A Corpus Linguistic Analysis of Pro-Nonsuicidal Self-Injury Public Tumblr Posts Written in Spanish (Un Estudio de Lingüística de Corpus de Publicaciones Públicas de Tumblr a las Pró Autolesiones No Suicidas en Español)

Kristeen E. Elrod¹ and Cass Dykeman
Oregon State University

Abstract

Rates of nonsuicidal self-injury (NSSI), especially high among adolescents, are associated with comorbid disorders including depression, anxiety, post-traumatic stress disorder, and eating disorders. Hispanic adolescents engage in NSSI at rates similar to or higher than their Caucasian counterparts, but little research exists on Spanish-language markers of mental health. This study, harnessing data from the social media platform Tumblr, collected pro-NSSI public blog posts written in Spanish and analyzed their content with Linguistic Inquiry and Word Count (LIWC) software. Pro-NSSI linguistic properties, psychological linguistic properties, and signature words were analyzed, and results revealed that, of pro-NSSI terms, *reasons for NSSI* was the most frequently used category in posts. This result aligns with the literature because words associated with negative emotions are commonly presented in the dominant language within trauma narratives. Evaluation of linguistic properties indicated that users could be code-switching to avoid encountering overwhelming emotions, a practice common among bilingual individuals. The psychological properties of these blog posts had an emphatically negative emotional tone when written in Spanish and a more concrete and less emotionally charged tone when users switched to English. This research suggests benefits to assessing bilingual clients for pro-NSSI and online-posting behaviors, while underscoring both the need for improved evidence-based practices for treating trauma in bilingual clients and, broadly speaking, the importance of Spanish and code-switching norms for blogs and social media platforms. *Keywords:* NSSI, LIWC, linguistic analysis, mental health, self-injury; *Palabras Claves:* lingüística de corpus, pró autolesiones no suicidas (ANS), salud mental, LIWC

Introduction

Online communities use distinctive linguistic practices to define terms of membership, build solidarity among members, share practices internally, and distinguish themselves from outsiders. Language plays an important role in signaling a shared identity and is subject to ongoing adaptation. In online communities where membership is discouraged by content-banning

1. Correspondence concerning this article should be addressed to Kristeen E. Elrod, Counseling Academic Unit, elrodk@oregonstate.edu

or blocking, linguistic variations of hashtags grow more popular, complex, and detached from original spellings, usage, and context. For parents, teachers, and clinicians, this can be confusing, diminishing the understanding enjoyed by these individuals, as well as their access to the community and their ability to provide care and support.

The literature on the social media posting habits of pro-nonsuicidal self-injury (NSSI) communities centers on five basic themes: (a) the prevalence of NSSI, (b) the prevalence of NSSI in Hispanic communities, (c) the prevalence of social media use, (d) the presence of pro-NSSI communities on social media, and (e) the lack of education for parents, teachers, and clinicians on pro-NSSI terms in Spanish. The research questions driving this study will be presented and considered in more detail following a thorough review of each of the above themes.

Described as the “deliberate destruction of one’s own body tissue in the absence of conscious suicidal intent,” NSSI is not a new phenomenon (Moreno, Ton, Selkie, & Evans, 2016; Nock & Favazza, 2009). Self-harm and NSSI involve behaviors such as cutting, burning, picking, scratching, interfering with wound healing, and hitting an object until injuring oneself, and they could take on potentially more dangerous forms such as breaking bones or poisoning oneself (Thyssen & van Camp, 2014). One study found 15% of adolescents inclined toward such behaviors, with the rate for college-age individuals approaching 35% (Kerr, Muehlenkamp, & Turner, 2010). Importantly, NSSI is associated with comorbid disorders such as depression, post-traumatic stress disorder, generalized anxiety disorder, and eating disorders (Bentley, Nock, & Barlow, 2014), warranting NSSI’s classification as a transdiagnostic issue for further study in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, American Psychiatric Association, 2013). Particularly for migrant Hispanics, the focus of the second of the five primary themes considered in this review of the literature, these risk factors include fragmented family structure, family conflict, parental criticism, transnational stress, bullying, and experiences with violence, as well as acculturation issues for the individual and family (Benjet et al., 2017).

Regarding the third theme in this discussion of the research surrounding NSSI, social media has changed ways that people seek support from and interact with others. Online support groups can provide guidance and a sense of community for both positive and negative behaviors. Some support groups promote self-harm as a lifestyle and help their members maintain this lifestyle at great cost to their health and relationships (Chancellor, Kalantidis, Pater, De Choudhury, & Shamma 2017). The pervasiveness of social media affects the behavior and choices of adolescents and young adults who could be engaging in self-harm and who are experiencing ongoing mental health issues. Research suggests adolescents and young adults spend about nine hours per day on social media, while checking social media sites approximately 100 times per day (Wallace, 2015). On social media platforms, NSSI is especially interesting given how peer and media influences can encourage ongoing behaviors (Moreno et al., 2016).

Turning to the fourth theme in this review, among the most common social media platforms for teens and young adults are Instagram (Pew Research Center, 2018) and Tumblr (Pew Research Center, 2015). Both sites have been criticized for continuing to allow online communities promoting nonsuicidal self-injury behaviors, eating disorders, and suicide. Given its secretive nature, NSSI can be tremendously isolating; thus, a community can offer understanding and/or a sense of belonging for those in need of succor (Joiner, Van Orden, Witte, & Rudd, 2009). While Instagram and Tumblr have attempted to eliminate these communities, warning users about their content, blocking hashtags, and so on, the communities continue to thrive (Matsakis, 2018). Banning or eliminating these communities entirely could be dangerous for their members, because online cohorts could be a user's only lifeline. That said, pro-NSSI communities can also trigger NSSI urges and normalize or reinforce NSSI behaviors (Brown et al., 2018).

Turning to the fifth and final theme, Linguistic Inquiry and Word Count (LIWC, pronounced "Luke") software can analyze language used by and specific to pro-NSSI communities (Pennebaker, Booth, Boyd, & Francis, 2015). In a manner akin to the way species must adapt to survive in nature, online pro-NSSI communities have evolved, changing the language they use to communicate and interact with one another. And yet, research has yet to appreciate this transformation, especially regarding Spanish content.

Thus, this study focused on words and phrases associated with NSSI, written in Spanish and appearing in public social media posts on Tumblr. Tumblr was chosen because it is used more by teens and young adults (ages 13–24), ages coinciding, in most cases, with the onset of NSSI behaviors. Understanding characteristics and contextual factors influencing Spanish-speaking pro-NSSI communities is a critical mental health and social justice matter, especially given the growth of the Hispanic population in the United States (Gulbas, Hausmann-Stabile, De Luca, Tyler, & Zayas, 2015).

Inspired by the above themes and building on the aforementioned literature, four questions guided this study. First, in public pro-NSSI Tumblr posts written in Spanish, what was the use rate of pro-NSSI-related word categories? Second, in public pro-NSSI Tumblr posts written in English, what was the use rate of pronoun categories? Third, in public pro-NSSI Tumblr posts written in English, did the use rate of pronoun categories differ from norms for such posts? And, fourth, in public pro-NSSI Tumblr posts written in Spanish, did the use rate of the psychological process categories differ from norms for such posts?

Method

Design

This study employed a synchronic corpus linguistic design (Weisser, 2017). The unit of analysis was single words (Bjekić, Lazarević, Živanović, & Knežević, 2014). The variables for the

first research question included the following word categories: (a) methods of NSSI, (b) cutting-specific terms, (c) NSSI terms, (d) instruments used, (e) reasons for NSSI, and (f) hidden-hashtag terms. The variables for the second and third research questions involved the word categories first-person singular pronoun, third-person singular pronoun, first-person plural pronoun, and third-person plural pronoun. The variables for the fourth research question included (a) negative emotion, (b) anxiety, (c) anger, (d) sadness, (e) cognitive process, (f) insight, (g) body, (h) health, (i) ingestion, (j) risk, and (k) death.

All variables were reported as a percentage of total words. There were three sub-corpora in this study: (a) Spanish-only, (b) English-only, and (c) Mixed. In terms of the third and fourth research questions, the comparison norm for all corpora was Twitter’s set of blog norms in English. There are currently no blog norms for Spanish or mixed-language situations that might serve as respective baselines for the Spanish-only and Mixed sub-corpora.

The inferential analysis used in this study was a log-likelihood (LL) ratio test, a test that evaluates goodness-of-fit to a hypothesized distribution. Since the LL ratio can be approximated by Pearson’s χ^2 , a priori power analysis for a χ^2 test was employed using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). The proper effect size is Cohen’s w (Rosnow & Rosenthal, 2003). The effect size input was the average of the Cohen’s w reported in a study on self-harm that was relevant to the present study (Harned, Najavits, & Weiss, 2006). Given the number of comparisons planned, the α level was set at .0033. The specific input parameters were: (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), $w = 0.52$, (e) power (1- β error probability) = 0.9, (f) $\alpha = .0033$, and (g) degrees of freedom = 1. The G*Power 3.1 output included a sample size of 78 and an actual power of 0.90.

Corpus

Scope. Tumblr’s Application Programming Interface (API) was used to collect public posts occurring between October 23, 2017 and October 23, 2018. The API was instructed to scrape posts that included Spanish in the post and/or hashtags, deployed hashtags identifying the post as pro-NSSI (e.g., #autolesiones signified *self-harm*), and originated in a North, Central, or South American country. The API was instructed to eliminate the following while collecting text: user names, URLs, location, names, photographs, comments left by other users, and direct quotes. Between October 23, 2017 and October 23, 2018, 1,868 posts and associated hashtags were collected (<https://www.tumblr.com/docs/en/api/v2>).

Construction. Captions for and hashtags associated with posts were scrutinized, and collected posts were entered into an Excel document. First, posts written in any language other than English or Spanish were excluded, and then posts written entirely in English were excluded. The corpus, which contained posts in Spanish, posts where whole sections were in English or

Spanish, and posts with mixed language (switching between English and Spanish in the same section), were then separated into three sub-corpora for analysis at the section level. These sub-corpora were: (a) English-only, including sections of the post, either its caption or hashtags, which were entirely in English, while the rest of the post had Spanish language, (b) Spanish-only, including sections of the post where either the caption or hashtags were entirely in Spanish, and (c) Mixed, including sections of the post where code-switching occurred in the caption or hashtag.

Preprocessing. Posts in all sub-corpora were pre-processed using procedures outlined in the LIWC operator’s manual and a supplement to this manual (Department of Psychological Services, 2015; Pennebaker, Booth et al., 2015). This cleaning involved the following processes: (a) all abbreviations were spelled out (e.g., “max” became *maximum*), (b) NSSI Slang (words used to hide NSSI-related Instagram posts) was not normalized (Moreno et al., 2016), and (c) textese was translated into standard spelling. Once the text was ready for analysis, the file was processed by LIWC software.

Size. The size of the Spanish-only sub-corpus was 42,661 tokens. The English-only sub-corpus contained 9,814 tokens. The Mixed sub-corpus included 4,299 tokens.

Measures

The measures used were selected scales from the LIWC scales and the first author’s Spanish adaptation of the Greaves NSSI Linguistic Scales (Greaves & Dykeman, 2019). Scores for all variables represented a percentage of all words used. The LIWC scales were pre-set scales contained in the LIWC software. Pennebaker, Boyd, Jordan, and Blackburn (2015) reported adequate reliability and validity for these scales. The reference norms used for comparison to the present results were Twitter norms contained in the LIWC psychometric manual (Pennebaker, Boyd et al., 2015). Internal reliability and external validity of LIWC software were well documented (Pennebaker, Boyd et al., 2015). Six NSSI-specific measures were employed.

GNLS_S-Methods of NSSI. Methods of NSSI are ways people engage in nonsuicidal self-injury, a broad category including all manner of self-harming behavior. Some examples of NSSI methods include biting (*mordiendo*), burning (*quemando*), erasing (*borrando*), hitting (*golpeando*), and picking (*raspando*).

GNLS_S-Cutting-Specific Terms. Cutting is a specific category under methods of NSSI. Since cutting is one of the most common methods of nonsuicidal self-injury, it has its own sub-category. Two examples for this category are the seed words *cut* (*cortar*) and *cutting* (*cortando*)

GNLS_S- NSSI Terms. Some examples of NSSI terms include *nonsuicidal* (*no suicida*), *NSSI* (*ANS*), *suicide* (*suicida*) and the seed word *self-mutil* (*automutilacion*).

GNLS_S-Instruments Used. This category includes tools people use to engage in NSSI behaviors, instruments such as blades (navaja), bleach (blanqueador), erasers (borrador), and fingernails (unas).

GNLS_S-Reasons for NSSI. There are many reasons why people choose to engage in NSSI behaviors, including feeling angry (enojo), anxious (ansiedad), or empty (vacío), seeking attention (atención), and desiring control (control).

GNLS_S-Hidden Hashtag Terms. To evade recently imposed restrictions, those who engage in NSSI behaviors and who post about their activities on social media have become more creative with the hashtags they use to communicate with others engaging in NSSI. Some of their new, “hidden” hashtags include #mifamiliasecreta, #munecas, and #cortadas.

Pronouns

LIWC was employed to assess the frequency of the following four pronoun types: first-person singular, third-person singular, first-person plural, and third-person plural.

Psychological Processes

The LIWC software was also used to assess 10 psychological processes. These processes, with the words that represented them in parentheses, included negative emotion (nasty), anxiety (worried), anger (hate), sadness (crying), cognitive processes (know), insight (consider), body (hands), health (flu), ingestion (dish), and death (coffin).

Comparison Norms

English Twitter norms contained in the LIWC psychometric manual were used to evaluate the three sample corpora (Pennebaker, Boyd et al., 2015). There are currently no Spanish or mixed-language blog norms available for comparison. While English and Spanish are syntactically dissimilar languages, it is reasonable to assume a roughly one-to-one correspondence between English nouns and Spanish nouns in terms of word count (Bailey, McIntyre, Arreola, & Venta, 2019). Thus, the second sub-corpus (Spanish-only) was compared to English Twitter norms for psychological process categories.

Apparatus

The LIWC software has been updated several times, but this study relied on the 2015 English version and the 2007 Spanish version. LIWC2015 offered new dictionaries, including more social words and cognitive-process words (Pennebaker, Booth, et al., 2015). The LIWC program can be utilized to review and analyze many kinds of written text. For the English sub-corpus, the

English LIWC2015 dictionary was used; the Spanish LIWC2007 dictionary was used for the Spanish sub-corpus; and, finally, the Mixed sub-corpus was analyzed using both the English LIWC2015 and Spanish LIWC2007 dictionaries, as recommended by Pennebaker (personal communication, October 30, 2018). LIWC analysis returned results for 90 output variables (i.e., LIWC categories), and LIWC category scores represented the percentage of total words used for the sample. Words could belong to more than one category.

Data Analysis

For the first and second research questions, raw count and percentage of total words used were reported for each variable. For the third and fourth questions, the LL test was used to compare the sub-corpora to norms (Rayson & Garside, 2000). The Bayesian Information Criterion (BIC) was the effect-size measure reported (Brezina, 2018). Analyses were completed using *R*. Given the large number of hypothesis tests conducted, a Bonferroni correction was used to reduce the chance of a Type I error.

Results

The first research question looked at word-usage rates, specifically among pro-NSSI word categories, in three groups of sub-corpora. Across all sub-corpora, the most common NSSI-specific category was *reasons for NSSI*. Complete results can be found in Table 1. For the second and third research questions, the linguistic process category that differed most from the English Twitter blog norms was *first-person singular* (LL = 40.21). The effect size for this category was BIC = 30.74, where anything greater than 10 was considered large. The linguistic process category *third-person singular* also differed from English Twitter blog norms (LL = 27.78), with the effect size of BIC = 18.3. So, too, did the linguistic process category *first-person plural* differ from English Twitter blog norms (LL = 20.85), yielding an effect size of BIC = 11.38. The results for these research questions can be found in Tables 2 and 3. Finally, regarding the fourth research question, in the English sub-corpus, the psychological process category that differed most from English Twitter blog norms was *health* (LL = 151.79, BIC = 142.32). In the Spanish sub-corpus, the psychological process category that differed most from English Twitter blog norms was *negative emotions* (LL = 261.61, BIC = 250.87). In the Mixed sub-corpus, the psychological process category that differed most from English Twitter blog norms was *negative emotions* (LL = 256.38, BIC = 247.46). The complete results for this research question can be found in Tables 4, 5, and 6.

Discussion

This study examined language used in public pro-NSSI blogs written in Spanish and posted on Tumblr, focusing specifically on differences in the use of language in Spanish pro-NSSI blogs as compared to blogs overall. With regard to the first research question, where *reasons for*

NSSI was used most across sub-corpora, two explanations can account for these results. The first is that words in the *reasons for NSSI* category (e.g., anger, anxiety, and sadness) are more associated with words suggestive of negative emotions. These negative emotion words, particularly during the recall or recollection of traumatic incidents, arise more often when communicants use their dominant language (i.e., Spanish) (Bailey et al., 2019), which is likely the case during posts about self-injury. The alternative explanation is that engaging in this community is a way to belong and feel understood among peers, facilitating discussions about the impulse to harm oneself. Between these two explanations, the former is the most plausible, because past research has demonstrated a relationship between self-injurious behavior and negative emotion-generating experiences such as childhood abuse.

The results from the second and third research questions revealed that pronoun use differed from English Twitter norms most frequently and significantly as *first-person singular*, followed by *third-person plural* and *first-person plural*. Two explanations could account for these results. First, the use of the first-person singular pronoun could indicate depression and perceived lower social status (Pennebaker, 2011). The English sub-corpus included language taken from posts where Spanish had been used, which assumes that the user is bilingual and also switched languages within the post. When bilingual individuals use their non-dominant language to discuss emotional issues, it can also be a way for them to create distance from or avoid their emotional experience and associated vulnerability. Self-harm is a way to avoid directly confronting intense emotions, so it would make sense that bilingual individuals who engage in self-harm might code-switch when discussing their experience in order to avoid those same intense emotions.

Second, it could be that the presence of code-switching denotes greater acculturation, thereby influencing pronoun use. Between these two explanations, the former is more likely because the sample was taken from Tumblr posts originating in North, Central, and South America. While acculturation, or adaptation of attitudes and behaviors to a host culture, might be influencing posts from some countries in this region, it does not accurately explain the code-switching occurring in posts from Spanish-dominant countries with native dominant culture.

The results from the fourth research question revealed the psychological process word-use patterns across all three pro-*NSSI* sub-corpora. The most striking result was for *negative emotion*. With the sub-corpora that contained Spanish, this category ranked first in effect size; however, in the case of the English sub-corpus, *health* ranked first, with *negative emotion* a distant second.

There could be two explanations for this result. First, research has shown that expression in the non-dominant language might be more concrete and less emotionally charged (Bailey et al., 2019), explaining why *health* could be substantially greater than *negative emotion* in the second-language-only sub-corpus. Second, it could be that the obtained results were encountered because Romance languages permit greater expression of emotionality than Germanic languages. Between these options, the former is most likely the correct explanation for two reasons. First, on a psycho-

lexical level, these language groups are similar (Ashton et al., 2004). Second, the former conjecture is consistent with prior research suggesting that people who engage in self-harm are in immense pain and would be expected to use a negative emotional tone to express their sadness. Pennebaker (2013) suggested that those who use negative emotional language do not benefit from writing about it and continue to dwell on it. Writing or posting on Tumblr, then, does not help individuals process these emotions; instead, it can contribute to a cycle where they carry on with the same feelings and behaviors.

While these data are compelling, there are a few admitted limitations to this study. First, words can be polysemous, and words in LIWC could appear in more than one category, somewhat skewing the data. To control for this potential and to avoid confusion, the data were reviewed before being analyzed by LIWC software. Second, only public Tumblr posts from North, Central, and South American countries were considered in this study. It is possible that people who post on Tumblr are doing so through a private account; but they could also be Spanish speakers who do not happen to reside in countries within North, Central, or South America. This combination of factors could fail to account for the entirety of the population. Third, the meanings of words can vary across languages. This study used a Spanish-language corpus, but it also relied on Spanish, English, and Mixed sub-corpora because of the phenomenon of code-switching. And there were no Spanish or mixed-language blog norms to use for comparison. As such, while the effect size for this study was large, inferences drawn from these data should be colored by the above concerns.

This study reveals two implications for practitioners and one implication for researchers. First, this research suggests what to inquire about when encountering client NSSI behaviors or ideation—that is, which lines of inquiry about specific NSSI behaviors and online activities should be pursued. Asking clients about NSSI and online behaviors is a necessary skill for counselors because these may not be topics adolescent clients would bring up on their own, and these topics might not be covered by standard assessment questions. This is important if clients are bilingual and if their dominant language is Spanish.

Second, this study points to the need to consider bilingualism with clients with NSSI issues. These clients often feel isolated and might be reaching out to online communities where they are not shamed and where they might feel more understood. The language of their distress could be seen in the frequency of their negative emotional tone or in their sadness. Such distress could be overwhelming to counselors; yet, no options have been specifically designed for evidence-based treatment of NSSI (Washburn et al., 2012). This implication is further highlighted by the shortage of bilingual or Spanish-speaking counselors. This study, like prior research, suggests that narration in trauma-focused therapies might be less successful, leaving counselors feeling stuck when treating these clients (Karp & Vogeley, 2016).

With increased access to online platforms and the growing number of Spanish-speaking adolescents in the United States, researchers and practitioners must continue to explore the language used by these communicants and must adapt in new ways so as to responsibly serve these individuals. Software such as LIWC can reveal psychological processes and patterns of behavior around a variety of mental health issues, and these results can direct parents, teachers, and counselors on how to intervene, perhaps also shedding insight on the process of recovery.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Ashton, M. C., Lee, K., Perugini, M., Szarota, P., de Vries, R. E., Di Blas, L., . . . De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology*, *86*, 356–366. <http://dx.doi.org/10.1037/0022-3514.86.2.356>
- Bailey, C., McIntyre, E., Arreola, A., & Venta, A. (2019). What are we missing? How language impacts trauma narratives. *Journal of Child & Adolescent Trauma*, 1–9. <https://doi.org/10.1007/s40653-019-00263-3>
- Benjet, C., Gonzalez-Herrera, I., Castro-Silva, E., Mendez, E., Borges, G., Casanova, L., & Medina-Mora, M. E. (2017). Non-suicidal self-injury in Mexican young adults: Prevalence, associations with suicidal behavior and psychiatric disorders, and DSM-5 proposed diagnostic criteria. *Journal of Affective Disorders*, *215*, 1–8. <https://doi.org/10.1016/j.jad.2017.03.025>
- Bentley, K. H., Nock, M. K., & Barlow, D. H. (2014). The four-function model of nonsuicidal self-injury: Key directions for future research. *Clinical Psychological Science*, *2*(5), 638–656. <https://psycnet.apa.org/doi/10.1177/2167702613514563>
- Bjekić, J., Lazarević, L. B., Živanović, M., & Knežević, G. (2014). Psychometric evaluation of the Serbian dictionary for automatic text analysis-LIWCser. *Psihologija*, *47*, 5–32. <https://doi.org/10.2298/PSI1401005B>
- Brezina, V. (2018). *Statistics in corpus linguistics: A practical guide*. Cambridge, UK: Cambridge University Press.
- Brown, R. C., Fischer, T., Goldwich, A. D., Keller, F., Young, R., & Plener, P. L. (2018). #cutting: Non-suicidal self-injury (NSSI) on Instagram. *Psychological Medicine*, *48*(2), 337–346. <https://doi.org/10.1017/S0033291717001751>
- Chancellor, S., Pater, J., Clear, T., Gilbert, E., & De Choudhury, M. (2016). #thyghgapp: Instagram content moderation and lexical variation in pro-eating disorder communities. *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*, 1201–1213. <https://doi.org/10.1145/2818048.2819963>
- De Muth, J. E. (2014). *Basic statistics and pharmaceutical statistical applications*. Danvers, MA: Chapman and Hall/CRC.

- Department of Psychological Services. (2015). *Reformatting transcripts for LIWC 2015*. Lubbock, Texas; Author. Retrieved from:
<http://www.depts.ttu.edu/psy/lusi/files/liwc2015transcriptioncleaning.pdf>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149–1160. <http://dx.doi.org/10.3758/BRM.41.4.1149>
- Feder, P. I. (1975). The log likelihood ratio in segmented regression. *The Annals of Statistics*, *3*(1), 84–97. <https://www.jstor.org/stable/2958080>
- Greaves, M. M., & Dykeman, C. (2019, February 3). A corpus linguistic analysis of public Tumblr blog posts on non-suicidal self-injury. <https://doi.org/10.31234/osf.io/k4qt3>
- Gulbas, L. E., Hausmann-Stabile, C., De Luca, S. M., Tyler, T. R., & Zayas, L. H. (2015). An exploratory study of non-suicidal self-injury and suicidal behaviors in adolescent Latinas. *American Journal of Orthopsychiatry*, *84*(4), 302–314.
<http://dx.doi.org/10.1037/ort0000073>
- Harned, M. S., Najavits, L. M., & Weiss, R. D. (2006). Self-harm and suicidal behavior in women with comorbid PTSD and substance dependence. *The American Journal on Addictions*, *15*, 392–395. <https://doi.org/10.1080/10550490600860387>
- Hull, K., Kim, J. K., & Stillwell, M. (2018): Fotos de béisbol: An examination of the Spanish-language Instagram accounts of Major League Baseball teams. *Howard Journal of Communications*, *30*, 249–264. <https://doi.org/10.1080/10646175.2018.1471756>
- Joiner, T. E., Jr., Van Orden, K. A., Witte, T. K., & Rudd, M. D. (2009). *The interpersonal theory of suicide: Guidance for working with suicidal clients*.
<http://dx.doi.org/10.1037/11869-000>
- Karp, M., & Voge, C. Does anyone still understand me? Psychotherapy and multilingualism. *Verhaltenstherapie*, *26*(3), 156–157. <https://doi.org/10.1159/000448818>
- Kerr, P., Muehlenkamp, J., & Turner, J. (2010). Nonsuicidal self-injury: A review of current research for family medicine and primary care physicians. *Journal of the American Board of Family Medicine* *23*(2), 240–259. <https://doi.org/10.3122/jabfm.2010.02.090110>
- Matsakis, L. (2018). How pro-eating disorder posts evade filters on social media. Retrieved from <https://www.wired.com/story/how-pro-eating-disorder-posts-evade-social-media-filters/>
- McNamara, P., McLaren, D., & Durso, K. (2007). Representation of the self in REM and NREM dreams. *Dreaming*, *17*(2), 113–126. <http://dx.doi.org/10.1037/1053-0797.17.2.113>
- Moreno, M. A., Ton, A., Selkie, E., & Evans, Y. (2016) Secret society 123: Understanding the language of self-harm on Instagram. *Journal of Adolescent Health*, *58*(1), 78–84.
<http://dx.doi.org/10.1016/j.jadohealth.2015.09.015>
- Nock, M. K., & Favazza, A. R. (2009). Non-suicidal self-injury: Definition and classification. In M. K. Nock (Ed.), *Understanding non-suicidal self-injury: Origins, assessment, and treatment* (pp. 9–18). Washington DC: American Psychological Association.
- O’Dea, B., Larsen, M. E., Batterham, P. J., Caele, A. L., & Christensen, H. (2017). A linguistic analysis of suicide-related Twitter posts. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, *38*, 319–329. <https://doi.org/10.1027/0227-5910/a000443>

- Pennebaker, J. W. (2011). *The secret life of pronouns: What our words say about us*. New York, NY: Bloomsbury Press.
- Pennebaker, J. W., Booth, R. J., Boyd, R. L., & Francis, M. E. (2015). *Linguistic Inquiry and Word Count: LIWC2015* (Operator's Manual). Austin, TX: Pennebaker Conglomerates, Inc.
- Pennebaker, J. W., Boyd, R. L., Jordan, K., & Blackburn, K. (2015). *The development and psychometric properties of LIWC2015*. Austin, TX: Pennebaker Conglomerates, Inc.
- Pew Research Center (2015). Demographics of Tumblr. Retrieved from http://www.pewinternet.org/2015/08/19/mobile-messaging-and-social-media-2015/2015-08-19_social-media-update_05
- Pew Research Center (2018). Social media use in 2018. Retrieved from <http://www.pewinternet.org/2018/03/01/social-media-use-in-2018>
- Rayson, P., & Garside, R. (2000). Comparing corpora using frequency profiling. *Proceedings of the Workshop on Comparing Corpora*, 9, 1–6. <http://dx.doi.org/10.3115/1117729.1117730>
- Rosnow, R. L., & Rosenthal, R. (2003). Effect sizes for experimenting psychologists. *Canadian Journal of Experimental Psychology*, 57, 221–237. <http://dx.doi.org/10.1037/h0087427>
- Thyssen, L. S., & van Camp, I. (2014). Non-suicidal self-injury in Latin America. *Salud Mental*, 4(37), 153–157. <https://psycnet.apa.org/doi/10.17711/SM.0185-3325.2014.019>
- Wang, S., Eccleston, C., & Keogh, E. (2015). The role of spatial frequency information in the recognition of facial expressions of pain. *Pain*, 156, 1670–1682. <https://doi.org/10.1097/j.pain.0000000000000226>
- Wallace, K. (2015, November 3). Teens spend a ‘mind boggling’ 9 hours a day using media. Retrieved from <https://www.cnn.com/2015/11/03/health/teens-tweens-media-screen-use-report/index.html>
- Wardecker, B. M., Edelstein, R. S., Quas, J. A., Cordo, I. M., & Goodman, G. S. (2017). Emotion language in trauma narratives is associated with better psychological adjustment among survivors of childhood sexual abuse. *Journal of Language and Social Psychology*, 36(6), 628–653. <http://dx.doi.org/10.1177/0261927X17706940>
- Washburn, J. J., Richardt, S. L., Styer, D. M., Gebhardt, M., Juzwin, K. R., Yourek, A., & Aldridge, D. (2012). Psychotherapeutic approaches to non-suicidal self-injury in adolescents. *Child and Adolescent Psychiatry and Mental Health*, 6(14). <https://doi.org/10.1186/1753-2000-6-14>
- Weisser, M. (2016). *Practical corpus linguistics: An introduction to corpus-based language analysis*. Hoboken, NJ: John Wiley & Sons, Inc.

Table 1

Nonsuicidal Self-Injury Item Word Count

	Pro-NSSI English %	Pro- NSSI English Count	Pro-NSSI Spanish %	Pro-NSSI Spanish Count	Pro-NSSI Mixed %	Pro-NSSI Mixed Count
Reasons for NSSI	.0288	283	.0482	2056	.221	950
NSSI Terms	.0058	57	.049	2090	.1868	803
NSSI Instruments Used	.0001	1	.014	597	.0126	54
Cutting-Specific Terms	0	0	.0005	21	0	0
Hidden-Hashtag Terms	0	0	0	0	0	0

Table 2

English Pronoun Word Count

	Pro-NSSI English %	Pro- NSSI English Count	Blog Norms English %	Blog Norms English Count	Total %	Total Count
All Words	75.37%	9814	24.63%	3206	100%	13020
First-Person Singular	9.89%	971	6.26%	201	9.00%	1171
Third-Person Singular	0.50%	49	1.50%	48	0.75%	97
Third-Person Plural	0.53%	52	0.68%	22	0.57%	74
First-Person Plural	0.25%	25	0.91%	29	0.41%	54

Table 3

English Pronoun Test Results

Pronoun	Pro- NSSI English Observed Count	Pro- NSSI English Expected Count	Blog Norms English Observed Count	Blog Norms English Expected Count	Family- Wise Error Rate	Adjusted Error Rate	<i>df</i>	<i>cv</i>	<i>LL</i>	<i>BIC</i>
First- Person Singular	971	882.63	201	288.37	0.05	0.003	1	8.6	40.21	30.74
Third- Person Singular	49	73.11	48	23.89	0.05	0.003	1	8.6	27.78	18.3
First- Person Plural	25	40.7	29	13.3	0.05	0.003	1	8.6	20.85	11.38
Third- Person Plural	52	55.78	22	18.22	0.05	0.003	1	8.6	1	-8.48

Table 4

Spanish Psychological Process Category Test Results

Category	Pro- NSSI Spanish Observed Count	Pro- NSSI Spanish Expected Count	Blog Norms English Observed Count	Blog Norms Expected Count	Family- Wise Error Rate	Adjusted Error Rate	<i>df</i>	<i>cv</i>	<i>LL</i>	<i>BIC</i>
Neg. E.	4049	3827.33	66	287.67	0.05	0.0036	1	8.49	261.61	250.87
Sadness	1898	1779.27	14	133.73	0.05	0.0036	1	8.49	182.03	171.29
Cog. Pro.	9245	8943.78	371	672.22	0.05	0.0036	1	8.49	171.44	160.71
Health	1851	1740.2	20	130.8	0.05	0.0036	1	8.49	153.38	142.65
Death	1135	1060.31	5	79.69	0.05	0.0036	1	8.49	126.84	116.11
Anger	1506	1421.18	22	106.82	0.05	0.0036	1	8.49	105.08	94.34
Anxiety	431	409.24	9	30.76	0.05	0.0036	1	8.49	22.53	11.8
Insight	1566	1524.42	73	114.58	0.05	0.0036	1	8.49	18.46	7.73
Body	678	652.93	24	49.07	0.05	0.0036	1	8.49	16.77	6.03
Ingestion	375	365.53	17	27.47	0.05	0.0036	1	8.49	2.87	-7.86

Table 5

English Psychological Process Category Test Results

Category	Pro- NSSI English Observed Count	Pro- NSSI English Expected Count	Blog Norms English Observed Count	Blog Norms Expected Count	Family- Wise Error Rate	Adjusted Error Rate	<i>df</i>	<i>cv</i>	<i>LL</i>	<i>BIC</i>
Health	464	364.81	20	119.19	0.05	0.0033	1	8.62	151.79	142.32
Neg. E.	604	505	66	165	0.05	0.0033	1	8.62	95.29	85.82
Sadness	218	174.87	14	57.13	0.05	0.0033	1	8.62	56.75	47.27
Death	96	76.13	5	24.87	0.05	0.0033	1	8.62	28.49	19.01
Anger	158	135.67	22	44.33	0.05	0.0033	1	8.62	17.32	7.84
Anxiety	94	77.63	9	25.37	0.05	0.0033	1	8.62	17.31	7.84
Cog. Pro.	1339	1288.89	371	421.11	0.05	0.0033	1	8.62	8.14	-1.34
Body	109	100.25	24	32.75	0.05	0.0033	1	8.62	3.32	-6.15
Insight	265	254.76	73	83.24	0.05	0.0033	1	8.62	1.72	-7.75
Ingestion	65	61.81	17	20.19	0.05	0.0033	1	8.62	.7	-8.78

Table 6

Mixed Psychological Process Category Test Results

Category	Pro- NSSI Mixed Observed Count	Pro- NSSI Mixed Expected Count	Blog Norms English Observed Count	Blog Norms Expected Count	Family- Wise Error Rate	Adjusted Error Rate	<i>df</i>	<i>cv</i>	<i>LL</i>	<i>BIC</i>
Neg. E.	1519	907.86	66	677.14	0.05	0.0036	1	8.49	1256.38	1247.46
Sadness	1131	655.84	14	489.16	0.05	0.0036	1	8.49	1133.16	1124.24
Death	910	524.1	5	390.9	0.05	0.0036	1	8.49	960.63	951.7
Health	627	370.59	20	276.41	0.05	0.0036	1	8.49	554.37	545.44
Anger	554	324.2	22	241.8	0.05	0.0036	1	8.49	457.68	448.76
Cog. Pro.	261	362.57	371	270.43	0.05	0.0036	1	8.49	63.03	54.11
Anxiety	98	61.29	9	45.71	0.05	0.0036	1	8.49	62.75	53.82
Ingestion	50	38.95	17	29.05	0.05	0.0036	1	8.49	6.76	-2.17
Body	58	46.97	24	35.03	0.05	0.0036	1	8.49	6.32	-2.6
Insight	126	113.98	73	85.02	0.05	0.0036	1	8.49	3.01	-5.91