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Design and evaluation of a peer network to support adherence to a web-based intervention for adolescents

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ABSTRACT

Background: Depression during adolescence is common but can be prevented. Behavioral intervention technologies (BITs) designed to prevent depression in adolescence, especially standalone web-based interventions, have shown mixed outcomes, likely due to poor intervention adherence. BIT research involving adults has shown that the presence of coaches or peers promotes intervention use. Developmentally, adolescence is a time when peer-based social relationships take precedence. This study examines whether peer-networked support may promote adherence to BITs in this age group.

Objective: Adopting the framework of the Supportive Accountability model, which defines the types of human support and interactions required to maintain engagement and persistence with BITs, this paper presents a feasibility study of a peer-networked online intervention for depression prevention among adolescents. We described the development of the peer network, the evaluation of participant use of the peer networking features, and qualitative user feedback to inform continued BIT development.

Method: Two groups of adolescents (N = 13) participated in 10-week programs of the peer networked based online intervention. Adolescents had access to didactic lessons, CBT based mood management tools, and peer networking features. The peer networking features are integrated into the site by making use expectations explicit, allow network members to monitor the activities of others, and to supportively hold each other accountable for meeting use expectations. The study collected qualitative feedback from participants as well as usage of site features and tools.

Results: Participants logged in an average of 12.8 sessions over an average of 10.4 unique days during the 10-week program. On average, 66% of all use sessions occurred within the first 3 weeks of use. The number of "exchange comments", that is, comments posted that were part of an exchange between two or more participants, was significantly positively correlated with mean time spent on site ($r = 0.62$, $p = 0.032$), use of the Activity Tracker ($r = 0.70$, $p = 0.012$) and Didactic Lesson ($r = 0.73$, $p = 0.007$). Qualitative interviews revealed that adolescents generally liked and were motivated by the peer networking features during the first weeks of the intervention when general site use by group members was high. However, the decrease of site use by group members during the subsequent weeks negatively affected participants' desire to log on or engage with group members.

Conclusions: This pilot study highlights the potential that a BIT designed to harness the connection among a peer network, thereby promoting supportive accountability, may improve adolescent adherence to BITs for depression prevention.

1. Introduction

Adolescence is a critical developmental period for the onset of Major Depressive Disorder (MDD) and depression during adolescence is significantly correlated with other mental illness and psychosocial difficulties later in life (Thapar et al., 2012). In 2014, 11.4% of US adolescents had a Major Depressive Episode (MDE) in the past year (Center for Behavioral Health Statistics and Quality, 2015). Depression can be prevented (Beardslee et al., 2013, Rohde et al., 2015). However, traditional prevention programs, such as many school-based programs, incur substantial costs and logistical demands (Young et al., 2015, Brent et al., 2015), making it difficult for these programs to be widely implemented.

Behavioral intervention technologies (BITs) such as web or smartphone delivered mental health interventions can reach a large

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number of users in a cost effective manner, offering the promise of greater mental illness burden reduction (Kazdin and Blase, 2011). Adolescents are digital natives and naturally go to the internet for health information (Wartella et al., 2015). To date, BITs that aim to prevent depression in adolescents are typically web-based and designed as adjuncts to class curriculum or medical care, still requiring substantial in-person involvement by teachers or the medical care team just to implement them (Lillevoll et al., 2014, Saulsberry et al., 2013, Van Voorhees et al., 2009). This limits their scalability, and has not proven to be very effective at promoting engagement, as evidenced by low use rates. Outcomes for depression have been mixed, suggesting that non-use is part of the reason for their lack of effectiveness (Clarke et al., 2015).

BITs research involving adults has shown that the presence of coaches, who provide support to users via brief telephone calls or emails, can substantially increase use and improve outcomes (Christensen et al., 2009, Mohr et al., 2013, Andersson and Cuijpers, 2009). The Supportive Accountability model has been used to describe the elements of human support required to promote engagement and persistence with BITs (Mohr et al., 2011). The model focuses on use of the BIT such as log-ins, time spent on site etc., and not on adherence to behavioral prescriptions such as increase positive activities, monitoring one's mood, etc. In this model, effective human support may come from other users, lay coaches, or professionals, who are seen as trustworthy and benevolent. Accountability in this model is defined as the implicit or explicit expectation that an individual may be called upon to justify his or her actions or inactions. Thus, a peer network using supportive accountability would require visibility into the expected goals or tasks, such as logging in or completion of treatment elements, and the ability to monitor their completion. The construct of supportive accountability has been validated through a number of clinical trials (Dennison et al., 2014, Mohr et al., 2010, 2013, Ebert et al., 2014).

There is evidence that lay supporters are just as effective as mental health professionals (Titov et al., 2010), raising the question of whether peers can also provide the support required to promote persistent use and engagement. A feasibility study of a web-based intervention for mood management among cancer survivors that was embedded in a peer network showed high utilization rates compared to participants who received the intervention alone (Duffecy et al., 2013). Developmentally, adolescence is a time when peer based social relationships take precedence. Existing research suggests that use of social networking sites alone, especially unstructured, open enrollment and unmoderated groups such as listservs and bulletin boards, is not necessarily beneficial for adolescents, with both positive and adverse outcomes found (Rice et al., 2014; Ali, Farrer, Gulliver, Griffiths, 2015). In fact, the potential negative effects of internet interventions in general have not been adequately studied (Rozental et al., 2014, Hayes et al., 2016). The impact of social networking may depend on the intervention content, the user interaction, and the safety of the online environment (Rice et al., 2014). It is possible that BITs designed to promote supportive peer interactions among users of a structured online intervention may increase BITs adherence in this age group.

This paper describes a feasibility study of a peer-networked online intervention using principles of supportive accountability for depression prevention among adolescents. We examine use data, including the relationship between use of intervention elements and social elements, and report on user feedback interviews.

2. Methods

2.1. Recruitment

Adolescent participants were recruited from schools, community agencies, and word of mouth between April and September of 2013. Participants met inclusion criteria if they were between 14 and 19 years of age, they were familiar with the use of mobile phones, computers and the internet, and able to speak and read English. We excluded individuals with severe depression (a score on the Center for Epidemiologic Studies Depression Scale (CESD) above 39), who were on an antidepressant medication, diagnosed with any medical conditions for which participation is either inappropriate or dangerous, or were suicidal (had ideation, plan, and intent). Adolescents who were older than the age of 18 provided consent, while adolescents who were under the age of 18 provided assent to participate while their parent/guardian provided consent. The Northwestern University Institutional Review Board approved study procedures.

2.2. Procedure

Two peer networked groups were run with the primary aims of 1) evaluating participant use of peer networking features, and 2) evaluating usability in order to continue the BIT development. The first group occurred in May 2013 and consisted of 5 adolescents. The second group occurred in October 2013 and consisted of 8 adolescents. While most internet-delivered interventions are designed for 5–8 weeks of use, this intervention was tested as a 10 week program, which is somewhat longer than we expected participants to stay engaged, to allow the research team to make general observations on length of engagement. Participants responded to questionnaires at baseline, week 5, and week 10 and were paid for each assessment. The first author conducted semi-structured qualitative feedback interviews with Group 1 participants after 1 week of use, and a research assistant conducted interviews with Group 2 participants at week 5 and week 10 of the intervention.

2.3. The Project TECH intervention

The intervention website is named Project TECH (Teens Engaged in Collaborative Health). It was based on moodManager, an internet-delivered intervention for depression based on cognitive behavioral therapy (CBT) that was previously validated with adults (Mohr et al., 2010, 2013). We modified moodManager to create Project TECH, based on laboratory testing sessions with 6 adolescents (Mean Age = 15.8), and where participants provided feedback on paper prototypes.

2.3.1. General design

The Project TECH intervention included didactic lessons and interactive tools designed to support the integration of behavioral activation and cognitive restructuring strategies aimed at the treatment of depression. Following the principles of supportive accountability, we embedded intervention components in a peer networking system, i.e. a closed group with a limited number of participants. This peer networking system included visible peer activity, commenting, and ability to share media such as photos and videos. The site also had a bright color scheme and an uncomplicated design, to appeal to adolescent users. Brief didactic lessons are released several times a week, and take about 5 min to read. Intervention tools take an additional minute or two to complete, depending on the user and their level of engagement. Psychologists monitored groups for safety but did not participate or intervene within the group.

2.3.2. Intervention elements: CBT tools

Fig. 1 displays the features on the Project TECH home page. The left half of the page contains tiles that access the intervention components. The “Today's Lesson” tile on the top left contains didactic information on the management of depressive symptoms. The “Activity Tracker” and “Thought Journal” (“Think & Feel”) tiles on the middle row contain interactive tools designed to support users in implementing mood management skills. The Activity Tracker supports behavioral activation strategies, allowing participants to schedule and monitor positive activities. Increasing positive activities (those that provide pleasure or a sense of accomplishment) is a core component of psychological treatments for depression. The Thought Journal is a tool that supports