to improve the reliability of certain DSM-IV depression symptoms, with ‘feelings of worthlessness and guilt’ as a case in point (Terluin et al., 2004). Another relevant focus would be to investigate similarities and differences between how young people articulate depression symptoms when applying for online treatment (informative interaction) and when consulting a GP (social interaction) (Biber, 1989).

Extensive research and discussion are also needed on the implications of a more effective diagnosis of subclinical or mild depression in primary care and of intervening at early stages of depression. Although early intervention has been shown to be cost-effective in the longer term (Munoz et al., 2010; Cuijpers et al., 2008b), more knowledge is needed about the short-term implications for the supply and costs of health care and about what interventions are appropriate to deliver. These are topical themes for future research.

Conclusion

In support of the early recognition of subclinical and clinical depression in young primary care patients, it is relevant to know how adolescents and young adults express their depressive feelings. This study showed that their articulations of their state of mind whilst applying for online depression treatment

corresponded well with DSM-IV depression symptoms and were predictive of their levels of depression. Although caution ought to be exercised in generalising these results to primary care practice, some clues identified here may facilitate the recognition of subclinical as well as more serious depression in young adults. Not only the number of symptoms needs to be taken into account, but in particular also expressions of (1) the key symptom *depressed mood*, articulated as feeling down, sad or depressed, feeling tearful or being short-tempered, (2) *insomnia or hypersomnia*, (3) *suicidal ideation* and (4) *comorbid problems or disorders*. With these, the last two symptoms could be indicators of a high depression levels. Future research should therefore include language analysis to improve early detection of depression in primary care.

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Chapter 8 General discussion

The primary aims of this thesis were to evaluate the online psychological intervention Master Your Mood (Grip Op Je Dip) for adolescents and young adults with depression symptoms, to explore the possible processes of change in MYM participants and to analyse their language usage as a psychological marker. This chapter summarises the major findings of those investigations and discusses their implications for clinical practice. It points out some limitations of the present research and makes recommendations for future research.

Main findings and interpretations

The MYM intervention

In the introduction the seriousness of depressive disorders was highlighted, the wide prevalence of major and subclinical depression in adolescents and young adults (e.g. Merry et al., 2011; De Graaf et al., 2010), and the importance of intervening at early stages of depression symptoms (e.g. Munoz et al., 2010; Cuijpers et al., 2007, 2008). Detecting the first onset of depression seems particularly crucial (Kamphuis et al., 2012). As initial episodes usually emerge in adolescence and early adulthood (Costello, 2006; Birhamer et al., 1996), those are highly relevant target ages for depression prevention. As research indicates, though, young people are not inclined to seek professional help for their mental health problems (Vanheusden et al., 2008). They experience many obstacles to this, including fears of stigmatisation.

To improve access to young people at an early stage of their depression symptoms and to provide effective interventions, we developed MYM in 2005. It is a guided online group course in a secure chatroom including homework assignments, designed for 16- to 25-year-olds with subclinical to moderate levels of depression. MYM is based on the principles of cognitive-behavioural therapy (CBT), which has been shown in a multitude of studies to be an effective treatment for depression in adults and adolescents (e.g. Cuijpers et al., 2011; Stice et al., 2008; Weisz et al., 2006). At the core of MYM is the cognitive restructuring of thinking patterns, activation (the planning of frequent plea-

surable activities) and self-monitoring (of mood, activities and thoughts). To reduce the fear of stigmatisation, the targeted individuals may apply for MYM anonymously and without referral, but they may also be referred by primary health care providers.

The first pilot study was conducted on an eight-session variant of MYM. It showed promising results in terms of reaching the target group, user satisfaction, technical feasibility and beneficial effects of the intervention. High attrition rates were found, however – a familiar problem both in face-to-face adolescent mental health prevention (Gerrits et al., 2007) and in e-health interventions (Eysenbach et al., 2005). To improve treatment adherence, we reduced the course from eight to six sessions after the pilot, while preserving the CBT core elements. The promising pilot results gave reason to perform the next step: a randomised controlled trial (RCT) to determine the effectiveness of MYM.

The clinical effects

Our trial of MYM was one of the first to be conducted in the field of e-mental health research involving young people with depression symptoms (Callear et al., 2010). The trial found a large effect size of $d = 0.94$ for depression, which is comparable with or greater than the measured effects of face-to-face psychotherapy for depression in youth (Michael et al., 2002; Weisz et al., 2006). Medium effect sizes were found for anxiety and mastery ($d = 0.49$ and $d = 0.44$). The effects were sustained in the intervention group at the 6-month follow-up. The number needed to treat was 2.7, meaning that 2.7 persons with depressive symptoms must be treated with MYM for one person to score outside the clinical or subclinical range. These results may be regarded as the most favourable outcome of any study of online interventions for depression so far (Smit et al., 2013).

One explanation for the positive findings might be that the trial of MYM had attributes that have been found related to larger effect sizes in depression interventions among youth, including high-risk samples (with elevated depression symptoms), samples with more female participants, samples with older adolescents, programmes of shorter duration and with homework assignments, and programmes delivered by professional interventionists (Stice et al., 2009). Moreover, a passive control condition (such as our waiting list) may contribute to higher effect sizes than an active control condition (Weisz et al., 2006; Baskin et al., 2003).

It could also be that MYM participants experience substantial social support from the course facilitator (and from their anonymous peers) in the weekly

group sessions. Some research has indicated that the amount of accompanying therapist support is related to effect sizes in Internet-based therapies for depression and anxiety (Speck et al., 2007). However, other studies of online psychological treatments suggest that effect sizes are not dependent on the frequency of therapist contact (Ruwaard et al., 2009; Klein et al., 2009). Similarly, a meta-analysis by Weisz and colleagues (2006) found treatment duration not to be correlated with depression outcome. Nor did the present study find any correlation between the number of sessions attended (treatment adherence) and the intervention outcomes. Possibly, those who stopped felt they had already sufficiently recovered. This may have levelled out the correlation between sessions attended and outcome. All in all, what role the degree of therapist support might play in the outcomes of online (and offline) treatments is not yet clear and needs further investigation (Donker et al., 2009).

A notable finding was that the MYM group also included participants who did not attend any session at all (21%) but who still showed significantly better outcomes at post-treatment than the wait-listed group. This is a puzzling result. An explanation might lie in the differences in study conditions to which the MYM group and the wait-listed group were assigned: although both groups attended no sessions, the MYM participants made an active decision about this, while the wait-listed group did not.

In conclusion, our study showed MYM is an effective intervention for depression symptoms in young people. However, the questions of which specific elements of a treatment are effective and which exact mechanisms bring on a person's recovery still remain at the frontiers of knowledge. To expand our systematic knowledge on these issues, we explored possible mechanisms of change and predictors of outcome.

Mechanisms of change

Mediating variables can provide insights into what specific factors lead to changes in depression during treatment. Identifying such mediators is important to the further improvement of treatments and their clinical and cost-effectiveness (Lemmens et al., 2011; Kazdin, 2007). Our mediation study investigated possible circularity in the process of change in MYM participants, testing three mediation models that explored bidirectional relationships between depression, anxiety and mastery. The analyses showed that depression change could have been due to changes in anxiety and mastery. By the same token, changes in anxiety and changes in mastery could have been due to changes in depression. We did not find that early changes in anxiety or depression predicted late changes in the other condition. When relations are bi-

directional and the change process is circular, it is less likely that one variable would be found predictive of the other in a time schedule. Furthermore, we found a high comorbidity rate of 69.2% between depression and anxiety in our sample. Altogether these results suggested possible circularity in recovery processes, which is in line with findings in other studies (e.g. Rosenbaum et al., 2012; Meulenbeek et al., 2010).

Further analysis of the relative impact of the separate mediators on the outcomes showed an impact of anxiety change on depression change, though that impact was smaller than vice versa. This suggests that targeting depressive symptoms can be a way of alleviating anxiety symptoms, as has also been suggested in other research (Titov et al., 2011; Barlow et al., 2004). This is a relevant finding in view of the frequent comorbidity between depression and anxiety in youth, as found in two earlier studies (Hale et al., 2009; Axelson & Birmaher, 2001) as well as in our MYM sample. An additional finding in our study was that change in mastery appeared to explain a larger proportion of the effect on depression than of the effect on anxiety. This is roughly consistent with other studies (Rosenbaum, et al., 2012; Warmerdam et al., 2010; Meulenbeek et al., 2010). If the MYM course (and the mastery scale) were to devote more attention to the ability to experience anxiety-provoking situations without avoiding them – which is a relevant aspect of the mastery of anxiety (Meulenbeek et al., 2010) – then the impact of mastery on anxiety change would probably be greater. And by virtue of the expected circularity in processes of change, such an adaptation to depression interventions should also boost the impact of mastery on depression, resulting in larger effect sizes.

Predictors of treatment outcome and adherence

In addition to the mediation analyses, we examined possible demographic predictors of the intervention effect. This might add to our knowledge of which participants benefit from MYM to greater or lesser degrees. Indirectly, it could also improve understanding of the working mechanisms in the treatment. In accord with the meta-analysis by Stice and colleagues (2009) on markers of larger effect sizes of (offline) depression interventions in youth, we expected higher depression level, older age and female gender to be predictors of better outcomes. However, our analyses found no relations between participant characteristics – depression level, age, gender, and in addition education and current or prior professional help – and either treatment outcome (Van der Zanden et al., 2011) or adherence (Van der Zanden et al., 2012). On the whole, there is still limited knowledge about outcome predictors in online depression

interventions (Warmerdam et al., 2010b), making it difficult to pinpoint subgroups for which online depression treatments like MYM are best suited.

Other predictors of depression outcome might be found in the language use of participants, as has been suggested in earlier studies (Rude et al., 2004; Pennebaker et al., 2003). Our analyses of participants' language use on application forms and in chat sessions showed that such usage can predict both treatment outcome and adherence. As hypothesised on the basis of prior research (Pennebaker et al., 2003), we found that the use of the pronoun 'I' declined from course application onwards to the last chat session. Depression improvement was also predicted by an increasing use of discrepancy words (such as 'should', 'wish' and 'hope'). Better course adherence was predicted by more total words used on the application form, more social words and fewer discrepancy words. This study was the first to link word usage in psychological treatment to outcomes of treatment, that has proven to be effective in an RCT. Although the results are too tentative to support widespread implementation in clinical practice, the study certainly makes it clear that the growing number of web-based psychological treatments, with their textual communication, generate a wealth of data that can help improve systematic knowledge on working mechanisms of treatment.

Text analysis studies may also provide clues to support the early detection of depression symptoms in primary care. This is important because general practitioners (GPs) have been found to underrecognise milder depressive conditions in particular (Kamphuis et al., 2012), whereas intervening with indicated prevention measures may be decisive in such cases (e.g. Cuijpers et al., 2008; Munoz et al., 2010). Our study of how MYM applicants articulated their mental health problems on their application forms revealed that their language usage predicted their level of depression at application. Predictors of higher depression level were expressions referring to depressed mood (words like 'sad', 'down', 'depressed' or 'crying'), insomnia or hypersomnia, suicidal ideation, as well comorbid mental health problems. The last two symptoms were nearly exclusive for the subgroup with the highest depression levels. A notable finding was that the number of articulated symptoms at application was not predictive of depression level, whereas this is an important DSM criterion for diagnosing minor or major depression (APA, 2013). This study also made it clear that applicants' problem articulations corresponded well to the DSM-IV depression symptoms. All depression symptoms were articulated in the full sample.

Clinical implications

Acceptability

This study has shown that a CBT group course like MYM is an effective and suitable indicated prevention intervention for adolescents and young adults with subclinical to moderate depression symptoms. Although no cost-effectiveness study has yet been performed on MYM, our study gives several reasons to believe it may turn out favourable. First, the costs of professional guidance per participant appeared roughly comparable to those of individual CBT self-help interventions for adults with minimal support by a professional. Second, for MYM we found a number-needed-to-treat value of 2.7, which is the most favourable outcome so far for online depression interventions (Smit et al., 2013). Third, other studies have reported preventative screening and indicated intervention for depression in youth to be cost-effective (Mihalopoulos et al., 2012).

Our findings indicate that MYM is of clinical value. To help reduce the burden of depression in society, it is recommendable to reach young depressed people, both inside and outside care, with such an intervention. MYM can be offered as a first-step intervention for young people who present to primary care providers with depression symptoms. Outside that context, the target group can also be reached with the intervention through recruitment activities in the general public.

Early detection

Although caution should be exercised in generalising results from the word use studies to clinical practice, such results may nonetheless contribute to a better recognition of depression. As primary care providers gauge a patient's level of depression, it may be wise to be alert not just to the number of depression symptoms the patient mentions, but in particular to phrasings that refer to (1) the key symptom depressed mood (articulated as sadness, feeling down or depressed, tearfulness or short-temperedness); (2) insomnia or hypersomnia; (3) suicidal ideation; and (4) comorbid mental health disorders. Such articulations appear to be associated with higher levels of depression and with these the last two symptoms are related to the highest depression levels. For early detection, health care providers should also keep in mind that young people experience barriers to seeking professional help; once they do seek it, one might surmise that the problems have already become aggravated. In addition, as noted in the Introduction above, providers ought to be alert to

young people with elevated risks of developing serious mental health problems, such as those whose parents have suffered psychiatric illness or those with low socioeconomic backgrounds. It seems wise in all such cases not to wait for further screening on depression when they express depressive symptoms. In the light of the current underrecognition of depression, and particularly its milder forms, primary care providers need support in the timely detection of depression, and they should be made aware of the clinical and cost-effectiveness of indicated depression prevention (Mihalopoulos et al., 2011; Smit et al., 2006).

Treatment

As comorbidity of depression with anxiety is common and, as our study and others suggest, CBT depression interventions are also effective in reducing anxiety symptoms, it seems advisable not to focus exclusively on young people with depressive symptoms in recruiting for such interventions, but on youth with anxiety as well (Titov et al., 2011; Barlow et al., 2004). Our study also indicates that the effectiveness of depression interventions might be further enhanced by focusing on the mastery of anxiety as well as the mastery of depression. It may additionally be useful in the delivery of MYM and other on-line treatments for young people to be alert to the number of words applicants use in articulating their problems on application forms, as this seems predictive of course adherence. Those using low numbers of words may need more encouragement and attention during treatment to stay motivated to participate. In web-based and possibly other forms of treatment, it would further seem wise to be alert to the use of the pronoun 'I' and discrepancy words such as 'should', 'hope' or 'wish', because these may be specific markers of depression levels and changes in them.

Prerequisites

In the light of the demonstrated effectiveness, the low number needed to treat and the presumable cost-effectiveness of MYM, and because young people with depressive symptoms are a crucial target group for depression prevention, it seems justifiable to argue for permanent funding by government (as is ensured now) and health insurance companies for the sustainment of web-based interventions like MYM for anonymous users. Such funding is a prerequisite for future delivery.

Our study also has a number of implications for the delivery of MYM in the primary health care sector. As various impediments appear to exist to referring

patients from primary care to web-based e-health interventions (Boerema et al., 2010), a transfer of research knowledge to primary care seems to be needed, both about the recognition of subclinical and more serious forms of depression in young people and about the characteristics of the online interventions, including the content and procedures for referral. A further prerequisite for a proactive role of primary care in referring to MYM is the integration of MYM into an optimal continuum of youth health care. MYM applicants or participants whose problems prove too severe in the pre-treatment screening, or who have not sufficiently recovered by the post-treatment assessment, may then be referred back to primary care for further help.

Targeted resources are also needed for reaching groups with depression symptoms that are not in touch with mental health care provision. For those groups in particular, it is important to ensure low-threshold access to online interventions, also in view of the hindrances that young people in general experience in seeking help for mental health problems (Husky et al., 2012; Vanheusden et al., 2010;). Key prerequisites for low-threshold indicated depression prevention are anonymity, free-of-charge and no-referral access. These features are now ensured by the MYM intervention. As our study showed, more than 99% of the young people applying for MYM without referral by professionals screened positively for elevated levels of depression. A surge of anonymous applicants not needing treatment is therefore highly unlikely and, besides that, only those applicants screening positive for subclinical- or moderate-level depression are admitted.

Main limitations

A number of limitations need to be considered in interpreting the results of this study. The participants in the randomised controlled trial were not diagnosed according to DSM criteria, meaning that caution is called for in generalising results to people with a diagnosis of depression. Another limitation was the uncontrolled follow-up assessment at six months, since the wait-listed control group participants were given immediate access to the course after the post-treatment assessment. The finding that improvements in the experimental group were maintained six months later should therefore be interpreted with caution. Other limitations were the rather high levels of education in our sample relative to the general population and the underrepresentation of respondents aged 16 and 17, due to the required parental consent, and underrepresentation of males making it uncertain whether results can be generalised to people with lower education levels, male gender or with ages below 18.

Beyond these limitations, the mediation study and the word usage studies were subject to further constraints. Our mediation analysis was based on three assessments (pre-treatment, post-treatment and follow-up); interim measurements in the course of the intervention were lacking. That prevented us from analysing the precise sequence of changes, which could have allayed concerns that the mediator and the symptoms both changed simultaneously or under influence of a third variable (Kazdin, 2007). A limitation in our first word use study lay in the large number of variables examined and the attendant risk of finding accidental associations; we reduced that risk by restricting the analysis to word categories shown by previous research to have associations with depression. A limitation in both the first and the second word use study involves generalising the results to the context of offline primary health care. For instance, the second study was based on participants' problem articulation in online application forms. This context differs from a consult in contexts such as GP consulting rooms, where symptoms are screened in face-to-face social interaction.

Future research

This study provided many clues for future research. Here, some relevant directions will be discussed. Given the frequent early onset of subclinical and major depression and its far-reaching impacts, randomised controlled trials are needed of web-based interventions specifically targeting adolescents and young adults with depression symptoms. These should assess long-term effects and contain economic evaluations (Riper et al., 2012). In view of the potential burden that a depressed adolescent can form for the whole family, an assessment of family quality-adjusted life years (or family QALY) might be considered, which would calculate costs and benefits for all family members (Smit et al., 2013). Interventions specifically tailored to young people of low socioeconomic status ought to be developed and tested as well (Van der Zanden et al., 2013). This group is generally underrepresented in study samples (as in the MYM sample), but it is in particular need, given its higher prevalence of psychological distress (Van Dorsselaer et al., 2009).

To expand the systematic knowledge of the working mechanisms in online treatments and processes of change, randomised comparisons are needed between online treatment groups and active control groups (Weisz et al., 2006). This could help identify more specific elements of treatment that induce effects. Also predictor, moderator and mediation analyses may add to this knowledge (Riper et al., 2012). Since specific mediators such as cognitions may

not account for the full effect in CBT interventions (Warmerdam et al., 2010), future research should include non-specific variables as well, such as social support (Spek et al., 2007), perceived stress (Mausbach et al., 2006, 2007), feelings of hope and expectation (Stephen et al., 2006) and feelings of control derived from the mere act of applying for the intervention (Van der Zanden et al., 2012). The strong connection between anxiety and depression may reflect underlying dimensions involving factors such as the psychobiological response to threat and stress (Cole et al., 1998; Dubovsky, 1990). In addition to psychological outcomes, research should also incorporate physiological outcomes into the total concept of change mechanisms. Interdisciplinary research will therefore be of interest in future work.

Future trials on web-based depression treatment should include text analysis. That could expand our knowledge of word usage as a marker of psychological processes. Once evidence is established for such markers, the textual analysis of clients' language use has a potential to provide detailed insights into recovery processes during treatment without burdening clients with invasive interim assessments.

A final challenge is to improve the early recognition of subclinical and more serious depression by GPs, as most depression diagnoses and treatments take place by them (Terluin et al., 2004). Language analysis of how people express different levels of depression and of how primary health care professionals interpret and classify their utterances can contribute to more timely and accurate recognition. Beyond that, research also needs to focus on developing reliable screening instruments for major as well as subclinical depression that can be readily administered within the context of primary care.

Conclusions

This study has shown that MYM can promote reaching, detecting and helping young people at early stages of their depression symptoms. With its favourable results in terms of effect sizes and number-needed-to-treat value, MYM may help to reduce the public health burden of depression. This study pointed out the importance of low-threshold interventions like MYM in reaching young depressed people, as well as support for primary care providers in the timely recognition of symptoms of subclinical and major depression in young people. Our studies of language usage have provided evidence for how adolescents and young adults articulate their depressed feelings, and this knowledge may aid in the detection of depression at an early stage. This study also pointed out we need to arrive at a better understanding of the working mechanisms of web-

based and face-to-face depression treatment to optimise its clinical and cost-effectiveness. Our study suggests that future intervention research including assessments of non-specific and physiological mediators may add to this knowledge, as well as research on language use as psychological marker on the wealth of data e-mental health interventions generate.

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