

AN ABSTRACT OF THE DISSERTATION OF

Megan A. Partch for the degree of Doctor of Philosophy in Counseling presented on March 15, 2019.

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Abstract approved:

Cass Dykeman

Treatment providers seek low-cost, high-impact means of engaging clients in care with the aim to enhance treatment delivery and outcomes. With improvements to mobile technology making cell phone accessibility and usage rates high across all socio-economic levels, text messaging is becoming more frequently utilized as a means of promoting provider-client communication. Numerous studies have demonstrated the efficacy of text message interventions in healthcare; touting a wide variety of achievements including increased treatment session attendance, improved medication compliance, enhanced client satisfaction, decreased symptomology, reduced substance use, and a reduction in rates of recidivism. While text messaging is being

utilized as an intervention by a growing number of healthcare providers, the literature is lacking related to the linguistic composition of text messages used in treatment. To extend this knowledge base, text message communications utilized in the treatment of mental health and substance use disorders were collected from previously published research and added to a corpus for analysis. Linguistic Inquiry and Word Count (LIWC) software was utilized to explore writer communication style and use of terminology thought to enhance client engagement. Results demonstrated statistical significance when compared to national blog norms derived from Twitter. Text messages for both mental health and substance use disorder treatment had high levels of Clout, demonstrating the text writer's confidence and expertise. However, Authenticity, which indicates communication that is both honest and personal, was found to be low in all messages. The Emotional Tone of mental health text messages was positive, while substance use disorder messaging demonstrated a neutral tone. Both sets of text messages had a higher rate of Biological terms used than expected while Informal terminology was used at a much lesser rate than national norms. Substance use disorder text messages demonstrated more frequent use of leisure terms, nearly three times the national norm.

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Psychological and Linguistic Processes in Treatment Related Text Messages

by

Megan A. Partch

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APPROVED:

Major Professor, representing Counseling

Dean of the College of Education

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Megan A. Partch, Author

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CONTRIBUTIONS OF THE AUTHORS

Cass Dykeman assisted with research design, methodology, data analysis and results.

Evelyn Stamey assisted with statistical computation of the data for this dissertation.

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DEDICATION

This dissertation is dedicated to my brother, Evan Partch. I am consistently impressed by your intellect, wit, and strength. I love you and I'm very proud of the amazing person you've become.

CHAPTER 1: A General Introduction

General Introduction

Text messaging is one of the fastest, easiest, and most economical forms of communication available today. With the vast majority of individuals owning and regularly utilizing a mobile phone, exploration of this medium as a means of engagement with healthcare providers is fitting. Text messaging has the capacity to positively impact an individual's mental health and substance use disorder treatment experience, increasing outreach, engagement, and support.

In a review of the literature on technology-based interventions in mental health and substance use disorder treatment, five key points emerge, (1) the pervasiveness of mental health and substance use disorders, (2) the prevalence of mobile phone ownership and use, (3) text messaging as a treatment intervention, (4) the importance of treatment engagement, and (5) the psycholinguistics of persuasion.

There is extensive literature on the prevalence of mental health and substance use disorders. According to the Substance Abuse and Mental Health Services Administration (SAMHSA), one in five adults in the United States has a mental health disorder and one in 25 lives with a serious mental illness (SAMHSA, 2014; 2018). Despite these startling statistics, less than half of the individuals experiencing mental health distress each year will seek the assistance of mental health services (SAMHSA, 2018). The 2013 National Survey on Drug Use and Health reported that one in 12 American adults has a substance use disorder (SAMHSA, 2014). Of an estimated 22.5 million Americans ages 12 and older who need substance use disorder treatment annually, only one in 10 will engage in treatment services (Center for Behavioral Health Statistics and Quality, 2015). It is estimated that around 7.7 million Americans have co-occurring disorders, experiencing both mental health and substance use disorder diagnoses, and

only seven percent of these individuals will obtain treatment annually (SAMHSA, 2014; 2018). Treatment is needed to mitigate the many risks related to untreated mental health and substance use disorders. Thus, it is essential that treatment providers find ways to enhance treatment engagement. Client engagement with care providers may be improved through intermittent phone-based communication.

Access to an ever-expanding array of mobile devices makes text messaging a viable option for provider interventions. In 2013, nine out of 10 individuals were mobile phone owners and 86% of individuals with an annual income of \$30,000 or less were owners of a basic mobile phone (Gates, Stephens & Artiga, 2014). The average adult mobile phone owner sends or receives approximately 41.5 text messages per day, and 91% of text messages are read within the first three minutes of receipt (Gates et al., 2014; Smith, 2011). With the increasing prevalence of mobile phones and Internet access, mobile technologies create additional opportunities for service providers to make contact with clients (Davis, 2013). Thus, use of technology in behavioral health, recovery, and prevention programs is rapidly gaining acceptance.

Portability, frequent use, and low cost make mobile phones an attractive tool to enhance clients' participation in healthcare. Text messaging facilitates the sending of messages that encourage client engagement in treatment-related activities and allows for cost-effective and proactive delivery of messages to clients, anytime and anywhere (Haug, Kowatsch, Castro, Filler & Schaub, 2014; SAMHSA, 2015b). Research has highlighted a number of text messaging features that may influence improved communication between client and provider; these included (a) the client's sense of confidentiality, (b) intermittent communication, (c) simulation of supportive interactions, and (d) messaging that is personalized, or tailored, to the recipient (Sharp et al., 2015). Text messaging interventions have been found to significantly improve

attendance at medical appointments (Chen, Fang, Chen & Dai, 2008). Similarly, a study by Franklin and colleagues (2003) noted that one-sided text messages from provider to client led to improvements in treatment compliance. Technological advances continue to expand engagement options and provide new lines of communication with clients.

Text messaging is the next step in technology-based provider-client communication. Text messaging interventions include strategies similar to empirically supported phone-based care, promoting extended monitoring, early identification of warning signs, and relapse prevention (McKay, 2009). Messaging interventions are becoming an increasingly popular way to “nudge” behavior change in clients (Merz, Baptista & Haller, 2015). Texting can also be a particularly convenient method for continued care post-treatment. A multitude of studies have demonstrated that clients have different needs during different times within the change process (Herd & Borland, 2009). Text messaging provides a method to promote many small contact points over a longer period of time, allowing the provider to adapt to the client’s changing needs (McKay, 2009). Texting also allows providers to reach clients in their “natural environment and adapt to their needs in real time using just-in-time therapies,” (Muench, Weiss, Kuerbis & Morgenstern, 2013, p. 316). Therefore, text messages may be a particularly effective intervention for individuals experiencing mental health and substance use disorders.

The literature demonstrates that text messaging promotes improvements in client health. In a review of 36 articles where text messaging interventions were employed, four key ways text messaging enhances client care were revealed: (1) to provide messages of support (42%); (2) to provide assistance with self-monitoring (42%); (3) to provide information (17%); and (4) to provide treatment reminders (14%; Berrouguet et al., 2016). Throughout these studies, text messaging was found to improve monitoring of symptoms, increase satisfaction with health

services, increase session attendance, and enhance treatment adherence (Berrouiguet et al., 2016). Similarly, a 2012 study by Apayapong and colleagues found that participants who received supportive text messages twice a day and weekly “thank you” messages over a three-months period demonstrated a statistically significant improvement in Beck Depression Inventory (BDI) scores (Agyapong, Ahern, McLoughlin & Farren, 2012). Accessibility, low costs, timeliness, and demonstrated positive outcomes make supportive text messaging a viable opportunity in the treatment field.

Treatment session attendance is paramount to engaging individuals in their care and improve health outcomes. Research indicates a strong correlation between the amount of time an individual is engaged in treatment and positive post-treatment results (Zerger, 2002). Studies of treatment outcomes over extended periods of time demonstrate that most individuals who remain in treatment cease substance use, decrease criminal activity, and improve their overall functioning (NIDA, 2012). Similarly, regularly scheduled health care has been shown to decrease hospitalizations by up to 30% (Laine et al., 2001). The data suggest that providers prioritize client engagement in treatment to assure recovery, decreasing risk to client and community (Lambert, 2007). Health care interactions that take place on a more frequent basis improve client wellbeing as well as treatment outcomes.

Supportive providers promote positive treatment outcomes. The factor most highly correlated with treatment program completion is the level of support that an individual receives (Zerger, 2002). Numerous studies have demonstrated that clients with social support systems exhibit improved compliance with treatment, reduced relapse risk, and positive outcomes post-treatment (DeCivita, Dobkin & Robertson, 2000). Thus, clients that receive support to engage in treatment may see improved outcomes.

The emotional tone used in communication with clients has the capacity to impact care. Positive tone, such as a counselor's expression of optimism or hope, has been shown to cultivate stronger provider-client relationships and reduce client anxiety (Alpert, Morris, Thomson, Matin, Geyer & Brown, 2018). Similarly, perceived empathy and politeness of text have been found to create a more positive client experience and increase treatment adherence (Bickmore, 2007). Messaging that is benefit-oriented and directive has also been found to improve the receptiveness of message recipients (Muench, Van Stolk-Cooke, Morgenstern, Kuerbis & Markle, 2014; Van Stolk-Cooke, Hayes, Baumel & Muench, 2015). Therefore, text message tone may either help or hinder the client-provider relationship.

Client text messaging preferences should be considered by providers. In a 2014 study on messaging preferences, researchers found that text messages that were free of grammatical errors and *textese* (e.g., "How r u?") were preferred by receivers (Muench, Van Stolk-Cooke, Morgenstern, Kuerbis & Markle, 2014). Research on the use of text messaging in substance use disorder treatment has confirmed a client preference for benefit-driven text messages over consequence-driven messaging (Muench, Weiss, Kuerbis & Morgenstern, 2013). Clients have also expressed a preference for tailored messaging over standardized messages (Ellis, Connor & Marshall, 2014). The end user's experience of a text message is integral as the recipient's perception has the capacity to impact the persuasive power of the messages received.

While message tone and structure are important considerations, writer status and credibility also impact the experience of the text message recipient. The message writer's credibility has been shown to be positively related to a text's perceived persuasiveness (Murphy, 2001). Therefore, it may be assumed that if the client views their provider as trustworthy or

sincere, their text interventions may create greater impact. Behavioral outcomes of text message recipients may be shaped by the effective persuasiveness of provider messaging.

Overview of the General State of Scientific Knowledge in the Dissertation Topic Area

Language is the basis of most human processes. Despite this fact, a relatively small portion of social science research has been dedicated to linguistics as the study of text has historically been costly, slow, and labor-intensive (Chung & Pennabaker, 2007). Currently, computer-based methods allow for exploration of text in a matter of seconds permitting researchers to investigate tone, structure, and content of written text (Chung & Pennebaker).

Research is lacking in relation to the linguistic composition of text messages that are being utilized in mental health and substance use disorder treatment. With client consent, text messaging expands opportunities for interaction between provider and client, making communication of treatment-related information possible in real-time. Improved communication has the capacity to enhance client engagement and positively impact treatment outcomes.

This research has implications for practice. Findings may have relevance to health professionals and other entities engaged in the field of mental health and substance use disorder treatment. For example, insurance companies, healthcare facilities, medical treatment providers, psychiatrists, mental health therapists, and alcohol and other drug (AOD) counselors may find the results helpful to increase client engagement, enhance support, assure medication compliance, reduce relapse risk, and improve overall outcomes.

Description of the Research Manuscripts

Manuscript 1

Rationale for the first study. Providers are consistently seeking low-cost, high-impact ways to engage clients and improve care delivery. The goal of mental health treatment-related

text messaging is to increase client participation in care and improve treatment outcomes. Presently, there is no research that addresses the linguistic composition of mental health treatment-related text messages. This study will extend current knowledge and fill a gap in the existing literature.

Target journal for publication. *Psychiatric Services* is a peer-reviewed journal which is published monthly by the American Psychiatric Association (APA). Research published in *Psychiatric Services* focuses on behavioral health service delivery in both the public and private sectors. The journal emphasizes the importance of development, dissemination, and utilization of evidence-based interventions in practice. *Psychiatric Services* maintains a strong clinical focus while also providing coverage of legal, administrative, and policy issues. The journal gives priority to material that is applicable to everyday clinical and administrative practice or public policy development. The impact factor for *Psychiatric Services* is 2.888.

This journal has previously published research related to the use of text messaging in mental health treatment. Sims and colleagues (2012) explored the impact of text message intervention through four community health clinics in London, England. To determine if text messaging might lessen the number of missed mental health appointments, reminders were sent to patients in the experimental group via text message; patients in the control group received no text message appointment reminders. Clients that received reminder messages demonstrated a 25-28% reduction in missed appointments (Sims et al., 2012). The researchers concluded that text messaging is a “cost-, labor-, and time-efficient strategy” to encourage engagement (Sims et al., 2012, para. 4).

Research questions and methodology. This study sought to answer the following research questions:

- 1) In text messages utilized in mental health disorder treatment, what is the use rate of the linguistic categories known to be related to patient engagement and participation (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?
- 2) In text messages utilized in mental health treatment, does the use rate of linguistic categories known to be related to patient engagement and participation differ from national blog norms (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?

Design. This study utilized a synchronic corpus linguistic design (Weisser, 2016). The unit of analysis was single words (Bjekić, Lazarević, Živanović & Knežević, 2014). Variables explored were *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*.

An *a priori* power analysis for a χ^2 square test was conducted using G*Power 3.1 (Faul, Erdfelder, Buchner & Lang, 2009). The proper effect size is Cohen's w (Rosnow & Rosenthal, 2003). The effect size was used for a large mental health and addiction clinical trial (Powers et al., 2016). The following input parameters were employed: (a) test family = χ^2 tests, (b) statistical test = Goodness-of-fit tests: contingency tables, (c) type of analysis = *a priori*: compute required sample size given α , power, and effect size, (d), $w = 0.17$, (e) power (1- β error probability) = 0.8, (f) $\alpha = 0.05$, and (g) degrees of freedom = 1. The G*Power 3.1 output included a sample size of 272 and an actual power of 0.80.

Procedures. Text messages were collected from previously published articles related to treatment of mental health disorders. Text message data was entered into a Microsoft Word file corpus. Text cleaning followed the procedures set forth in the Linguistic Inquiry and Word

Count (LIWC) Operator's Manual and a supplement to this manual (Department of Psychological Services, 2015b; Pennebaker, Booth, Boyd & Francis, 2015). The Word document data set was converted to .txt file format then uploaded to LIWC software for analysis.

Manuscript 2

Rationale for the second study. Text messages are currently utilized in the treatment of substance use disorders to provide appointment reminders, encourage treatment compliance, enhance engagement in care, and reduce relapse risk. However, there is a lack of information available regarding the linguistic elements that are present within substance use treatment-related text messages. There is a need to further explore the composition of treatment-related text messages to better understand how persuasiveness of text may impact the provision of care.

Target journal for publication. *Health Informatics Journal* is a peer-reviewed journal which is published quarterly. This journal includes research that is determined to be relevant to healthcare informatics, including articles which focus on e-health, support for clinical decision-making, healthcare applications of mobile (mhealth) and pervasive digital technologies, applications of social media technologies and services, barriers and enablers to adoption, dependability of systems and services, innovations and future developments in healthcare technologies and applications, and evidence-based practice. The impact factor for this journal is 1.833.

Health Informatics Journal publishes literature similar to this research. A study by Gerber, Stolley, Thompson, Sharp, and Fitzgibbon (2009) sought to explore the impact of text message communication for African-American women engaged in a weight management program. Messages related to physical activity, healthy eating, and general encouragement were sent to participants three times each week. Study participants' demonstrated "generally positive

attitudes” related to messaging and only one participant out of 95 elected to cease involvement (Gerber et al., 2009, para. 1). The researchers concluded that text messaging is a means of communication that is largely accepted by recipients and a feasible method for promoting healthy behaviors (Gerber et al., 2009).

Research questions and methodology. This study sought to explore text messages utilized in substance use disorder treatment. The methodology, design, and procedures of this second study mirror that of Manuscript 1. The research questions were as follows:

- 1) In text messages utilized in substance use disorder treatment, what is the use rate of the linguistic categories known to be related to patient engagement and participation (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?
- 2) In text messages utilized in substance use disorder treatment, does the use rate of linguistic categories known to be related to patient engagement and participation differ from national blog norms (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?

Glossary of Specialized Terms

Corpus. The term *corpus* is Latin for *body*, meaning a “body of texts,” (Baker, 2010a). A corpus is a large collection of computerized text meant to function as a representative sample of a language variety (Baker, 2010b). The plural form of this term is *corpora*, though *corpuses* is also accepted (Baker, 2010b).

Corpus linguistics. Corpus linguistics is “the study of language based on examples of real life language use,” (McEnery & Wilson, 2001. p. 1). Corpus linguistics has become an increasingly popular mode of inquiry since the advent of personal computers as a corpus is not

necessarily valuable on its own without computerized methods with which to explore it (Baker, 2010b). Corpus linguistics make use of quantitative methodologies to look at similarities, or differences, between sets (Baker, 2010b). Corpus linguistics utilizes a collection of methods; researchers must determine which method is most applicable in addressing their specific research questions as well as which software to utilize (Baker, 2010b).

Linguistic Inquiry and Word Count (LIWC). Linguistic Inquiry and Word Count (LIWC) is a linguistic analysis software that has undergone several revisions, the most recent of which took place in 2015 (Pennebaker, Boyd, Jordan & Blackburn, 2015). The LIWC program can be utilized to review and analyze many kinds of written text; the program returns results on 90 output variables (i.e., LIWC categories). Internal reliability and external validity of LIWC are well documented (Pennebaker et al., 2015).

Mental health. Mental health disorders involve changes in thinking, mood, and/or behavior which may impact how an individual relates to others and makes choices (SAMHSA, 2017). According to the Substance Abuse and Mental Health Services Administration's National Survey on Drug Use and Health ([NSDUH], 2014), an estimated 43.6 million Americans aged 18 and up experience some form of mental health disorder (Hedden, 2015). Mental health diagnoses, prevalence, and symptomology are documented in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition ([DSM-5], American Psychiatric Association, 2013).

SMS message. Short Message Service (SMS) between mobile devices is commonly referred to as *text messaging*. This communication method provides timely, cost-effective delivery of messages anytime and anywhere between mobile devices (Haug, Kowatsch, Castro, Filler & Schaub, 2014).

Substance use disorder. Substance use disorders occur when the recurrent use of alcohol and/or drugs causes clinically significant impairment to the individual's functioning (SAMHSA, 2017). According to the Substance Abuse and Mental Health Services Administration's 2014 National Survey on Drug Use and Health (NSDUH), an estimated 20.2 million American adults have a substance use disorder (Hedden, 2015). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) classifies substance use disorders as mild, moderate, or severe determined by the number of diagnostic criteria met by an individual (American Psychiatric Association, 2013). Of eleven criteria, the presence of two to three demonstrate a mild disorder, four to five criteria demonstrate a moderate disorder, and six or more criteria demonstrate a severe substance use disorder (American Psychiatric Association, 2013).

Thematic Linkage of Manuscripts

The first and second manuscripts link thematically through research design, methods, and data analysis. They differ in the diagnostic needs of the text message recipients for each study. The first manuscript examines text message interventions utilized in mental health treatment, while the second study explores text messages utilized in the treatment of substance use disorders. Together, they aim to fill gaps in research by exploring the linguistic themes of text messages currently being utilized by treatment providers.

A replication of the current study, (i.e., same research questions, linguistic variables, design, methods, and data analysis) could explore text messaging interventions in medical care. A comparison between text messages utilized in the treatment of various health needs (i.e., medical treatment, mental health treatment, and substance use disorder treatment) may identify similarities, differences, or best practices in provider-client messaging.

Additional research may include a focus on the linguistic make up of one-to-one (provider-client) messages, as the results may prove useful to current treatment providers. Similarly, an exploration of the linguistic composition of client text messages (to their providers) may provide interesting results and prepare providers for the use of two-sided messaging, if applicable. Acknowledging the impact of provider messaging on the client's treatment experience and post-treatment outcomes, additional treatment-related documentation may be reviewed to explore persuasiveness of written text.

Organization of Dissertation

This dissertation is organized into four chapters. Chapter One presents an overview of the two studies and the goals of this research. Chapters Two and Three each stand alone as manuscripts for journal submission. Chapter Two includes its own literature review, methods, data analysis, and results section, and focuses on text messages utilized in the treatment of mental health diagnoses. Chapter Three also includes a literature review, methods, data analysis, and results section, while focusing on text message interventions utilized in substance use disorder treatment. Though the two studies utilize similar research questions, variables, methods and data analyses, each article strives to provide pertinent information for the readers of that journal. The final chapter summarizes the combined results and concludes the dissertation.

Chapter 2: A Research Manuscript

Text Messaging as a Mental Health Treatment Intervention

Megan A. Partch and Cass Dykeman

Oregon State University

Author's Note

Megan A. Partch, Counseling Academic Unit, Oregon State University; Cass Dykeman, Counseling Academic Unit, Oregon State University.

The research contained in this manuscript was conducted under the approval of the Oregon State University Institutional Review Board (Study ID No. 8489) and was part of the first author's dissertation research project.

Correspondence concerning this article should be addressed to Megan A. Partch, Counseling Academic Unit, Oregon State University, 104 Furman Hall, Corvallis, OR 97331-3502. E-mail: partchm@oregonstate.edu

Abstract

Mental health treatment providers seek high-impact and low-cost means of engaging clients in care. As such, text messaging is becoming more frequently utilized as a means of communication between provider and client. Research demonstrates that text message interventions increase treatment session attendance, decrease symptomology, and improve overall functioning. However, research is lacking related to the linguistic make up of provider communications. Text messages were collected from previously published articles related to the treatment of mental health disorders. A corpus of 39 mental health treatment text message interventions was composed totaling 286 words. Using Linguistic Inquiry and Word Count (LIWC) software, messages were analyzed for prevalence of terminology thought to enhance client engagement. Clout, demonstrating the writer's confidence and expertise, and positive Emotional Tone were found to be at a high level within the corpus. Results demonstrated statistical significance for five linguistic variables. When compared with national blog norms derived from Twitter, Clout, Emotional Tone, and use of Biological terminology were found to be at higher rates than expected. Authenticity and Informal terminology were found at significantly lesser rates.

Keywords: client, engagement, corpus linguistics, intervention, mental health, text messaging, treatment, LIWC

Text Messaging as a Mental Health Treatment Intervention

How many times will you check your phone while you read this article? Mobile phone technology has quickly become a major part of our lives. Text messaging, once reserved as a means of communication between friends and family, is extending into the world of provider-client relationships. What message content is being utilized to establish stronger connections with clients? What can providers do to better engage individuals with mental health diagnoses in their treatment? These questions are the focus of this study.

According to the Substance Abuse and Mental Health Services Administration (SAMHSA), one in five adults in the United States has a mental health diagnosis and one in 25 lives with a serious mental illness (SAMSHA, 2014, 2018). It is estimated that around 7.7 million Americans have co-occurring mental health and substance use disorder diagnoses (SAMHSA, 2014). Despite these startling statistics, less than half of the individuals experiencing mental health distress seek mental health services (SAMHSA, 2018). Treatment is needed to mitigate the many risks to client, family, and community that arise when mental health disorders remain untreated. Therefore, it is essential that health providers find unique ways to enhance engagement and motivation for treatment with both current and potential clients.

In a review of the literature on technology-based interventions in mental health treatment, four key points emerge. These four points are: (1) the importance of client treatment engagement, (2) access to mobile technology, (3) how text messaging is utilized in treatment, and (4) the psycholinguistics of persuasion. After the literature related to these points is detailed, the research questions will be presented.

Session attendance is paramount to engage individuals in their care and improve health outcomes. In the research on treatment attendance, a large subset of the literature focuses on

increased treatment dosage and subsequent impact on outcomes. Researchers have long sought to understand the dose-response effect of psychotherapy (Hansen & Lambert, 2003). A study by Orlinsky, Grawe and Parks (1994) reviewed 156 articles on treatment dosage and client outcomes published between 1950 and 1992. This comprehensive review found that the vast majority of the literature showed a positive relationship between the amount of time a client engaged in treatment and their treatment outcomes; only six of the studies demonstrated a negative relationship between these two variables (Orlinsky, Grawe & Parks, 1994). Since this review, additional studies on the treatment of various disorders have demonstrated a positive relationship between the number of sessions a client attends and the effects of treatment (Bowen, South, Fischer & Looman, 1994; Taft, Murphy, Elliott & Morrel, 2001; Zenger, 2002). Conversely, researchers have found that lower levels of client engagement (i.e., attend fewer sessions, complete less treatment-related homework, or have higher attrition rates) can negatively impact treatment outcomes (Glenn et al., 2013). Thus, it is essential that mental health providers increase client engagement to improve treatment results.

The benefits of treatment are enhanced, and risk levels are decreased as the number of sessions increases. Research has revealed that regularly scheduled care may decrease hospitalizations by up to 30% (Laine, Hauck, Gourevitch, Rothman, Cohen & Turner, 2001). Studies of treatment outcomes over extended periods of time demonstrate that most individuals who remain in treatment cease substance use, decrease criminal activity, and improve overall functioning, decreasing risk to themselves, their families, and communities (NIDA, 2012). The factor most highly correlated with treatment program completion is the level of support an individual receives (Zenger, 2002). Therefore, it is essential that providers find ways to support

client engagement in treatment to promote better outcomes. This is especially critical as there is a demonstrated relationship between session attendance and health improvement.

Psychotherapy researchers have noticed a strong relationship between treatment dosage and outcomes, specifically the benefits of treatment are enhanced as the number of sessions increases. In a review of prior research on psychotherapy outcomes, an analysis demonstrated that 75% of clients reach recovery criteria between session 25 to 45 with additional sessions benefitting those individuals who are at higher risk for personal failures, self-harm behaviors, and hospitalizations (Lambert, 2007). This data suggests providers prioritize client engagement in treatment to assure recovery (Lambert, 2007). The current literature demonstrates that while each client's unique needs will influence treatment duration, the longer a client is engaged in outpatient care the better the individual will fare post-treatment. While treatment attendance has a positive effect on post-treatment outcomes, the question remains regarding how to assure session attendance and extend client engagement in care.

With the prevalence of cell phones and Internet access on the rise, mobile technologies create additional opportunities for providers to make contact with clients (Davis, 2013). Nine out of 10 individuals own a mobile phone and the typical adult mobile phone owner sends, or receives, an average of 41.5 text messages each day (Gates, Stephens & Artiga, 2014; Smith, 2011). Timeliness of text messaging is similarly prevalent with 91% of texts read within the first three minutes of receipt (Gates et al., 2014). Access to an ever-expanding array of mobile devices makes text messaging a viable communication option for providers and clients.

Client socio-economic status is unlikely to impact mobile phone ownership or use. A 2014 study demonstrated that 86% of individuals with an annual income of \$30,000 or less owned a basic mobile phone (Gates, Stephens & Artiga, 2014). Recent studies show that

Medicaid beneficiaries demonstrate high use of technology and are more likely to use text messaging than their privately insured peers (Davis, 2013). Widespread access and frequent use make the utilization of mobile technology interventions an attractive option for health care providers.

The use of technology in behavioral health care has been rapidly gaining acceptance. The literature demonstrates that mobile phone technology has an especially high potential for affecting healthcare delivery (SAMHSA, 2015b). Text messaging is commonly used to encourage client engagement in treatment-related activities with a number of positive results (SAMHSA, 2015b). In fact, one-sided text messages from providers have been shown to significantly improve client attendance at medical appointments and treatment compliance (Chen, Fang, Chen & Dai, 2008; Franklin, Waller, Pagliari & Greene, 2003). Messaging interventions are also becoming an increasingly popular way for providers to “nudge” client behavior change (Merz, Baptista & Haller, 2015). In a 2012 study, participants that received supportive text messages twice a day and weekly “thank you” messages for three months demonstrated a statistically significant improvement in Beck Depression Inventory (BDI) scores (Agyapong, Ahern, McLoughlin & Farren, 2012). This study concluded that supportive text messages demonstrate the potential to improve client treatment outcomes (Agyapong et al., 2012). Thus, mobile phone technology may be a tool to promote care engagement and improve treatment outcomes.

Text messaging allows for increased communication. Research has noted a number of text messaging features that may influence improved communication between clients and their providers, including: (a) the client’s sense of confidentiality, (b) intermittent communication, (c) simulation of supportive interactions, and (d) messaging that is personalized or tailored to the

recipient (Sharp et al., 2015). This is paramount as the factor most highly correlated with treatment completion is the level of support a client receives (Zerger, 2002). Therefore, increased communications may expand the client's perceived support network and improve treatment compliance.

As it is high impact and low cost, supportive text messaging is a viable opportunity in the treatment field. Berrouiguet and colleagues (2016) explored 36 articles where mobile messages were used by providers as a treatment intervention; four key ways text messaging is utilized to impact client care were revealed. Messages were used to provide assistance with self-monitoring (42%), communicate supportive statements (42%), share information (17%), and provide treatment reminders (14%; Berrouiguet et al., 2016). Throughout these studies, text messaging was found to increase session attendance, improve monitoring of symptoms, enhance treatment adherence, and increase client satisfaction with health services (Berrouiguet et al., 2016). However, questions remain related to text message composition and what elements within a provider's written messages influence client behavior.

Language is the basis of most human processes. Despite this fact, a relatively small portion of research is dedicated to linguistics (Chung & Pennabaker, 2007). Historically, the study of text was costly and tedious; however, computer-based methods now permit investigation of large amounts of text in a matter of seconds (Chung & Pennabaker). New software has increased researchers' abilities to explore tone, structure, and content of written messages.

The emotional tone used in communications with clients has the capacity to impact care. Positive tone, such as an expression of optimism or hope, has been shown to cultivate stronger provider-client relationships and reduce client anxiety (Alpert, Morris, Thomson, Matin, Geyer

& Brown, 2018). Perceived empathy and politeness have also been found to increase adherence and create a more positive client experience (Bickmore, 2007). Written messages that are courteous, benefit-oriented, and directive have been shown to improve recipient receptivity (Van Stolk-Cooke, Hayes, Baumel & Muench, 2015; Muench, Van Stolk-Cooke, Morgenstern, Kuerbis & Markle, 2014). Similarly, research on the client's experience of text message interventions has confirmed recipients prefer benefit-driven texts over consequence-driven messaging (Muench, Weiss, Kuerbis & Morgenstern, 2013). Therefore, a message's overall tone may help or hinder the client-provider relationship. While emotional tone is an important variable to consider, so is the general persuasiveness of the provider's message.

Persuasiveness of text may be an essential component of treatment-related text messaging. Writer credibility has been shown to be positively linked to a text message's perceived persuasiveness (Murphy, 2001). Thus, text messages that spur client behavior change are likely shaped by providers that are perceived as credible. In the study of linguistics, several measures point to writer integrity and status. Use of "clout" words in written messages suggests the writer is "speaking confidently and with expertise," while increased "authenticity" levels demonstrate writing that is honest as well as personal in nature (Cohn, Mehl & Pennebaker, 2004; Sell & Farreras, 2015, p. 110). It is assumed that provider-client messages will exhibit both clout and authenticity. When these two elements are combined, it demonstrates that the writer has both knowledge and authority (Hannon, 2015). These linguistic elements are essential as they shape the client's view of their provider and influence the persuasive power of received messages.

The goal of healthcare-related text messaging is to increase client participation. In a study on Twitter engagement, a writer's increased use of "friend, informal, leisure, and power

words” was shown to positively impact the number of likes, retweets and comments (Leek, Houghton & Canning, 2017, p. 9). This study also noted that “biological” words are more likely to be found in written communications related to healthcare (Leek, Houghton & Canning, 2017). For the reasons noted above, it is assumed that text messages from providers to client may demonstrate frequent use of these linguistic categories.

A written message’s demonstration of provider positivity, genuineness, and expertise, combined with use of pertinent key words, has the power to drive client engagement. Thus, the exploration of text messages that are currently used in the treatment of mental health disorders is essential. With the review of the psycholinguistics of persuasion complete, the research questions can be detailed.

Given the aforementioned needs and gaps in the literature, two specific research questions were formulated to guide this study. These research questions were:

- 1) In text messages utilized in mental health disorder treatment, what is the use rate of the linguistic categories known to be related to patient engagement and participation (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?
- 2) In text messages utilized in mental health treatment, does the use rate of linguistic categories known to be related to patient engagement and participation differ from national blog norms (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?

Method

Design

This study utilized a synchronic corpus linguistic design (Weisser, 2016). The unit of analysis was single words (Bjekić, Lazarević, Živanović & Knežević, 2014). Variables explored were *Authenticity*, *Clout*, *Emotional Tone*, *Biological*, *Friend*, *Informal*, *Leisure*, and *Power*.

An *a priori* power analysis for a χ^2 square test was conducted using G*Power 3.1 (Faul, Erdfelder, Buchner & Lang, 2009). The proper effect size is Cohen's w (Rosnow & Rosenthal, 2003). The effect size was same used for a large mental health and addiction clinical trial (Powers et al., 2016). The following input parameters were employed: (a) test family = χ^2 tests, (b) statistical test = Goodness-of-fit tests: contingency tables, (c) type of analysis = A priori: Compute required sample size given α , power, and effect size, (d), $w = 0.17$, (e) power (1- β error probability) = 0.8, (f) $\alpha = .05$, and (g) degrees of freedom = 1. The G*Power 3.1 output included a sample size of 272 and an actual power of 0.80.

Corpus

Text messages were collected from previously published articles related to the treatment of mental health disorders. A total of 39 text messages were collected and reviewed (Agyapong, Ahern, McLoughlin & Farren, 2012; Kauppi et al., 2015). The average word count per text message was 7.55 in a range from 3 to 27. The total word count for the text message corpus was 286 words, providing sufficient material to analyze.

Corpus construction. Text message data was entered into a Microsoft Word file. Text cleaning followed the procedures set forth in the LIWC Operator's Manual and a supplement to this manual (Department of Psychological Services, 2015b; Pennebaker et al., 2015). A period was added to the end of all text messages that were without punctuation. *Textese* was translated into standard US English spelling (e.g., conversion of "R U" to "are you."). The Microsoft Word document corpus was converted to .txt file format and run through LIWC software for analysis.

Measures

Overview. The measures used were selected scales from Linguistic Inquiry and Word Count 2015 (LIWC2015) software. Pennebaker, Boyd, Jordan, and Blackburn (2015) report adequate reliability and validity for these LIWC scales. The reference norms used to compare against the present results were Twitter blog norms contained in the LIWC Manual (Pennebaker et al., 2015).

LIWC summary variables are reported as a standardized score that can range from 0 (i.e., very low levels) to 100 (i.e., very high levels) with 50 being the mid-point. In this study, three summary variables were explored: Authenticity, Clout, and Emotional Tone. Summary variable scoring is based on the area under a normal curve. The scores for LIWC linguistic categories are reported as a percentage of all terms found in the corpus. Five linguistic variables were explored: Biological, Friend, Informal, Leisure and Power.

LIWC-Authenticity. Authenticity is one of four summary variables available in LIWC2015 (Pennebaker et al., 2015). Authenticity scores suggest the author is speaking honestly or has personal knowledge of a subject (Hannon, 2015). Based on the area under a normal curve, summary variable scores range from zero (i.e., very low) to 100 (i.e., very high).

LIWC-Clout. Clout is one of four summary variables available in LIWC2015 (Pennebaker et al., 2015). Clout words suggest the author is speaking confidently and with expertise (Sell & Farreras, 2017). Clout results are reported as standardized scores converted to percentile; scores range from zero (i.e., very low) to 100 (i.e., very high).

LIWC-Emotional Tone. Emotional Tone is one of four summary variables available in LIWC2015 (Pennebaker et al., 2015). While Positive and Negative Tone can be assessed by LIWC individually, there is also the capacity to combine both dimensions into a single summary

variable, Emotional Tone (Cohn, Mehl & Pennebaker, 2004). Scores range from zero to 100 with low scores demonstrating negativity and high scores demonstrating more positive or upbeat communication.

LIWC-Biological. This category contains 748 words. Examples of this category include the following words: *eat, blood, pain*. The corrected internal consistency was $\alpha = .71$ (Pennebaker et al., 2015).

LIWC-Friend. This category contains 95 words. Examples of this category include the following words: *buddy* and *neighbor*. The corrected internal consistency was $\alpha = .60$ (Pennebaker et al., 2015).

LIWC-Informal. This category contains 380 words. Examples include the following categories: *swear words, netspeak*, and filler words. The corrected internal consistency was $\alpha = .84$ (Pennebaker et al., 2015).

LIWC-Leisure. This category contains 296 words. Examples leisure terminology include the following: *cook, chat, and movie*. The corrected internal consistency was $\alpha = .86$ (Pennebaker et al., 2015).

LIWC-Power. This category contains 518 words. Examples of this category include the following words: *superior* and *bully*. The corrected internal consistency was $\alpha = .76$ (Pennebaker et al., 2015).

Apparatus

The software used to analyze the corpus assembled for this study was Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, Boyd & Francis, 2015). LIWC was developed in the 1990s and has undergone several revisions, the most recent of which took place in 2015

(Pennebaker, Boyd, Jordan & Blackburn, 2015). This software can be utilized to review and analyze many kinds of written text.

LIWC software has the capacity to analyze four summary variables, which are Analytical Thinking, Clout, Authenticity and Emotional Tone. Three of these variables were explored in this study. Summary variable scoring is converted to percentile based on standardized scores from large comparison samples. Based on the area under a normal curve, scores range from zero (i.e., very low) to 100 (i.e., very high).

Additionally, LIWC returns results on 90 output variables (i.e., LIWC categories). LICW category scores represent the percentage of total words used in the sample and it is possible for words to be part of more than one category. Internal reliability and external validity of LIWC are well documented (Pennebaker, Boyd et al., 2015).

Data Analysis

The mental health text message corpus was analyzed with LIWC2015 software (Pennebaker, Boyd, Jordan & Blackburn, 2015). For the first research question, the percentage of words found in the corpus will be reported. For LIWC summary variables, the rate reported was a standardized score that has been converted to percentile ranging from 0 to 100 (Voogt, 2017). For the linguistic categories that were LIWC standard variables, the rate reported was the percentage of all words counted (Pennebaker et al., 2015). In addition, the raw word count for each category will be calculated. For the second research question, the following will be reported for all categories: (a) log likelihood statistic of the comparison of the text message corpus to general blog norms, and (b) effect size.

Log-likelihood analysis requires raw scores. These were obtained by multiplying the percentage of all words times the size of the corpus. Cressie and Read's (1989) log-likelihood

formula was used (as cited in Rayson & Garside, 2010). Bayes Factor (BIC) was used to measure effect size. BIC values quantify the degree of evidence against the null hypothesis with scoring as follows: BIC values from zero to two do not warrant more than a bare mention, values from two to six demonstrate “positive” evidence against the null hypothesis, scores from six to 10 demonstrate “strong” evidence for the alternative hypothesis, and BIC values > 10 indicate “very strong” evidence for the alternative hypothesis (Wilson, 2013).

In this study, the hypothesis was tested eight times (i.e., once for each linguistic variable). Testing multiple hypotheses may inflate the false discovery rate, increasing the chance of incorrectly rejecting the null hypothesis with each additional test performed. When a test involves multiple hypotheses, the Bonferroni correction is recommended as method for adjustment (Aikin & Gensler, 1996). The Bonferroni correction sets a “family-wise” error rate, α , judging individual tests against a more conservative significance level (α/m , where m is the number of hypothesis tests in a “family”). The family-wise error rate was set at $\alpha = 0.05$; the adjusted level of significance for individual tests was $0.05/8 = 0.00625$. To maintain the Type I error bound of α (0.05) on all tests concurrently, the corresponding P value is compared with α/m (0.00625; Aikin & Gensler, 1996). Analyses were completed using Microsoft Excel.

Results

In reference to the first research question, mental health text messages demonstrated high levels of Clout and positive Emotional Tone while Authenticity was found to be low. Specific results can be viewed in Table 1. The frequency of word use for the linguistic categories explored were as follows: Biological (8.0%), Power (4.2%), Leisure (1.8%), Informal (0.7%), and Friend (0.4%). Results can be viewed in Table 2.

For the second research question, the mental health corpus was compared against national blog norms. Results for linguistic summary variables Clout, Emotional Tone, and Authenticity yielded statistically significant results. Log-likelihood and significance levels for Clout, Emotional Tone, and Authenticity can be found in Table 1. The frequency of Biological and Informal term use in mental health text messages were found to be statistically significant. Log-likelihood and significance levels for the linguistic categories can be found in Table 2.

Discussion

This study sought to explore word usage of text messages utilized in the treatment of mental health disorders. The first research question was related to the usage rate of words in linguistic categories that are believed to be directly related to client engagement and participation. Linguistic Inquiry and Word Count (LIWC) software was used to analyze the linguistic properties of the mental health text message corpus (Pennebaker, Booth, Boyd, & Francis, 2015). The results have implications for the ways mental health providers elect to engage clients with treatment-related text messages. Key findings will be discussed.

Mental health text messages demonstrated very high levels of Clout (99.0%), indicating the writer's leadership, confidence, and expertise. There are two probable reasons for these results. One possible reason is that treatment providers see themselves as leaders, or guides, for their clients and as such may take on a more authoritative role in their communications. An alternative explanation is that after years of education and practice, providers are likely to speak with confidence in their area(s) of proficiency. Specifically, mental health providers' interactions with clients are likely to draw upon their treatment expertise. Between the former and the latter explanations, the latter is most probable because providers are likely to see

themselves as experts of mental health care in relation to their clients who are seeking support with knowledge and skills that are beneficial to their clients.

Emotional Tone scores range from zero (i.e., negative communication style) to 100 (i.e., positive and upbeat). The analysis of mental health text messages demonstrated high levels of positivity (99.0%). There are several likely reasons why the results demonstrated a positive emotional tone. First, many could argue that positive tone is indicative of good customer service. Second, there is a great deal of literature that demonstrates a provider's positive tone achieves positive results. Use of positive emotional tone is an efficacious provider practice, shown to reduce client anxiety, improve the client experience, increase client responsiveness, and improve treatment adherence (Alpert, Morris, Thomson, Matin, Geyer & Brown, 2018; Bickmore, 2007; Muench, Van Stolk-Cooke, Morgenstern, Kuerbis & Markle, 2014; Van Stolk-Cooke, Hayes, Baumel & Muench, 2015). While the aim of treatment-related text messages is to motivate and engage clients, the provider's positive tone via text message is crucial to preserve the possible impact of this intervention. Conversely, one may assume that messages demonstrating negative tone would be less likely to motivate or encourage client treatment participation. A third alternative explanation is that providers are trained in their degree programs or respective workplaces to employ a positive and non-judgmental stance in all client-facing interactions. Thus, all treatment-related communication, regardless of modality, would demonstrate a positive tone. Regardless of cause, positive tone is a wise choice for all mental health providers as it has been shown to promote stronger provider-client relationships (Alpert, Morris, Thomson, Matin, Geyer & Brown, 2018).

The second research question explored differences between the mental health text message corpus and national norms. From this comparison, it was determined that the scores for

linguistic summary variables Clout, Emotional Tone and Authenticity were statistically significant. Frequency of word usage in Biological and Informal linguistic categories was also found to be of statistical significance. Interestingly, while treatment-related text messages demonstrated high levels of Clout, positive Emotional Tone, and a higher use rate of Biological words, writer Authenticity and Informal word usage were significantly lower than expected. The possible explanations of such results are discussed below.

As referenced above in relation to the first research question, there are several probable reasons why such high levels of Clout and positive Emotional Tone were demonstrated within the mental health treatment text messages, even exceeding those of national norms. Similarly, the frequency of Biological word use within mental health text messages was higher than expected. This corresponds with Leek and colleagues' (2017) research, which noted written communications related to healthcare are more likely to utilize Biological terminology. The most likely cause for the higher frequency of Biological word use is the nature of the relationship between mental health provider and client. The communication between the two exists as a means to improve the client's health. Thus, text message content is likely to emphasize the importance of caring for their body and understanding biological processes; therefore, promoting a higher frequency of Biological word usage than general communications.

The mental health text message corpus demonstrated Authenticity rates that were lower than expected compared to national norms. Authenticity scores are meant to detect writing that is both honest and personal in nature (Cohn, Mehl & Pennebaker, 2004). Low results in this linguistic area could be problematic, as writer credibility has been shown to be positively linked with message persuasiveness (Murphy, 2001). One possible reason for this discrepancy is that while providers are likely to be honest in their communications with clients, they are less likely

to be personal due to the boundary expectations of therapeutic professions. The alternative explanation points to the kind of text messages retrieved for this study. Messages gathered from previously published research were used broadly with a large number of recipients, which would decrease their personal quality. Thus, this corpus may not accurately reflect the more personal nature of communication that could possibly be derived from one-to-one (provider-client) text messaging. Of these two possible explanations, the latter is most likely the case.

Frequency of Informal terminology was lower in mental health text messages than the national norms. Informal terminology use rates are indicative of the presence of swear words, netspeak, and other filler words (Pennebaker et al., 2015). While research on Twitter usage has recognized the Informal linguistic category as a possible driver for increased engagement, it is unlikely a mental health provider would send client-facing communication with frequent use of these words (Leek, Houghton & Canning, 2017). Therapeutic boundaries, keeping text messages short and to the point, and message content centered on mental health care are all probable reasons why frequency of Informal word use was below national norms.

The following may be presumed related to text messages used in the treatment of mental health disorders. Messages (1) exhibit provider expertise, (2) demonstrate positive tone, (3) reveal a less honest or personal communication style, (4) are primarily focused on health, and (5) infrequently utilize informal terminology.

Limitations

While many studies reference the use of text messaging as an intervention in mental health treatment, very few researchers have shared the messages that were utilized, thus limiting the quantity of text messages that could be analyzed in this study. In a review of current

research, only three previously published studies were identified which shared sets of text messages used in the treatment of mental health disorders.

There is the potential that additional studies and messages may have been of use; however, this particular study analyzed English words solely. Messages that referenced websites and phone numbers or relied on client “Yes/No” answers to promote communication were not selected. Similarly, the messages analyzed in this study were created for use with diverse groups of recipients, thus nuances of one-to-one, provider-client, communication could not be examined. Due to the above noted limitations, the results from these studies are not generalizable.

Implications

Text messages from providers are low-cost, high-impact, and timely interventions that have the capacity to influence client engagement, adherence, and positive treatment outcomes. This study sought to shed light on the linguistic composition of provider messaging. Specifically, this research aimed to explore whether mental health treatment text messages demonstrate word use in linguistic categories believed to be aligned with client engagement and participation. This is the first study to examine the linguistic make up of mental health treatment-related text messages. The results of this study have implications for both research and practice.

Findings may impact how mental health treatment providers view the use of mobile interventions, including (1) whether providers choose to implement text message communication with clients, (2) the goal, or purpose, of provider-client text messaging, (3) message content or focus, (4) tone communicated within text messages, or (5) the use of tailored messaging versus messages written for use with all clients. It is possible that these findings may also have

relevance to other health professionals that support clients with mental health diagnoses, including psychiatrists, medical providers, or alcohol and other drug (AOD) counselors. Similarly, insurance companies and treatment providers may find the results helpful in the evaluation of their mobile efforts to enhance engagement, improve care, and encourage treatment compliance.

As this study explored previously published text messages that were used with large groups of recipients, additional research focusing on individual, provider-client messaging is needed. Similarly, research on text messages from clients to their providers (in instances of two-way mobile communications) would be of interest to determine linguistic tendencies of client written messages. Future research may also focus on text messages used in the treatment of substance use disorders, or those utilized in medical care, to explore similarities, differences, or determine best practices in provider text message interventions.

In light of the vast array of literature demonstrating the efficacy of text messaging in treatment, providers are encouraged to consider use of this medium to improve care delivery. With any therapeutic intervention, providers must be mindful of possible relational, ethical, or legal implications. It is essential that mental health providers understand all client-facing communications are considered a part of the client record and thus, must be protected in accordance with state and federal privacy and confidentiality laws. Providers who are considering use of text messaging with clients are encouraged to explore possible areas of liability through additional training.

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Table 1

LIWC Summary Variable Results

	MH	Twitter	LL	BIC
Clout	99	63	33.15**	Very Strong
Emotional Tone	99	72	17.12**	Very Strong
Authenticity	34	50	12.44**	Positive

* $p < 0.05$ ** $p < 0.00625$

Table 2

LIWC Linguistic Category Results

	WC	MH	Twitter	LL	BIC
Biological	23	8.0	2.6	12.56**	Positive
Informal	2	0.7	4.7	11.94**	Positive
Friend	1	0.4	0.4	0.03**	-
Leisure	5	1.8	2.1	0.13**	-
Power	12	4.2	2.2	2.75**	-

* $p < 0.05$ ** $p < 0.00625$

Chapter 3: A Research Manuscript

Text Message Interventions in Substance Use Disorder Treatment

Megan A. Partch and Cass Dykeman

Oregon State University

Author's Note

Megan A. Partch, Counseling Academic Unit, Oregon State University; Cass Dykeman, Counseling Academic Unit, Oregon State University.

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Correspondence concerning this article should be addressed to Megan A. Partch, Counseling Academic Unit, Oregon State University, 104 Furman Hall, Corvallis, OR 97331-3502. E-mail: partchm@oregonstate.edu

Abstract

Technology is being leveraged in numerous ways to improve client care. Health-related text messages aim to engage clients, assure treatment session attendance, and promote healthy habits. Research on the use of text messages in substance use disorder treatment demonstrates the efficacy of this intervention; however, research is lacking related to the linguistic composition of provider text messages. Text messages interventions were collected from previously published research on the treatment of substance use disorders. A corpus of 71 text messages was composed totaling 1,624 words. Using Linguistic Inquiry and Word Count software (LIWC), the corpora of text messages was examined for use of terminology thought to enhance client engagement. Results demonstrated statistical significance of six LIWC measures when compared against national blog norms (i.e., Twitter). Clout, a score that demonstrates writer expertise and confidence was higher than expected when compared to national norms, while Authenticity, writing that is both honest and personal in nature, was found to be significantly lower than expected. The Emotional Tone of text message communications from substance use disorder treatment providers was found to be neutral. The use of Biological terms and Leisure words were found to be more prevalent in substance use disorder treatment text messages than national norms. Informal terminology, however, was used at a lesser rate than expected.

Keywords: client, engagement, corpus linguistics, intervention, mental health, text messaging, treatment, LIWC

Text Message Interventions in Substance Use Disorder Treatment

When was the last time your counselor asked, “How R U?” Technological advances have changed the ways we correspond with our health care providers. Mobile messaging is quickly becoming a preferred means of relationship-building and communication between counselor and client.

Texts are currently utilized to remind clients about upcoming appointments, medication compliance, and also to enhance engagement in care. However, there is a lack of information available regarding the linguistic composition of substance use treatment-related text messages. There is a need to further explore how new smartphone technologies are impacting the provision of care.

In a review of the literature on the use of text messages in substance use disorder treatment, five themes emerged. The themes are: (1) frequency of substance use disorders, (2) prevalence of smartphone use, (3) the use of text messages in healthcare, (4) the importance of treatment engagement and compliance, and (5) what is currently known about persuasive communication in substance use disorder treatment. After the literature about these points is detailed, the research questions will be presented.

The pervasiveness of substance use disorders in the United States is striking. According to the 2013 National Survey on Drug Use and Health, one in 12 American adults has a substance use disorder, which is an estimated 20.2 million individuals (SAMHSA, 2014). Each month, one in four American adults will engage in binge drinking behavior (59.4 million) and one in ten will use illicit substances (24.6 million; SAMHSA, 2014). Of an estimated 22.5 million Americans ages 12 and older who need substance use disorder treatment annually, only 10% will engage in treatment services (Center for Behavioral Health Statistics and Quality, 2015). Treatment is

needed to mitigate the many risks that negatively impact clients, families, and communities when substance use disorders remain untreated. It is essential that treatment providers find ways to enhance client treatment engagement and participation in needed care.

Mobile technology may be one way that providers can increase client engagement in substance use disorder services. Over 95% of phones have text messaging capacity, making texting a quick and cost-effective manner of communication (Muench, Weiss, Kuerbis & Morgenstern, 2013). With the average adult mobile phone user sending and receiving around 42 text messages per day and 91% of these messages being read within the first three minutes of receipt, messaging is likely to be a communication method that is utilized in both the counselor and client's lives (Gates et al., 2014; Smith, 2011). Client access to mobile phones and their frequent usage make these devices an ideal option to open lines of communication between clients and healthcare providers.

Socio-economic status (SES) has little impact on mobile phone access and usage. In 2013, 86% of individuals with an annual income of \$30,000 or less, owned a basic mobile phone (Gates, Stephens & Artiga, 2014). Additionally, while home Internet usage varies between high- and low-income households, there is no such discrepancy in mobile phone usage (Pew, 2010). In fact, it is quite the opposite. Research demonstrates that Medicaid beneficiaries were 79% more likely to use text messaging than individuals who were privately insured (Davis, 2013). Text message interventions reach low-income groups, possibly minimizing risks related to inequitable access to care (Sharpe et al., 2015). With increased rates of accessibility and use, mobile technology is an ideal vehicle for client outreach and engagement regardless of SES.

The literature demonstrates text messaging is being utilized currently in treatment across a wide variety of health issues. Since 2006, the interest in utilizing text communication in client

care has grown as mobile phone messaging allows for proactive delivery of messages, anytime and anywhere (Berrouiguet, Baca-Garcia, Brandt, Walter, Courtet & 2016; Haug, Kowatsch, Castro, Filler & Schaub, 2014). Mobile health technologies have the capacity to change the healthcare environment while simultaneously delivering positive outcomes and significantly lower costs (Hall, Cole-Lewis & Bernhardt, 2015). Sharp and colleagues (2015) noted a number of text messaging features that may influence improved communication between client and provider, these included (a) the client's sense of confidentiality, (b) intermittent communication, (c) simulation of supportive interactions, and (d) messaging that is personalized to the recipient. Advances in technology have established new lines of communication and thus created new opportunities to support client treatment success.

Mobile technology has demonstrated the capacity to improve client engagement in treatment-related activities (SAMHSA, 2015). One-sided text messages have been shown to significantly improve attendance at medical appointments and positively impact treatment compliance (Chen, Fang, Chen & Dai, 2008; Franklin, Waller, Pagliari & Greene, 2003). Research also demonstrates that shorter, recurrent feedback via text message may prove to be more effective for individuals with lower education levels who might experience difficulty absorbing information provided during a treatment visit (Haug et al., 2014). Messaging is an effective way to provide support and monitor maintenance of behavior change over time with each mobile message contact considered a "microintervention" that may foster positive change (Haug et al., 2014; Muench, Weiss, Kuerbis & Morgenstern 2013). The aforementioned literature points to the expanding interest providers have related to the use of text message communication with clients.

The use of text messaging in behavioral health care has been on the rise. Text messaging interventions include strategies similar to empirically supported phone-based care, promoting extended monitoring, early identification of warning signs, and relapse prevention (McKay, 2009). Text messages are becoming an increasingly popular way to “nudge” behavioral change and can be an especially convenient intervention method for disenfranchised population groups such as substance users (Fjeldsoe et al., 2009; Heron & Smyth, 2010; Merz, Baptista & Haller, 2015). A 2013 study by McClure, Acquavita, Harding and Stitzer explored mobile phone usage of individuals attending outpatient clinics, methadone/buprenorphine maintenance programs, and buprenorphine maintenance primary care clinics; they discovered that the majority of patients had mobile phone access (91%) and utilized texting (79%). Thus, text messages are an effective intervention for individuals with substance use disorders.

Mobile messaging may be an additional method for promoting treatment engagement. Research demonstrates that each year, one out of 10 individuals who experience substance use disorders will engage in needed treatment (Center for Behavioral Health Statistics and Quality, 2015). Further, fewer than half of the clients who enter treatment will complete it (SAMHSA, 2011). Moreover, roughly 70% of these individuals will experience a recurrence of use within a few months of initiating engagement in care (Sinha, 2011). Entry into substance use disorder treatment and ongoing participation are necessary to shift the odds towards harm reduction and client recovery.

Mobile messaging can also be a particularly convenient method for continued care, post-treatment. A multitude of studies have demonstrated clients have different needs during different times within the change process (Herd & Borland, 2009). Text messaging provides a method to promote many, small contact points over a longer period of time, allowing the provider to adapt

to the client's changing needs (McKay, 2009). Texting also allows providers to reach clients while they are in the community and adapt to a client's current needs using "just-in-time therapies," (Muench, Weiss, Kuerbis & Morgenstern, 2013, p. 316). Provider-client mobile communications have the capacity to promote, or extend, the duration of behavioral change.

The research on substance use disorder treatment demonstrates that client engagement is paramount to improve outcomes. Patients engaged in methadone treatment for one year or longer were five times more likely to have treatment success than their peers with lesser engagement (Simpson, Joe & Rowan-Szal, 1997). Similarly, individuals engaged in the criminal justice system's drug court programming demonstrate better outcomes and lower rates of arrest post-involvement (Peters, Haas & Hunt, 2001). Regularly scheduled general health care has also been shown to decrease hospitalizations by up to 30% (Laine, Hauck, Gourevitch, Rothman, Cohen & Turner, 2001). Provider-client interactions that occur on a routine basis improve client well-being.

Support is also a key component related to client treatment engagement and post-treatment outcomes. Numerous studies have demonstrated that clients with social support systems exhibit improved compliance with treatment, reduced relapse risk, and positive outcomes post-treatment (DeCivita, Dobkin & Robertson, 2000). Additionally, a 2009 study revealed that socially anxious substance users were four to eight times more likely to have shyness that interfered with their treatment activities; specifically, willingness to meet with a counselor, participate in groups, and seek support from others (Book, Thomas, Dempsey, Randall & Randall, 2009). For the reasons noted above, text messages may be especially useful to improve engagement in substance use disorder treatment. Clients that receive support experience improved outcomes.

Readiness for change is another critical aspect of substance use disorder treatment. The vast majority of the literature examining the constructs of *readiness* and *motivation* and subsequent impact upon client engagement and positive post-treatment outcomes, have found these constructs to be positively correlated (Zerger, 2002). Counselors can match a client's readiness for change throughout the change process through messaging interventions (Brendryen, Kraft, & Schaalma, 2010; Prochaska, DiClemente, Velicer, & Rossi, 1993). Messaging that matches the client's motivational orientation has been found to be more effective than messaging that is incongruent (Rimer & Kreuter, 2006). Thus, the provider's knowledge of client readiness for change and level of motivation allows for specifically tailored interventions, decreasing provider frustration and increasing client satisfaction (Zimmerman, Olsen & Bosworth, 2000).

Many researchers have explored communication techniques that positively influence client retention in substance use disorder treatment. A 2006 study comparing various counseling styles during initial treatment sessions found the use of Motivational Interviewing (MI) positively impacted client retention (Carroll et al., 2006; Miller & Rollnick, 1991). Similarly, positive therapeutic relationships that are established within the first two months of treatment have been linked to improved session attendance, increased retention, and lower levels of client substance use during treatment (Simpson, Joe, Rowan-Szal & Greener, 1997). Researchers have created treatment-related text messages influenced by behavior change theory that (1) provide participants with feedback regarding their current substance use, (2) encourage contemplation regarding use, (3) provide information and strategies to assist the participant in reduced consumption, as well as (4) providing participants with support and encouragement to aid them during their behavior change process (Sharp et al., 2015). Therefore, Motivational Interviewing,

and other evidence-based therapeutic interventions, may be implemented via mobile messaging. Text messages are a quick, cost-effective strategy which counselors may utilize to enhance the therapeutic relationship.

Text messaging is currently utilized as a tool to improve client engagement in treatment. However, no research has explored the psycholinguistics of substance use disorder treatment-related text messages. Given the aforementioned gaps in the literature, the following research questions were designed to guide the present study.

- 1) In text messages utilized in substance use disorder treatment, what is the use rate of the linguistic categories known to be related to patient engagement and participation (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?
- 2) In text messages utilized in substance use disorder treatment, does the use rate of linguistic categories known to be related to patient engagement and participation differ from national blog norms (i.e., *Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power*)?

Method

Design

This study utilized a synchronic corpus linguistic design (Weisser, 2016). Variables explored were: Authenticity, Clout, Emotional Tone, Biological, Friend, Informal, Leisure, and Power. The unit of analysis was single words (Bjekić, Lazarević, Živanović & Knežević, 2014).

An *a priori* power analysis for a χ^2 square test was conducted using G*Power 3.1 (Faul, Erdfelder, Buchner & Lang, 2009). The proper effect size is Cohen's w (Rosnow & Rosenthal, 2003). The effect size was the same one used for a large mental health and addiction clinical trial (Powers et al., 2016). The following input parameters were employed: (a) test family = χ^2 tests,

(b) statistical test = Goodness-of-fit tests: contingency tables, (c) type of analysis = A priori: Compute required sample size given α , power, and effect size, (d), $w = 0.17$, (e) power (1- β error probability) = 0.8, (f) $\alpha = .05$, and (g) degrees of freedom = 1. The G*Power 3.1 output included a sample size of 272 and an actual power of 0.80.

Corpus

Text messages related to substance use disorder treatment were collected from previously published articles. A total of 71 text messages were collected (Agyapong, Ahern, McLoughlin & Farren, 2012; Bock et al., 2016; Free et al., 2011; Laursen, 2010; Sharp et al., 2015). The average word count per text message was 22.7 words (range 5 to 43 words). The total word count for the text message corpus was 1,624 words, providing sufficient material to analyze.

Corpus construction. Collected text messages were entered into a Word document. Text cleaning followed the procedures outlined in the LIWC operator's manual (Pennebaker et al., 2015) and a supplement to this manual (Department of Psychological Services, 2015b).

First, a period was added to the end of all text messages that were without punctuation. Then, URLs and phone numbers were removed from the data set. All instances of *textese* were translated into standard US English spelling (e.g., “2 U” modified to “to you.”) and abbreviations were spelled out (e.g., “min” to “minimum”). US word usage replaced any UK English word usage (e.g., “fag” to “cigarette”). The Microsoft Word document was converted to .txt format. Then, the corpus was run through LIWC software for analysis.

Measures

Overview. The measures used were selected scales from the Linguistic Inquiry and Word Count 2015 (LIWC2015). Pennebaker, Boyd, Jordan, and Blackburn (2015) report adequate reliability and validity for these LIWC scales. The reference norms used to compare

against the present results were the Twitter norms contained in the LIWC psychometric manual (Pennebaker et al., 2015).

LIWC summary variables are reported as a standardized score that can range from 0 (i.e., very low levels) to 100 (i.e., very high levels) with 50 being the mid-point. In this study, three summary variables were explored: Authenticity, Clout, and Emotional Tone. Summary variable scoring is based on the area under a normal curve. The scores for LIWC linguistic categories are reported as a percentage of all terms found in the corpus. Five linguistic variables were explored: Biological, Friend, Informal, Leisure and Power.

LIWC-Authenticity. Authenticity is one of four summary variables that may be analyzed with LIWC2015 software (Pennebaker et al., 2015). Authenticity scores are meant to detect writing that is honest and personal in nature (Cohn, Mehl & Pennebaker, 2004).

LIWC-Clout. Clout is one of the four summary variables available in LIWC2015 (Pennebaker et al., 2015). Clout words suggest the author is speaking confidently and with expertise (Sell & Farreras, 2017).

LIWC-Emotional Tone. Tone is one of four summary variables in LIWC2015 (Pennebaker et al., 2015). The Emotional Tone category measures the tone of written messages; the higher the score the more positive the tone (Pennebaker et al., 2015). Scores below 50 suggest a more negative emotional tone.

LIWC-Biological. This linguistic category contains a total of 748 words. Examples of words within this category include: *eat, blood, pain.*

LIWC-Friend. LIWC's Friend category contains a total of 95 words. Examples of words within this category include the following: *buddy* and *neighbor.*

LIWC-*Informal*. The Informal linguistic category contains a total of 380 words. Examples include the following: swear words, netspeak, and filler words.

LIWC-*Leisure*. This linguistic category contains a total of 296 words. Examples of words in the Leisure category include: *cook*, *chat*, and *movie*.

LIWC-*Power*. The Power category contains a total of 518 words. Examples of this category include the following: *superior* and *bully*.

Apparatus

The software used to analyze the corpus assembled for this study was Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, Boyd & Francis, 2015). This software was developed in the 1990s and has undergone several revisions, the most recent of which took place in 2015 (Pennebaker, Boyd, Jordan & Blackburn, 2015). The LIWC program can be utilized to review and analyze many kinds of written text.

LIWC analysis returns results for four summary variables and 90 output variables (i.e., LIWC categories). It is possible for words to be part of more than one category. Internal reliability and external validity of LIWC are well documented (Pennebaker et al., 2015).

Data Analysis

The text message corpus was analyzed with LIWC2015 software. For the first research question, raw count and percentage of total words used will be reported for each variable. For LIWC summary variables, the rate reported was a standardized score that has been converted to percentile ranging from 0 to 100 (Voogt, 2017). For the linguistic categories that were LIWC standard variables, the rate reported was the percentage of all words counted (Pennebaker et al., 2015).

Log likelihood analysis requires raw scores. These were obtained by multiplying the percentage of all words times the size of the corpus. Cressie and Read's (1989) log likelihood formula was used (as cited in Rayson & Garside, 2010). Bayes Factor (BIC) was utilized to measure effect size. BIC values measure the degree of evidence against the null hypothesis with scoring as follows: values from zero to two do not warrant more than a mere mention, BIC values from two to six demonstrate "positive" evidence against the null hypothesis; scores from six to 10 demonstrate "strong" evidence for the alternative hypothesis; and BIC values > 10 indicate "very strong" evidence for the alternative hypothesis (Wilson, 2013).

In this study, the hypothesis was tested a total of eight times (i.e., once for each linguistic variable). Testing multiple hypotheses may increase the false discovery rate, or the chance of incorrectly rejecting the null hypothesis. The Bonferroni procedure is recommended as method for adjustment when a test involves multiple hypotheses (Aikin & Gensler, 1996). The Bonferroni correction sets a "family-wise" error rate, α , judging individual tests against a more stringent significance level (i.e., α/m , where m is the number of hypothesis tests in the "family"). The family-wise error rate for this study was set at $\alpha = 0.05$ with an adjusted level of significance for individual tests set at 0.00625. To maintain the Type I error bound of $\alpha = 0.05$ on all tests concurrently, the corresponding P value was compared to 0.00625. Analyses were completed using Microsoft Excel.

Results

In reference to the first research question, substance use disorder text messages demonstrated high levels of Clout. Results for linguistic summary variables can be viewed in Table 1. The frequency of word usage in linguistic categories were as follows: Biological

(8.7%), Leisure (6.3%), Power (2.9%), Friend (0.6%), and Informal (0.1%). Results for linguistic categories can be viewed in Table 2.

For the second research question, the substance use disorder corpus was compared against national norms. Results for all three linguistic summary variables, Clout, Emotional Tone, and Authenticity yielded statistically significant results. The frequency of Biological, Leisure, and Informal terminology was also found to be statistically significant. Log-likelihood and significance levels of the linguistic variables can be found in Table 1. Log-likelihood and significance levels for the linguistic categories can be found in Table 2.

Discussion

This study sought to explore word usage in text messages utilized in substance use disorder treatment. The first research question explored the word use of linguistic categories that are believed to be impactful to client engagement and participation. Results demonstrated Clout levels and use of Biological terminology to be high. The second research question sought to determine if word usage rates differed between substance use disorder text messages and national blog norms derived from Twitter. Scores for all three summary variables, Clout, Authenticity, and Emotional Tone, were found to be statistically significant. Similarly, when compared to national norms, Biological, Leisure, and Informal terms were used at frequencies that were of statistical significance. The effect size for Clout, Biological, and Informal linguistic areas were especially prominent ($BIC > 20$). Noteworthy results for both research questions are discussed below.

Clout levels in substance use disorder text messages were high, indicating the text writer's confidence and expertise. There are several probable reasons for these results. One possible explanation is that the combined influence of education and practice makes treatment

providers more apt to communicate with confidence in their area of expertise. Another possible explanation is that providers see themselves as leaders, guiding clients to improved health. Indeed, upon review it is apparent that many of the texts within the corpus are written in a more directive manner and thus likely to drive Clout scores (i.e.; *Make a list of 5 people you can call if you are craving; Make sure you carry their numbers with you all the time.*). Either scenario has the capacity to impact level of Clout; however, given the fact that over half of substance use disorder treatment providers are in recovery themselves and driven by a strong motivation to “give back” (i.e., help others overcome their substance use disorder), the latter is more likely (Doukas & Cullen, 2010; Doyle, 1997). We can surmise that Clout levels should be high in treatment-related text messages when providers see themselves as role models for their clients and communicate as such.

Emotional Tone of the text messages was fairly neutral or mildly positive. Low Emotional Tone scoring runs counter to what one might expect in treatment-related messaging, as positivity has been found to support stronger counselor-client relationships (Alpert, Morris, Thomson, Matin, Geyer & Brown, 2018). There are several possible explanations for the obtained results. As noted above, text messages within the corpus were written in a directive style, which might impact linguistic measures for overall tone. Also, many text messages were written in a factual manner, including numeric measures (e.g., consumption limits) leaving little space for perceived emotionality (i.e., *Reduce your risk of injury on a single occasion of drinking by setting a limit of no more than 4 standard drinks; 1 drink = 100 milliliters wine or 330 milliliters beer or 30 milliliters spirits.*). However, the most likely explanation may be the demonstration of empathy in messaging. Research has shown empathic statements (i.e., “I understand this is tough.” or “I know changing can be hard.”) may increase the level of negative

Emotional Tone within a message (Ellis, Connor & Marshall, 2014). With the aim of substance use disorder text messaging being client engagement, the provider's positive tone may be integral to preserve the impact of this intervention. Thus, providers who intend to use text messaging as an adjunct to treatment might consider purposefully displaying positive Emotional Tone in their mobile messages to clients.

Authenticity was found at lesser levels than expected in the substance use disorder corpus. Authenticity suggests the writer is speaking honestly or has authentic knowledge on a particular subject. Low Authenticity is unique given the high scoring for Clout, and operating under the assumption that many providers are in recovery themselves. There are two probable causes for this finding. One possible explanation is that while providers are likely to be truthful in client-facing communications, they are less likely to be personal due to ethical guidelines related to therapeutic boundaries. Another possibility is that the text message communications that were collected from previous research were written to be used with a large number of mobile recipients; researchers are likely to strive for a larger n in order to demonstrate significance. These factors alone or combined are likely to decrease the possibility of detecting honest, personal qualities within the corpus (i.e., factors that may otherwise be noted in one-to-one messaging). Of these two possible explanations, the latter is the most likely cause. However, had the message corpus been collected from single provider-client communications, the former could be a more likely explanation. With research demonstrating client preference for tailored messaging, providers are encouraged to consider use of one-to-one messaging, in lieu of text messages written for use with all clients (Ellis, Connor & Marshall, 2014).

Biological words appeared in substance use disorder text messages at a higher rate than expected. This finding corresponds with research by Leek and colleagues (2017), which cited

that healthcare-related communications are more likely to utilize Biological terminology. An example from the corpus demonstrating use of Biological terms via text message is, “Alcohol can cause injuries, diseases like cancer, depression, weight gain...plus hangovers are awful!” (Sharp et al, 2015, p. 5). The most likely cause for increased frequency of Biological terms is the goal, or purpose, of the provider-client relationship; all communications between the two exist as a means to improve the client’s health. Thus, text message content may emphasize the importance of reducing health risks and caring for one’s body, producing a higher frequency of Biological word use. Health-related discussions between provider and client are essential as general health status is significantly related to continued abstinence (Cook, 1988). Thus, a high frequency of Biological words in substance use disorder messages may positively impact treatment outcomes.

Leisure words appeared in substance use disorder text messages at nearly three-times the rate of the national norms. This linguistic category includes Leisure activity terminology such as *cook*, *chat*, and *movie*. Research on the treatment of substance use disorders has demonstrated that one of the key factors linked with positive post-treatment outcomes is “general enjoyment of life,” (Cook, 1988, p. 738). After years of sustained use, many clients are uncertain of their personal interests. Thus, the most likely explanation for the frequency of Leisure terms is the common treatment recommendation that clients find hobbies to engage in that do not involve the use of substances. Providers often encourage clients seek new ways to have fun and avoid idle time (Gray & Gibson, 1993). Leisure activities are especially important for individuals who are making substance-related behavioral changes as loneliness and boredom are cited as common causes for relapse (Blaszczynski, McConaghy & Frankova, 1990). Therefore, providers that promote engagement in leisure activities may see greater client success.

While research on Twitter posts has found Informal terminology positively impacts engagement, the same cannot be said for substance use disorder messaging (Leek, Houghton & Canning, 2017). Informal words appeared in substance use disorder text messages at a significantly lower rate than expected. LIWC's Informal linguistic category captures the presence of netspeak, filler words, and swear words (Pennebaker et al., 2015). Treatment-related communications from providers are unlikely to include examples of netspeak (i.e., *LOL*, *OMG*, *BRB*). Filler words are also not likely, as text messages are meant to be brief communications. While some providers may mirror their clients' terminology and use swear words during one-to-one sessions, we could assume that written messages should be free of such terms to maintain professionalism and therapeutic boundaries. Therefore, minimal Informal word usage in provider to client text messaging is an encouraging finding.

Limitations

Only text messages from previously published research were utilized in the substance use disorder corpus. Attempts were made to obtain text messages from organizations and providers that utilize this communication method; however, these requests for correspondence and data sharing went unanswered.

Text messages selected for analysis were limited to those that were written in English. Messages where the primary content delivered was provision of web addresses or phone numbers were not used. The text messages that were collected had been created for use with a large number of recipients (e.g., one message sent to many clients), thus nuances of one-to-one messaging could not be analyzed. Therefore, the results from this study are not generalizable.

Implications

This research has implications for practice. Findings may have relevance to health professionals in various settings. Insurance companies, treatment facilities, medical providers, psychiatrists, mental health therapists, and alcohol and other drug (AOD) counselors may find the results helpful to improve client care, enhance engagement, reduce risk of relapse, and assure treatment compliance. Similarly, developers may find this information to be of use when creating templated messages and notifications for treatment-related applications (apps).

Research

This is the first study to examine the linguistic composition of provider-to-client text messages used in the treatment of substance use disorders. This study aimed to (1) enhance provider understanding of the linguistic categories that may promote client engagement and positive treatment outcomes, as well as (2) explore whether these linguistic categories are evident in current messaging.

Future research may investigate one-to-one (i.e., provider-client) messaging, which may demonstrate additional nuances that could not be derived from group messaging content. Similarly, additional treatment documentation shared by providers could be assessed for evidence of pertinent linguistic categories that are known to drive client engagement.

Practice

Words have a great deal of power. Text messaging allows treatment providers to communicate “mini-interventions” between sessions that may enhance client engagement, motivation, and treatment compliance. A vast amount of literature points to the efficacy of text messaging interventions in the treatment of various health diagnoses, therefore it is unlikely this communication modality will cease in the foreseeable future. Substance use disorder treatment providers are encouraged to consider use of this medium to improve care delivery.

Before implementation of any therapeutic intervention, providers must be aware of possible relational, ethical, and legal consequences. All client-facing communications, including text messages, are considered a part of the client record and thus, must be protected in accordance with state and federal privacy and confidentiality laws. New web-based platforms allow providers to track text message content that is sent and received, as well as assure compliance with regulations including Health Insurance Portability and Accountability Act (HIPAA) and 42 CFR Part 2. Providers who are considering use of text messaging with clients are encouraged to seek additional training and complete a thorough review of available text messaging resources prior to implementation of this practice.

This research offers substance use disorder providers an overview of linguistic elements that are recommended for text messaging communication with clients, and others they are encouraged to purposefully forego. If the goal of substance use disorder text messages is client engagement, it is recommended that treatment providers greatly increase the use of positive Emotional Tone within their messaging to enhance the impact of this intervention. Similarly, it is recommended that providers consider increasing the level of Authenticity demonstrated in client-facing messaging as this is likely to impact the persuasiveness of messaging.

When counselors are aware of and attentive to the linguistic variables known to promote client engagement, motivation, and satisfaction, text message communications have the capacity to significantly improve substance use disorder treatment outcomes.

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Table 1

LIWC Summary Variable Results

	SUD	Twitter	LL	BIC
Clout	97.3	63	67.13**	Very Strong
Emotional Tone	54.8	72.2	22.96**	Very Strong
Authenticity	31.8	50.4	39.93**	Very Strong

* $p < 0.05$ ** $p < 0.00625$

Table 2

LIWC Linguistic Category Results

	WC	SUD	Twitter	LL	BIC
Biological	158	8.7	2.6	30.29**	Very Strong
Informal	32	0.1	4.7	68.58**	Very Strong
Leisure	116	6.3	2.1	19.08**	Very Strong
Friend	12	0.6	0.4	0.16**	-
Power	61	2.9	2.2	0.97**	-

* $p < 0.05$ ** $p < 0.00625$

Chapter 4: A General Conclusion

Conclusion

This chapter will provide a summary of the two studies completed within this dissertation. These manuscripts sought to explore the linguistic composition of provider-to-client text messages utilized in the treatment of mental health and substance use disorders. A summary of findings will be provided along with a discussion of thematic linkages, limitations, and implications for practice. The chapter will close with a statement related to the author's plans for future research.

Summary of Findings of Manuscript #1

Manuscript One, titled "Text Messaging as a Mental Health Treatment Intervention," explored word usage rates of text messages utilized in the treatment of mental health disorders. A corpus of treatment-related text messages was collected from previously published research. The text messages corpus was analyzed with Linguistic Inquiry and Word Count (LIWC2015) software to determine summary scores and frequency rates. Findings were then compared to national blog norms derived from Twitter norms. Data analysis demonstrated linguistic summary variables Clout, Emotional Tone, and Authenticity to be of statistical significance. Frequency rates of linguistic categories Biological and Informal were also found to be statistically significant.

Clout was found at high levels within the text messages, demonstrating writer leadership and confidence. This is to be expected, as mental health providers are likely to communicate with clients in a manner that demonstrates proficiency. Providers see themselves as experts in the field with knowledge and skills that benefit their clients. Thus, it is logical that Clout scoring would be high within provider-client messages.

Emotional Tone levels were also high, demonstrating writer positivity. The cause for this could be linked to the provider's general politeness, a demonstration of customer service skills, or viewed as an expectation of the provider's profession and workplace. Conversely, providers are likely to avoid negative messaging as this may cause clients to disengage from communications or treatment entirely. Regardless of cause for high Emotional Tone scores, research has found positivity in text messaging to drive engagement, enhance the client experience, and improve treatment outcomes. Thus, high Emotional Tone scores should be a goal for providers who utilize text messaging interventions.

Scoring for Authenticity was lower than expected when compared against national norms. Authenticity scores are meant to detect writing that is both honest and personal in nature. It is likely that this score was low due to the nature of the messages within the collected corpus. Text messages that were analyzed within this study were collected from previously published research and utilized to communicate with large groups of diverse individuals. Therefore, the nuances of provider-client messaging that would likely occur in one-to-one mobile communications, which demonstrate honesty or personal connection, could not be analyzed. Thus, the results related to Authenticity cannot be generalized to messaging that would take place in individually tailored provider-client text messages.

Within the mental health text corpus, Biological terminology was used at a rate that exceeded national norms. Due to the health-focused nature of communications between mental health providers and their clients, text message content is highly likely to use words related to the body and biological processes. Therefore, this finding is fitting with therapeutic goals, as the foundation of the relationship is to improve client health.

Informal terminology within mental health text messages was utilized at rates that were lower than expected when compared with national blog norms. This linguistic category includes netspeak, filler words, and swear words. Mental health providers are unlikely to use Informal terminology in text message communications with clients. Swear words and netspeak use should be low due to provider-client boundaries. Also, with the general purpose of mobile messaging being what is it (i.e., a short message service), filler words should be infrequent. Therefore, lower levels of Informal terminology are not a detriment to mental health text message interventions.

The following may be presumed related to text messages used in the treatment of mental health disorders. Messages: (1) demonstrate provider expertise, (2) have an overall positive tone, (3) may demonstrate a less honest, or personal, communication style, (4) are primarily focused on health and the body, and (4) infrequently utilize informal terminology.

Summary of Findings of Manuscript #2

Manuscript Two, titled “Text Message Interventions in Substance Use Disorder Treatment,” sought to explore word usage rates of substance use disorder text messages. A corpus of text messages was collected from previously published literature on the treatment of substance use disorders. The text messages corpus was analyzed with LIWC to determine usage rates. Then, results were compared to national norms, derived from Twitter, to explore word use and frequency. Analysis of the substance use disorder text message corpus revealed several notable elements. Levels for linguistic summary variables Clout, Authenticity, and Emotional Tone were statistically significant. LIWC categories Biological, Leisure, and Informal were also found to demonstrate statistical significance in substance use disorder messages. The effect size for Clout, Biological, and Informal linguistic areas were especially noteworthy (i.e., BIC > 20).

Levels of Clout in substance use disorder text messages were high. Given the fact that a large number of substance use disorder treatment providers are in recovery and cite a strong motivation to help others overcome their disorder, this results seems fitting. Many providers know what it is like to walk in their client's shoes, and they are eager to lead them towards better health. Regardless of exact cause, it can be assumed that Clout levels should be high in treatment-related text messages if the provider see themselves as a role model, or an expert in the field, and thus communications with clients are likely to reflect these sentiments.

The Emotional Tone of substance use disorder text messages was fairly neutral. This finding runs counter to what we might expect, as provider positivity has been found to improve the therapeutic relationship and bolster client engagement. It is likely that the style in which the text message communications were written impacted this particular score. Messages within the substance use disorder corpus were written in a factual, directive manner, and many texts included numeric measurements of recommended intake levels. If the goal of substance use disorder text messages is to promote client engagement, it is recommended that treatment providers increase the Emotional Tone level within their messaging to enhance the impact of this intervention.

Authenticity levels were found to be low in the substance use disorder corpus. Low Authenticity scores were a striking finding, given the high levels of Clout, and operating under the assumption that many providers in the field of substance use disorder treatment are in recovery themselves. However, when we take the procurement of these text messages into account, this scoring appears reasonable. It is likely that the text messages that were collected from previous research demonstrate lesser levels of Authenticity than expected as the texts were written for use with a large number of recipients. This likely decreased the possibility of

detecting writing that was honest or personal in nature within the substance use disorder corpus. Thus, the findings cannot be generalized to communications that take place between individual providers and their clients.

Biological words were used in substance use disorder text messages at a high rate. The most likely cause for the increased number of Biological terms is the general purpose of provider-client interactions to improve the client's health. These results uphold findings from previous research and support the notion that providers should be regularly engaging clients in discussions about health status to promote continued behavior change. It can be surmised that the increased frequency of Biological words in substance use disorder texts could positively shape client outcomes.

Leisure words appeared in substance use disorder text messages at a rate nearly three-times the national norms. In the field of substance use disorder treatment, providers commonly come in contact with clients who are uncertain of their hobbies, personal interests, and how to have fun in the absence of substances. Thus, the use of Leisure terminology (i.e., *chat*, *bake*, *movie*) is fitting for use between providers and clients. The literature also supports this practice, as research on the treatment of substance use disorder has commonly demonstrated the importance of clients enjoying life. Clients that engage in hobbies and activities that bring them joy are likely to avoid idle time or boredom, which are commonly cited as cause for relapse. Therefore, frequent use of Leisure terms in provider-client text messages may support positive treatment outcomes and sustained harm reduction or abstinence.

Informal words appeared in the text message corpus at a significantly lower rate than expected. It can be assumed that due to the nature of the provider-client relationship, the frequency of netspeak (i.e., *LOL*, *OMG*) and swear words within treatment-related messaging

should be minimal, if at all. The use of filler words should also be low due to the communication style that is commonly utilized via text message; that is, short and to-the-point statements. When we consider the kind of terminology that would increase frequency rates of Informal terms in provider communications (i.e., *damn, shit, LOL, BRB, um, that, huh*, etc.), the alternative, which is negligible use, is a positive finding.

The following may be presumed related to text messages used in substance use disorder treatment. Messages: (1) exhibit provider expertise, (2) are neutral in tone, (3) may demonstrate a less personal or honest communication style, (4) focus on health, (5) promote client engagement in leisure activities, and (6) use informal terms infrequently.

Thematic Linkages

These two manuscripts are thematically linked. Both sought to explore the word usage rates of linguistic categories believed to be connected to client treatment engagement and participation. Manuscript One explored text messages utilized in mental health disorder treatment while manuscript two explored text messages utilized in the treatment of substance use disorders. These are the first studies that examined the linguistic components of mental health and substance use disorder treatment text messaging. In a comparison of both studies, several interesting elements emerged.

In a review of the two corpora utilized for analysis, an interesting difference between the two data sets becomes apparent. The text messages utilized in the treatment of mental health diagnoses were relatively short (average word count = 7.55, range = 3 – 27), while text messages used in substance use disorder treatment were much longer (average word count = 22.7, range = 5 - 43 words).

While text messages from mental health and substance use disorder treatment demonstrated similar linguistic composition in many ways, a comparison between Manuscript One and Two's results point to two notable differences. First, Emotional Tone varied dramatically. The tone of substance use disorder messages was fairly neutral while mental health treatment text messages were exceedingly positive (i.e., 54.8% versus 99.0%). Second, text messages used in substance use disorder treatment had especially high rates of Leisure terminology while use of Leisure terms in mental health messaging was minimal, lacking statistical significance. In relation to these results, provider recommendations are discussed below (see Implications section).

Limitations

A limited number of current research articles have shared treatment-related text messages, restricting the amount of messages that could be analyzed. Mental health treatment related messages were especially limited (i.e., 39 text messages from two studies) while text messages related to the treatment of substance use disorders were more easily collected from current literature (i.e., 71 text messages from five studies).

Messages for analysis were limited to those that were English only and those that included web addresses and phone numbers as primary content were not used. Few messages requiring "Yes/No" responses were utilized; only those with additional educational or support content were added to the corpus. It should also be noted that no one-to-one, or personalized, text messages were available for review as the messages which were collected from previously published research were meant for use with a large number of recipients. Thus, scoring and frequency rates may differ in these communications; it is hypothesized that Authenticity levels

would likely differ in one-to-one provider-client communications. Thus, the results from these studies are not generalizable.

In relation to data analysis, LIWC summary variables present as a challenge due to their standard scores. While the LIWC categories demonstrating frequency are binary (i.e., Yes/No), which lend to use of log-likelihood analyses, the standard scoring of LIWC summary variables violates the binary assumption of log-likelihood analyses and thus, inferences made from these results may be flawed.

Should these studies be replicated, future researchers may elect to take the following steps to avoid this violation: (1) run LIWC analyses for each individual text message within a corpus, (2) collect LIWC summary variables scores for the linguistic elements that are being explored, (3) compute the mean (average) of the LIWC summary variable score, and (4) utilize an independent two-sample t-test to explore the differences between the data sets (i.e., between the mean score for the LIWC summary variable of choice versus national Twitter blog norms). For example, if a researcher sought to explore Clout levels within 40 unique provider-client text messages, the researcher would run each individual message through the LIWC and obtain 40 different standard scores (i.e., a score of for each text). Next, the average of these 40 scores would be computed. Then, the mean score for Clout would be compared against the Clout scoring found in the national norm set.

It is also worth noting that the manner in which LIWC summary variable scores are determined has not been made completely transparent by the software's creators. Additional information related to the linguistic elements that influence these scores may be useful to researchers to assure greater understanding and generalizability of research results.

Implications for Practice

Technological advances continue to expand treatment engagement options and offer providers new lines of communication with clients. Text messages are low-cost, high-impact, and timely interventions that can impact client motivation and treatment outcomes. Text messaging is a relevant intervention method which allows providers to promote a number of positive treatment-related goals from session attendance to medication compliance to relapse prevention. The aim of these studies was to explore the linguistic composition of treatment-related text messages and enhance provider insight related to text message use and composition to increase the impact of these interventions.

There are several implications for practice that stem from these studies. It is recommended that substance use disorder treatment providers consider enhancing the Emotional Tone of their messaging. A great deal of literature has shown a provider's use of optimistic tone is linked to a number of positive treatment-related outcomes. It is also suggested that mental health providers consider use of Leisure terms in their text messages to clients. Inclusion of this linguistic element in mental health treatment-related messages is recommended for a number of reasons: (a) previous research has demonstrated that use of Leisure terms promotes engagement, (b) client engagement in leisure activities promotes the acquisition of new coping strategies, (c) research demonstrates many clients experiencing mental health disorders also have co-occurring substance use disorders, (d) research demonstrates that promoting client engagement in hobbies reduces substance use-related health risks, and (e) client engagement in personal interests is likely to positively impact overall health, happiness, and enhance social support. Finally, treatment providers are also encouraged to consider tailoring messaging to the individual text message recipient as tailored messages are perceived as more personalized and preferred by clients.

Future Research Plans and the Relationship of these Plans to the Student's Dissertation Experience

Linguistic analysis is a relatively new methodology and a small amount of counseling research has been done utilizing various software platforms that allow for linguistic exploration. However, linguistic inquiry can be a timely, efficient, and low-cost method of analysis with results that have various implications for providers. My future research is likely to utilize LIWC, or a similar modality such as Custom List Analyzer (CLA), to review additional corpora-related to treatment. Words are powerful tools in client engagement and are known to enhance or diminish motivation for change.

An off-shoot of these two studies would be to explore text messages that have been used in one-to-one provider-client communications. This may provide more generalizable and useful results for treatment providers, though message content may be difficult to obtain. Another more accessible option would be to explore text messages that are being utilized in the treatment of physical health diagnoses with the same research questions and variables. There is a great amount of research available on text message interventions for physical ailments, making this a relatively easy investigation. The comparison of how providers are communicating with clients may highlight similarities, differences and the possibility of exploring best practices.

Additionally, I have an interest in reviewing the linguistic composition of program orientation and consent forms, client assessments, and other treatment-related documents that impact care delivery and treatment outcomes. I would also be fascinated to review counseling session notes to explore the possible ways that a provider's emotional attachment, or disconnect, may be witnessed through their treatment documentation.

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Appendices

Appendix A: IRB Approval Notice



Oregon State University
Research Office

Human Research Protection Program
& Institutional Review Board
B308 Kerr Administration Bldg, Corvallis OR 97331
(541) 737-8008
IRB@oregonstate.edu
<http://research.oregonstate.edu/irb>

Date of Notification	03/07/2018	Study Number	8489
Notification Type	Oversight Determination		
Principal Investigator	Cass Dykeman		
Study Team Members	Megan Partch		
Study Title	Linguistic Analysis of Treatment-Related Text Messages		
Funding Source	None	Cayuse Number	N/A

DETERMINATION: RESEARCH, BUT NO HUMAN SUBJECTS

It has been determined that your project, as submitted, does meet the definition of research but **does not** involve human subjects under the regulations set forth by the Department of Health and Human Services 45 CFR 46.

Additional review is not required for this study.

Please do not include HRPP contact information on any of your study materials.

Note that amendments to this project may impact this determination.

The federal definitions and guidance used to make this determination may be found at the following link: [Human Subject](#)

Appendix B: Mental Health Text Message Corpus

Have you taken your medication – feel well.

Please remember to take your medication.

It is important to take your medication as prescribed.

Time for medication!

Take your medication please.

It is time for your medication soon.

It is important to comply with your follow up appointments, isn't it.

Please remember your follow up appointment.

Please go to your follow up appointment.

Appointment with your nurse today.

Keep your appointment with your nurse, won't you.

You have an appointment.

Please, go to your appointment.

Remember to book an appointment with your doctor.

Remember to book a follow up appointment.

Keep your appointment with your doctor, will you.

Remember to book an appointment with your nurse.

Appointment with your doctor today.

Get up, go out and exercise!

Health food, better mood.

Be gracious to yourself.

Good morning! Did you sleep well?

Have you called your friend or loved one?

Don't take risks, know your limits.

You are safe.

Weekly cleaning hooray.

Brush your teeth, please.

Remember your hobbies.

Remember to feed pets.

Are your clothes clean and tidy?

Night peace!

Today is a free day – enjoy!

Remember to charge your mobile phone.

Monitor changes in your mood; develop a list of personal warning signs.

Develop a support system; isolating yourself can bring on depression.

Stress cannot be avoided; learn to cope better by adopting new strategies.

If you are having a good day, share your joy with others. If you are having a bad day, share it with others and accept their help.

To change the outside world all you have to do is change the way you think and feel.

Stick to your treatment plan; take your medication as prescribed and keep your appointments.

Sources: Kauppi et al., 2015; Agyapong, Ahern, McLoughlin & Farren, 2012

Appendix C: Substance Use Disorder Text Message Corpus

Keep sobriety as a number one priority and you will reach your goals.

We have this choice everyday of our lives. We can take the path of sobriety that leads to a happy and useful life.

Make a list of 5 people you can call if you are craving. Make sure you carry their numbers with you all the time.

Alcoholics Anonymous meetings are crucial; attend regularly; if you don't like a particular Alcoholics Anonymous meeting, shop around until you find one that suits you.

Thanks for joining the study. Text messages will be coming to your mobile over the next 4 weeks. Call if you have any study-related problems.

The survey showed your alcohol drinking is hazardous compared with other people. We recommend you think about cutting down.

Reward yourself for your successes. Learn from slip-ups but don't dwell on them. Don't give up on your goal to reduce drinking!

Drinking too much alcohol can cause problems for you, your family, your friends. See for easing up tips.

Ideas for helping you cut down: consider planning alcohol free days, measure and track drinks, alternate alcohol and non-alcohol drinks, avoid risky circumstances.

Consider planning alcohol free days, pacing yourself when drinking, alternating alcohol and non-alcohol drinks, taking smaller sips, eating before or while you are drinking.

Recommended drinking limit for females = maximum 2 drinks day and maximum 10 drinks week. 1 drink = 100 milliliters wine or 330 milliliters beer or 30 milliliters spirits or half a premix.

Recommended drinking limit for males = maximum 3 drinks day and maximum 15 drinks week. 1 drink = 100 milliliters wine or 330 milliliters beer or 30 milliliters spirits or half a premix.

Reduce your risk of injury on a single occasion of drinking by setting a limit of no more than 4 standard drinks. (1 drink = 100 milliliters wine or 330 milliliters beer or 30 milliliters spirits).

Would you be willing to make changes to reduce your drinking? If your answer is 'Yes', text 1 to. If your answer is 'No', text 2 to.

Consider setting a goal to reduce drinking to within safe limits: maximum 2 drinks day, maximum 10 drinks week. (1 drink = 100 milliliters wine or 330 milliliters beer or 30 milliliters spirits).

Consider setting a goal to reduce drinking to within safe limits: maximum 3 drinks day, maximum 15 drinks week. (1 drink = 100 milliliters wine or 330 milliliters beer or 30 milliliters spirits).

Thanks for your reply. Drinking alcohol is your choice. Texts to follow about ways to minimize harm from alcohol.

You can get more free and confidential support from Alcohol Helpline, or by contacting your family doctor.

Consider sharing your goal and plan with friends and family. They can provide support and might want to join in and reduce their alcohol drinking too.

Alcohol can cause injuries, diseases like cancer, depression, weight gain...plus hangovers are awful! Make a list of the pros and cons of drinking too much alcohol.

Great news that you are willing to reduce your alcohol use! Keep your reasons in mind. We would like to help and will text you tips and advice.

Plan ahead for cutting down your alcohol use. Consider setting some drinking rules for yourself.

See for more info.

Plan ahead so you get home safely. Arrange a designated driver. Put some cash aside and share a taxi. If you have to walk home, go with a friend.

We encourage you to think about your drinking. You may have bad experiences, regrets, worries.

One day you may decide you want to make a change.

Thanks for taking part in the study. We will text you in 2 months to see how you are going.

Don't let your pre-game ruin the big game. Pace yourself and know your limit.

Always have an exit plan.

Be responsible tonight, you are important to a lot of people.

Who are you with tonight, who's the designated driver?

Let's just pretend that it's tomorrow morning, where do you want to be when you wake up?

Set a limit for yourself tonight, avoid a hangover tomorrow.

When you notice your face getting closer and closer to the phone screen I think that's a reminder you had enough.

Not sure who's driving home later? Go ahead and look up the number for a cab, just in case.

Having a blast? It's not the alcohol that's fun - YOU ARE!

When you smoke a lot of cannabis, you become poorer at navigating the social world, and less interesting to other people.

Young people who stop smoking cannabis after many years of using often find that they have not developed in the same way as other people.

When you smoke cannabis, you often find routines disappear, and everything revolves around cannabis. Just getting out of bed can seem an insurmountable task.

Those who smoke a lot of cannabis often find it difficult to have a conversation unless they are stoned. They know themselves best when they have smoked.

It can be hard to be a part of a group of friends who smoke cannabis without smoking yourself.

A month after you stop smoking cannabis, you will find that you feel more fresh and awake, and that both language and memory are reappearing.

Think about how much cannabis you have smoked in the last week. Which times have been important for you, and which could you have done without?

Do you smoke less when you have to do something important the next day? Think about whether you smoke as much as you would like without considering what you have to do the next day.

Decide that you will smoke less today, and only today. Take one day at a time. That way, you will be able to keep a better perspective on the situation.

Did you try to smoke less today? How did it go? Have you noticed situations in which you used to smoke but have not done so?

Think about three positive things that have happened to you since you changed your cannabis-taking. Write them down and put them on the wall. Read them several times a day.

Think about how you are going to tell your old smoking buddies you don't do drugs any more.

Think about the arguments you will use when your friends ask you why you don't want to smoke any more. Look at some of the things you have texted us.

To make things easier for yourself, try having some distractions ready for cravings and think up some personal strategies to help in stressful situations; why not write an action list of your reasons why you want to quit. Use it as your inspiration.

Think you'll put on weight when you quit? We're here to help - We'll text weight control and exercise tips, recipes, and motivation tips.

This is it! QUIT DAY, throw away all your cigarettes. TODAY is the start of being QUIT forever, you can do it!

Quick result! Carbon monoxide has now left your body!

Day 4 = Big day - cravings still strong? Don't worry tomorrow will be easier! Keep your mind & hands busy. Save this text so you can text CRAVE to us at any time during the program.

Cravings last less than five minutes on average. To help distract yourself, try sipping a drink slowly until the craving is over.

Don't feel bad or guilty if you've slipped. You've achieved a lot by stopping for a while. Slip-ups can be a normal part of the quitting process. Keep going, you can do it!

Hi, thanks for taking part in the study. Over the next four weeks we will be sending you texts with info & ideas.

Your survey responses show your drinking is harmful to your health. Make a positive change in your life – cut down or quit.

You can get confidential support from Alcohol Helpline or your doctor.

Alcohol may be causing problems for you, your family & friends. We encourage you to think about your drinking and its impact on your life.

You might find it helpful to think about the good things & the not so good things about your drinking. Making a list can help.

We recommend you cut down or quit alcohol. Making a positive change can be hard, try small steps.

Ideas for cutting down: plan no-alcohol days, have water between drinks, try low alcohol drinks like light beer.

Keep track of your drinks. You could use a diary. One drink = one small bottle beer, half an RTD, half a glass wine or one shot spirits.

Reduce your chance of injuries & health problems by having no more than two drinks per day and at least two no-alcohol days per week.

Think of one thing you can do to cut down your drinking. Plan ahead & take action!

Don't drive if you have had alcohol. Arrange a sober driver, share a taxi, take a bus, walk with a friend.

Think about sharing your goal with friends or family. They can give you support and may also want to cut down.

It's best not to drink alcohol at all if your health is not so good or you are on medication.

It's best not to drink alcohol at all if you are pregnant or might get pregnant, your health is not so good or you are on medication.

Reward yourself for making progress with your goal - but not with alcohol! Don't give up on your goal, try small steps.

Remember that you can get confidential help from Alcohol Helpline or your doctor.

Make a positive change in your life - cut down or quit drinking alcohol. Thanks for taking part in the study – great effort! We'll be in touch in two months.

Sources: Agyapong, Ahern, McLoughlin, & Farren, 2012; Bock et al., 2016; Free et al., 2011; Laursen, 2010; Sharp et al., 2015.