A Corpus Based Study of Anorexia and Suicidality in Memoirs
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Abstract

Suicide is a widespread problem in the United States, impacting people of all ages and backgrounds. Someone diagnosed with anorexia is at significantly greater risk of completing or attempting suicide, making the need to understand the role of eating disorder dynamics on suicide even more critical. Memoirs written by people diagnosed with anorexia are a resource that can be used to better understand the risk of self-harm and suicide. A log likelihood statistic was used to determine word usage rates in the memoir corpus compared to known norm rates. Besides the log likelihood values, effect sizes (i.e., Bayesian Information Criterion) were reported for all inferential analyses. The study found that memoirs of people self-identifying as diagnosed with anorexia included differences in linguistic processes, psychological processes, and interpersonal psychological theory of suicide dictionaries when compared to the novel norm.

Keywords: Anorexia, Suicide, LIWC, Corpus Linguistics, Interpersonal-Psychological Theory of Suicide, Joiner, IPT

Introduction

The course of an eating disorder, like many favorite stories, is reflective of “The Hero’s Journey”, a classic story structure. Our protagonist, someone with an eating disorder, begins their journey unknowing of and unprepared for what lies ahead. They find themselves stepping into a challenge they did not ask for. Along the journey, protagonists will encounter tests, friends, villains, dark places, help from others, and self-understanding. Not all heroes return from their journey. A disproportionate number of people diagnosed with eating disorders, compared with people not diagnosed with eating disorders, choose not to continue the hero’s journey and instead end their lives. What are the factors that lead someone with an eating disorder to choose to end their life? Do people diagnosed with anorexia experience risk factors that cause them to be more likely to end their lives through suicide?

In the United States, an estimated 30 million people will meet criteria for an eating disorder during their lifetime (Hudson, Hiripi, Pope, & Kessler, 2007). Arcelus et al.’s (2011) meta-analysis of 36 quantitative studies found that people diagnosed with an eating disorder have a significantly higher mortality rate compared to someone diagnosed with a different mental health diagnosis. Arcelus et al. (2011) concluded this rate is even higher in someone diagnosed with anorexia compared to other eating disorder diagnoses and that additional research is needed to understand predictors of mortality in eating disorder diagnosis. Joiner et al. (2009) identified three factors that lead a person to follow through with suicide: perceived burdensomeness, thwarted belongingness, and acquired capacity for suicide. When clinicians grasp the importance of these factors and the way that they reveal themselves in clients, clinicians are better able to provide appropriate prevention and treatment interventions. Joiner et al. (2009) stated that while someone with an eating disorder diagnosis is at increased risk of suicidal ideations and suicide attempts, someone diagnosed with anorexia has significantly greater risk of completing suicide than the general population. Further examination of perceived

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burdensomeness, thwarted belongingness, and acquired capacity for suicide and the impact these factors play within someone diagnosed with anorexia is imperative in creating informed prevention and treatment. Linguistic analysis tools are used to examine language dimensions and can be used to predict changes in behavior, including mental health changes (Pennebaker, Boyd, Jordan, & Blackburn, 2015).

An examination of the literature on the relationship between the interpersonal theory of suicide and eating disorders reveal these dominant themes: (1) the impact of perceived burdensomeness on suicide, (2) the impact of thwarted belongingness on suicide, (3) the impact of the acquired capacity for suicide on suicide, (4) anorexia and suicide rates, (5) increased risk of suicide within people diagnosed with eating disorders, (6) and effectiveness of linguistic tools in identifying risk factors of suicide. After these six themes are addressed, the research questions that guided this study will be presented.

Joiner et al. (2009) reasoned that people are at greater risk for suicidal behavior when they have an increased sense of perceived burdensomeness, thwarted belongingness, and acquired capacity. Perceived burdensomeness is defined as the belief that one's existence burdens family, friends, and/or society. Van Orden et al. (2008) confirmed that perceived burdensomeness was positively and significantly correlated with suicidal ideation in undergraduate psychology students through a self-report questionnaire. Assessing for and addressing perceived burdensomeness within treatment has the potential for significant impact in suicide prevention. The more that clinicians understand perceived burdensomeness in clients with eating disorders, the better they are able to address their needs and ensure their safety.

Thwarted belongingness is defined as the degree to which a person feels their need to belong is being met (Joiner et al. 2009). Van Orden et al. (2010) reported thwarted belongingness—social isolation—is the most significant predictor of suicidal across groups varying in age, nationality, and clinical severity. Someone diagnosed with a disorder that can be socially isolating, leads to conflict, or could cause the person to feel like a liability to other people increases the chances of thwarted belongingness, resulting in increased association with suicidal ideation (Silva, Ribeiro, & Joiner, 2015). Additionally, Anestis et al. (2011) identified that a sense of thwarted belongingness contributes to difficulty regulating emotions, which has been positively correlated with suicidal ideation. Awareness and management of thwarted belongingness is important in the prevention and treatment of suicidal ideation, particularly for groups at higher risk for thwarted belongingness. Professionals treating eating disorders need to be aware of the impact thwarted belongingness plays in the lives of their clients.

Joiner et al. (2009) stated that someone will not die by suicide unless they have both the desire and the ability to die by suicide. The ability to die by suicide refers to the acquired capacity for suicide, meaning the desensitization towards dangerous or self-harming behavior gained through life experiences. Joiner et al. (2009) explained that less direct pathways to an acquired capability may exist through the experiences of other fear-inducing, risky behaviors, such as self-injecting drug use, non-suicidal self-injury, or exposure to physical violence. Brewerton (2007) concluded that exposure to dangerous, traumatic, and neglectful situations increases the probability of developing an eating disorder. Life experiences that increase the acquired capacity for suicide also increase the likelihood of developing an eating disorder. These same life experiences might also be symptoms of an eating disorder. Consideration for these experiences is an important component of the treatment of clients with eating disorders.

Someone diagnosed with anorexia nervosa is at high risk for committing suicide. Contrary to what someone might think, Holm-Denoma et al. (2008) found that someone diagnosed with anorexia nervosa who died prematurely was more, or at least as likely, to die from suicide as they were to die from complications related to their anorexia nervosa diagnosis. Suokas et al. (2014) reported someone with a diagnosis of anorexia nervosa was eight times more likely to attempt suicide compared to the general population. The significance of the impact of suicide on the eating disorder population cannot be ignored. Better understanding the relationship between eating disorders and risk of suicide is essential.

There are many reasons why someone diagnosed with an eating disorder is at an even greater risk of suicide. Holm-Denoma et al. (2008) speculated the cause for the increased rate of suicide in people diagnosed with eating disorders could be attributed to medical fragility, making a suicide attempt potentially more lethal to someone diagnosed with an eating disorder. Additionally, a person with an eating disorder has a high threshold for pain, as well as increased social isolation, and these have been cited as potential explanations for the increased rate of suicide (Herzog et al., 2000). The increased rate of suicide in people diagnosed with an eating disorder and the additional risk factors involved with having been diagnosed with an eating disorder indicate a need for early detection and effective treatment. Looking more closely at the impact of thwarted belongingness, perceived burdensomeness, and the acquired capacity for suicide among clients diagnosed with eating disorders is essential in their care and assessment.

It has long been understood that the words we use and the way that we use them are a translation of thoughts and emotions into a formula that can be understood by others. Attempts at evaluating language have included creating projective tools as well as training judges to evaluate spoken as well as written words (Tausczik, & Pennebaker, 2010). These attempts at understanding language proved to be time consuming, costly, and inconsistent. With the development of linguistic analysis software, large amounts of text have been able to be studied in an effective method. A higher percentage of first-person singular pronouns and a lower percentage of first-person plural pronouns have been found to reflect a greater sense of social isolation and an increased sense of thwarted belongingness (Fernández-Cabana, Ceballos-Espinoza, Alves-Pérez, Garcia-Garcia, & Mateos, 2013). Fernandez-Cabana et al. (2013) also found the use of third-person pronouns indicates a person's level of flexibility and positive coping. With the use of linguistic analysis software, language can be linked to behavioral, cognitive, and emotional patterns, including patterns found in suicide and eating disorders.

Given the aforementioned gaps in the literature on eating disorders and suicidality, four questions were developed to guide this study concerning a corpus of memoirs written by persons self-identifying with a history of anorexia. The first research question was: What are the usage rates for linguistic and psychological processes related to suicidality? The second research question: Do linguistic processes word usage rates differ from known norms? The third research question was: Do psychological processes word usage rates differ from known norms? The fourth research question was exploratory in nature. This question was: What are the usage rates for words in the following areas: (a) thwarted belongingness, (b) perceived burdensomeness, and (c) acquired capacity?

Method

Design

This study employed a synchronic corpus linguistic design (Weisser, 2016). The variables included: first-person singular pronouns, third-person singular pronouns, first-person plural pronouns, third-person plural pronouns, positive emotion, negative emotion, anxiety, anger, sadness, and risk, biological processes, thwarted belongingness, perceived burdensomeness, and acquired capacity. All variables were non-negative discrete. The corpus was composed of memoirs written by people who self-identify as having been diagnosed with anorexia. For all research questions, unit of analysis was single words. Each memoir was examined separately. The analysis results of each subcorpus were then averaged to determine results for the corpus.

For the second and third research questions, an *a priori* power analysis for chi-square goodness of test was completed by employing G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). The effect size for this type of analysis is Cohen's *w* (Cohen, 1992). The specific effect size was the average Cohen's *w* reported by a study on the relationship of personality and suicidality (Lewitzka, Denzin, Sauer, Bauer, & Jabs, 2016). The input parameters were: (a) test family = 2; (b) statistical test = goodness of fit tests: contingency tables; (c) type of power analysis = *a priori*: compute required sample size given α , power, and effect size; (d) $w = 0.21$; (e) power ($1 - \beta$ err probability) = 0.90; (f) $\alpha = .05$; and (g) degrees of freedom (df) = 1. The G*Power output noted a sample size of 239 and an actual power of 0.90.

Corpus

Register, Scope and Sources. To construct the corpus, memoirs were used that were included on a list of books recommended in the online database *Gürze-Salucore eating disorders resource catalogue* (Salucore, 2019). In order to achieve adequate statistical power, researchers needed to supplement the corpus with memoirs meeting criteria for the corpus not found on the recommended reading list. Memoirs were found on a list of 50 must-read books about eating disorders published by bookriot.com. The corpus included memoirs written by authors self-identifying as having been diagnosed with anorexia. This study focused on the experience of authors rather than specific *DSM* diagnostic criteria. Memoirs that were excluded included: (1) memoirs not published in English, (2) self-help books, and (3) memoirs written by more than one author. The final selection of books included De Rossi (2010), Oseman (2016), Osgood (2013), Schaefer (2003), and Shavin (2014).

Preprocessing. The software used in this study to convert .kfx files to plain text was Kindle Converter v3.19.918.386 (2019). After preprocessing, the corpus contained 234,987 words and 37,790 types. At the memoir level, the word counts ranged from 263,222 to 89,432 and 5,035 to 10,650 types.

Measures

Linguistic Inquiry and Word Count (LIWC). LIWC2015 contains a dictionary of approximately 6,400 words. This dictionary is divided into 90 subdictionaries, which are also referred to as variables. The linguistic-oriented variables chosen for this study included those known to be associated with a person's level of

social connectedness. The scales used were: first-person singular pronoun, third-person singular pronoun, first-person plural pronoun, and third-person plural pronoun. The psychological variables used for the study included: positive emotion, negative emotion, anxiety, anger, sadness, and risk. In addition, a variable using biological processes was employed. The LIWC psychometric manual reports adequate validity and reliability for this measure (Pennebaker, Boyd, et al., 2015).

Norm Comparison Group For Second And Third Research Questions. The LIWC psychometric manual reported a variety of norms for different registers. Two relevant register norms for the present study were expressive writing and novels. The novel norm was used in this study because the word count was more comparable to the corpus than the expressive writing norm. No norm comparison analyses could be completed with the custom dictionaries because there are no preset LIWC subdictionaries incorporating the custom dictionaries.

Exploratory Custom Dictionaries. Custom dictionaries were developed for the fourth research question. The goal of this question was to explore the relationship of LIWC subdictionaries to core IPT dimensions. The contents for the custom dictionaries were gathered from academic writing on anorexia and suicide, as well as the clinical experience of the authors.

Thwarted Belongingness Custom Dictionary (Thwart-CD). The TBD contains words that convey a feeling of perceived isolation by others. A person can feel connected to many different aspects of the world around them, safeguarding them from the isolating feelings that can contribute to lethal suicide attempts. A list of the words for this custom dictionary can be found in Table 1.

Perceived Burdensomeness Custom Dictionary (Burden-CD). The PBD contains words that communicate an attitude of devaluing oneself, an idea that a person's surroundings would be better off without them. Someone with a high degree of perceived burdensomeness believes that they are a drain on their environment rather than contributing to the people around them. A list of the words for this custom dictionary can be found in Table 1.

Acquired Capacity For Suicide Dictionary (Acquired-CD). The ACSD contains words that capture the presence of obtained ability to overcome one's natural reaction to danger and fear. The words chosen for the dictionary used in this study are specific to the experiences of people diagnosed with eating disorders. Some of the words included in the dictionary are applicable to other populations at risk for suicide, other words included would not be pertinent to populations except for those having experienced eating disorders. A list of the words for this custom dictionary can be found in Table 1.

Apparatus

LIWC. The software used in this study to analyze the data was the Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth et al., 2015). LIWC's most recent revision, LIWC2015, will be used for this study. LIWC2015 features the option to create custom dictionaries, such as the dictionaries created for this study, specific to the eating disorder population (Pennebaker, Booth, Boyd, & Francis, 2015).

Kindle Converter. The software used in this study to convert .kfx files to plain text was Kindle Converter v3.19.918.386 (2019). Once files were converted to plain text files, the files were compatible with use with LIWC.

Data Analysis

For the first and fourth question, the across memoirs' raw count and percentage of all words will be reported for each variable. For the second and third research questions, the log likelihood statistic (*LL*) will be used to assess whether word usage rates in the memoir corpus significantly differ from corresponding known norm rates; for effect size, the Bayesian Information Criterion (BIC) will be reported. BIC strength descriptors were acquired from Fabozzi, Focardi, Rachev, and Arshanapalli (2014). All analyses will be conducted using R, with a family wise error rate of .05, and an adjusted error rate of .0045.

Results

Absolute and relative average usage rates for all variables appear in Table 2. Several significant results were encountered for the second and third research questions. Complete results for these research questions including effect sizes appear in Table 3. For the variables that were statically significant, the obtained effect sizes were Very Strong (i.e., first-person singular word use, third-person singular word use, third-person plural word use, biological processes). The fourth research question was exploratory in nature. The usage rates for the custom dictionaries of thwarted belongingness, perceived burdensomeness, and acquired capacity for suicide appear in Table 4.

Discussion

This study aimed to examine word usage in memoirs written by people diagnosed with anorexia. Linguistic Inquiry Word Count (LIWC) was used to analyze linguistic and psychological processes of the corpus, as well as word usage related to the interpersonal theory of suicide (Joiner et al., 2009). Results of this study inform treatment and prevention when working with clients that have been diagnosed with anorexia.

The results from the first question reveal higher use of first-person language compared to third-person language. One explanation for these results is that someone diagnosed with anorexia does not want companionship and separates themselves socially intentionally. An alternative explanation for the results encountered is that someone with anorexia feels a greater sense of isolation and does not see themselves as a part of a community. Between the former and the latter explanations, the latter is the most likely the cause for more frequent use of first-person language, Joiner et al. (2009) described thwarted belongingness as a fundamental need for connectedness. An increased focus on self implies an increased feeling of thwarted belongingness, putting them at greater risk of self-harm or suicide.

Findings from the second question show greater use of first-person singular, first-person plural and third-person plural in the corpus compared to the novel norm. One likely explanation for the obtained results is that someone with a diagnosis of anorexia has a greater sense of thwarted belongingness and disconnectedness from people around them. An alternative explanation is that someone with a diagnosis of anorexia has

difficulty understanding that objects continue to exist when the person does not recognize them. Among these probable reasons, the initial explanation is most likely the correct one. Anorexia is characterized by an increased sense of social isolation, potentially related to behavior connected to anorexia as well as treatment for anorexia. Social isolation has been recognized in the current body of literature to be the strongest indicator of suicidality (van Orden et al., 2010). It can be concluded that the writing of someone diagnosed with anorexia would reflect a greater sense of isolation and therefore greater risk for suicidality compared to the norm given the high rate of suicide among people diagnosed with anorexia (Arcelus et al., 2011).

The results from the third question reveal higher use of first-person biological language in the corpus compared to the norm. One explanation for the results is that people diagnosed with anorexia are significantly more focused on their body and bodily functions compared to the norm. Another possible explanation is that people diagnosed with anorexia feel confidently and positively about their bodies. Between these two, the most reasonable answer is that people diagnosed with anorexia are more focused on their body and are not experiencing their bodies as being positive. Characteristics of anorexia include negative body image and negative feelings towards their body (American Psychiatric Association, 2013).

The fourth research question explored usage rates of words related to each of Joiner et al.'s (2009) core IPT dimensions. Thwarted belongingness was used more often in the corpus compared to Joiner's (2009) variables acquired capacity and perceived burdensomeness. One interpretation of the results is that someone diagnosed with anorexia experiences significant thwarted belongingness. Another interpretation is that someone diagnosed with anorexia does not experience acquired capacity and perceived burdensomeness to a noteworthy degree. With regards to these interpretations, the first is most probable because increased feelings of thwarted belongingness are the most significant predictor of self-harm or suicide (van Orden et al., 2010), and people diagnosed with anorexia are at risk for self-harm and suicide.

One limitation of the study is the number of memoirs meeting the criteria of the corpus. This could be attributed to issues related to diagnosis of anorexia—misdiagnosis, under diagnosis, and emphasis on comorbid diagnosis rather than anorexia diagnosis. A larger corpus would provide researchers the opportunity to draw conclusions with more certainty.

A second limitation of the study is the impact the diagnostic criteria for eating disorders has on the corpus. The memoirs included in the corpus were published prior to the revisions made to the *Diagnostic Statistical Manual's* diagnostic criteria for eating disorders, including anorexia. Application of the revised criteria holds the potential that people would redefine their experiences with anorexia, both relating with and not relating with having been diagnosed with anorexia. Moreover, Miller, and Golden (2010) found that a significant percentage of people diagnosed with an eating disorder will experience crossover symptoms with another eating disorder diagnosis in their lifetime, most significantly someone that has received a diagnosis of anorexia. These circumstances create a barrier to defining a corpus reflective of the experiences of authors.

This study has implications in the areas of identification of people diagnosed with anorexia and their risk of suicide, treatment, the impact of the current diagnostic criteria for anorexia, and the need for continued research. This study supports the

presence of thwarted belongingness and acquired capacity for suicide within the experience of people diagnosed with anorexia. Therefore, the need for treatment addressing thwarted belongingness and acquired capacity for suicide is stressed by the findings of this study.

Findings from the study accentuated the impact that the revision of the diagnostic criteria for anorexia plays on diagnosis, treatment, and prevention of anorexia. As professionals and patients adapt to the changes made to the diagnostic criteria, these changes will be reflected in the way that people self-identify as having anorexia and treatment approaches, and in understanding risk factors impacting someone diagnosed with anorexia. These dynamics indicate a need for future research with a larger, contemporary, corpus, providing a greater depth of understanding of the experiences of someone diagnosed with anorexia.

This study isolated the significance of thwarted belongingness and acquired capacity for self-harm or suicide on someone diagnosed with anorexia, putting these patients at greater risk for suicide or self-harm. This study highlights the need to add to the current body of research literature applying the current eating disorder diagnostic criteria.

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Table 1***Custom Dictionaries***

Thwarted Belongingness	Perceived Burdensomeness	Acquired Capacity
single*	hopel*	attempt*
reject	ashamed	ideation
lone*	worthl*	pain
abandon*	doubt	cut*
dump*	rely	burn*
neglect*	guilty	hunger
forgot*	help*	scratch*
Empty	usel*	blood
Left	waste	vomit*
distant	difficult	hurt*
homesick		faint*
overlook*		bone

Table 2***LIWC Selected Subdictionary Usage Rates***

Variable	Category	Count	% All Words
1 st person singular	Linguistic	6262	8.08%
Biological	Psych./Physical	3340	4.31%
Positive emotion	Psych./Physical	2127	2.74%
1 st person plural	Linguistic	2059	2.66%
Negative emotion	Psych./Physical	1749	2.26%
3 rd person singular	Linguistic	466	0.60%
3 st person plural	Linguistic	451	0.58%
Risk	Psych./Physical	442	0.57%
Anger	Psych./Physical	433	0.56%
Sadness	Psych./Physical	423	0.55%
Anxiety	Psych./Physical	399	0.51%

*Results reported are averages for the five memoirs.

Table 3***Results Comparisons to Known Norms***

Variable	Anorexia Count	Expected Count	Norm Count	Expected Count	<i>LL</i>	<i>BIC</i>	BIC Description
1 st person sing.	6262	4324.65	1728	3666.35	2036.27	2024.39	Very Strong
1 st person plural	2059	2821.23	3154	2391.77	448.05	436.18	Very Strong
3 rd person plural	451	570.96	605	484.04	57.16	45.29	Very Strong
Biological	3340	2579.31	1426	2186.69	507.16	495.29	Very Strong
3 rd person sing.	466	469.21	401	397.79	0.05	-11.82	Trivial
Positive emotion	2127	2100.9	1755	1781.1	0.71	-11.17	Trivial
Negative emotion	1749	1686.35	1367	1429.65	5.09	-6.79	Trivial
Anxiety	399	372.34	289	315.66	4.18	-7.69	Trivial
Anger	433	415.63	335	352.37	1.59	-10.29	Trivial
Sadness	423	424.29	361	359.71	0.01	-11.86	Trivial
Risk	442	427.54	348	362.46	1.07	-10.8	Trivial

Note. Family-wise error rate = .05, adjusted error rate = .0045, $Df = 1$, critical value = 8.05

Table 4***LIWC Custom Dictionary Usage Rates***

Variable	Category	Count	% All Words
Thwarted	Custom	104	0.13%
Burdensomeness	Custom	89	0.11%
Acquired capacity	Custom	71	0.09%

Note. Results reported are averages for the five memoirs.