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ORIGINAL RESEARCH REPORT

Distinguishing Between Need Support and Regulatory Focus with LIWC

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The need-support model bridges regulatory focus theory and self-determination theory. Research on this model has shown that support of needs for autonomy, competence, and relatedness (key constructs in self-determination theory) is higher in experiences of pursuing hopes versus duties (key constructs in regulatory focus theory). The current research used LIWC 2015's standard dictionary to examine differences between descriptions of high and low support of these needs (N = 941), descriptions of pursuing hopes and duties (N = 1,047), high need support and hopes, and low need support and duties. As expected, descriptions of high need support and hopes were more emotionally positive than low need support and duties, whereas high need support and duties showed more attention to social relationships than low need support and hopes. These and additional findings of this research support the need-support model's proposal that regulatory focus and need support do not reduce to each other.

Keywords: regulatory focus theory; self-determination theory; LIWC; autonomy; competence; relatedness; need-support model; promotion; prevention

The following scenario is from a research participant who described an experience of feeling free to make decisions and to do the things they wanted, feeling competent, and feeling connected to others. In many ways, it is representative of what participants wrote about experiences high in support of needs for autonomy, competence, and relatedness. "I was invited to stay with some friends from out of town for a few days to celebrate my birthday. I was doing really well in all aspects of my life at that time and had no problem asking for and getting the time off from work to accept this invitation."

The next scenario is from a research participant who described an experience of pursuing a hope or aspiration – something they ideally wanted to do. In many ways, it is representative of what participants wrote about experiences of pursuing their hopes. "I wanted to be recognized for my academic success this year, so I entered into a writing contest and won. In addition to the reward from the contest, my school gave me an award for the paper I wrote. I love to write and was doing what I wanted to do."

These scenarios are similar in their positive emotional tone, but they differ in other ways. In general, how different are experiences of high need support from experiences of pursuing hopes? This question is important because it addresses links between two major theories of motivation: self-determination theory (Deci & Ryan, 2000) and regulatory focus theory (Higgins, 1997, 1998). These theories emphasize different kinds of needs. Self-determination theory distinguishes between needs for autonomy, competence, and relatedness, which it proposes are requirements for psychological well-being and help with long-term goal pursuit. Regulatory focus theory distinguishes between needs for growth and security, which it proposes motivate promotion and prevention-focused activity. Promotion-focused goals include fulfilling hopes and gaining good things, whereas prevention-focused goals include fulfilling duties and maintaining the absence of losses. Bridging these theories, the need-support model (Vaughn, 2017b) proposes that support for autonomy, competence, and relatedness can influence and be influenced by promotion and prevention focus. Early tests of this model have been promising (Vaughn, 2017b; also see Kim, Chen, Davis, Hicks, & Schlegel, 2019).

When testing a model that bridges theories, it is natural to emphasize positive relationships between constructs in the theories. For example, initial tests of the need-support model showed that participants reported more need support in the pursuit of hopes than in the pursuit of duties (Vaughn, 2017b). However, it also is important to assess how key constructs are different. One could incorrectly assume that certain constructs are not just distinguishable but are logically independent, which would be one kind of binary-thinking error, or that certain constructs are not just related but are logically the same,

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which would be another kind of binary-thinking error. Both errors are understandable given the complexity of the theories the need-support model bridges, which is why it is crucial to examine differences as well as similarities.

Therefore, the current research examined differences between descriptions of high need support, low need support, pursuing hopes, and pursuing duties. To do so, it examined the language people used to describe these experiences with Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, Boyd, & Francis, 2015). LIWC distinguishes between 81 categories of words, and it counts the percentages of words in a writing sample that fall into each category. Research with LIWC has shown that word usage relates to many psychological processes (for reviews, see Pennebaker, 2011; Tausczik & Pennebaker, 2010). For example, words about positive emotion are more common in descriptions of hopes, and words about social processes are more common in descriptions of duties (Vaughn, 2018).

There are numerous benefits of using LIWC 2015's standard dictionary in the current research. In contrast to trained coders, LIWC produces identical results from the same writing samples every time. Additionally, in contrast to custom-designed dictionaries that researchers can create for LIWC to test specific hypotheses, the word categories in LIWC 2015's standard dictionary were not developed to test any specific hypothesis about need support or regulatory focus.[1]

Self-Determination Theory

Self-determination theory proposes that all people have needs for autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan & Deci, 2000). In this theory, the need for autonomy is not about independence from others; rather, it is about feeling that one is free and supported to express one's true self. Indeed, research shows that autonomy support within a relationship can help partners feel closer to each other (Knee, Hadden, Porter, & Rodriguez, 2013). The need for competence is about feeling that one is capable of taking on and mastering difficult challenges. Relatedness, or the need to belong (Baumeister & Leary, 1995), is about feeling close and connected to others. According to self-determination theory, these needs serve as requirements for psychological well-being, and need support benefits long-term goal pursuit (for reviews, see Deci & Ryan, 2000, 2008; Ryan & Deci, 2000, 2008; Vansteenkiste & Ryan, 2013).

Research shows that bringing to mind experiences of high (vs. low) need support can increase positive mood and subjective well-being (e.g., Houle & Philippe, 2017). Additionally, research shows that LIWC accurately detects emotion (for reviews, see Pennebaker, 2011; Tausczik & Pennebaker, 2010). Thus, I expected that emotional tone would be more positive in descriptions of high need support than in descriptions of low need support.

Relatedness support is about feeling close and connected to others. Thus, I expected that descriptions of high need support would convey more attention to social relationships than descriptions of low need support. LIWC has many categories of words that people could use when describing aspects of social life, including personal pronouns, words about affiliation, and words about friends and family (Pennebaker, Booth, et al., 2015). I did not have strong expectations about which of these specific categories would show reliable differences.

Regulatory Focus Theory

Regulatory focus theory emphasizes two fundamental survival needs that it proposes serve as motives: growth and security (Higgins, 1997, 1998). The need for growth motivates promotion-focused activity, whereas the need for security motivates prevention-focused activity. Compared to people in a prevention focus, those in a promotion focus tend to have higher-intensity positive mood states (Higgins, 1997, 1998; Idson, Liberman, & Higgins, 2000) selectively attend to positive information when distracted (Yoon, Sarial-Abi, & Gürhan-Canli, 2012), and bring to mind more positive information about the self (Scholer, Ozaki, & Higgins, 2014). Accordingly, people in a promotion focus recall events more positively (Pattershall, Eidelman, & Beike, 2012), and people recall promotion-focused experiences as having been more positive (Vaughn, 2017b). In contrast, people in a prevention focus often orient toward maintaining stability and security through managing responsibilities and maintaining harmony with others (Lee, Aaker, & Gardner, 2000), which is consistent with common definitions of duties and obligations (e.g., Buchtel et al., 2018). Not all promotion-focused goals or experiences are explicitly about hopes, and not all prevention-focused goals or experiences are explicitly about duties (e.g., Manczak, Zapata-Geitl, & McAdams, 2014). However, the most commonly used manipulations and measures of regulatory focus use "self-guide definitions" (e.g., Hodis, 2017; Summerville & Roese, 2008). These operationally define promotion in terms of hopes and ideals, and prevention in terms of duties and oughts (e.g., Freitas & Higgins, 2002; Higgins et al., 2001; Kim et al., 2019; Lalot, Quiamzade, & Zerhouni, 2018; Scholer & Miele, 2016; Vaughn, Childs, Maschinski, Niño, & Ellsworth; Vaughn, Harkness, & Clark, 2010; Whitson, Kim, Wang, Menon, & Webster, 2018). Therefore, the current research focused on hopes and duties.

Research with LIWC shows that descriptions of hopes are more positive in emotional tone than descriptions of duties, and descriptions of duties focus more on social relationships than descriptions of hopes (Vaughn, 2018). In the current research, I examined how much these findings replicated with a new sample.

Need-Support Model

The need-support model bridges self-determination theory and regulatory focus theory (Vaughn, 2017b). It proposes that regulatory focus can influence subjective need support, and vice-versa. The three studies in the foundational tests of this model provided support for these predictions (Vaughn, 2017b). Study 1 showed that recalled experiences of hopes (vs. duties) were higher in need support. Study 2 showed that recalled experiences of higher (vs. lower) need support were more about hopes and less about duties. Study 3 varied regulatory focus with a gain versus maintain-framed performance task.

Participants in the promotion-focused, gain condition reported that their lives as a whole were higher in need support than participants in the prevention-focused, maintain condition, showing that regulatory focus can affect subjective need support. Vaughn's (2017b) Studies 1 and 2 provided some of the data for the current research, because these studies were the ones that asked participants to describe an experience.

For reasons noted above, I expected that descriptions of duties would show more attention to social relationships than descriptions of low need support. Likewise, I expected that descriptions of hopes would show less attention to social relationships than descriptions of high need support.

I also expected that descriptions of duties would be more positive in emotional tone than descriptions of low need support. The reason is that in Studies 1 and 2 of Vaughn's (2017b) research, participants reported much higher support for autonomy, competence, and relatedness in duties conditions than in low need-support conditions. In contrast, participants reported more similar need support in hopes and high need support conditions.[2]

The Current Research

In short, I expected that descriptions of high need support and hopes would be more positive in emotional tone than descriptions of low need support and duties. Additionally, I expected that descriptions of high need support and duties would show more attention to social relationships than descriptions of low need support and hopes. I intended the current results for hypothesis generation as well as hypothesis testing. Therefore, I examined differences on all word categories that participants used at least 0.5% of the time in the respective studies. There were many such categories. To reduce the likelihood of Type 1 errors, minimize the number of comparisons to interpret, and maximize transparency of analyses, I used *t*-tests with Bonferoni-adjusted *p*-values and high minimum Cohen's *d*s, instead of more complex analyses that were more forgiving of multiple comparisons. I also emphasize the results that replicated across samples.

General Methods

I recruited participants for these studies through Amazon's Mechanical Turk (MTurk) website. These studies took about 3–5 minutes to complete, so workers received US $0.30–$0.50 for participating. Data collection for these studies occurred October 2014–March 2016.

Data Sets

Table 1 shows the data sets, manipulations, word counts, participant exclusion criteria, and demographic information. Some of the studies in the current paper are secondary analyses of studies in the foundational tests of the need-support model (Vaughn, 2017b). Vaughn (2017a) describes these data sets in detail. The study labeled Vaughn (2018) in the current research is a published LIWC analysis of participants' descriptions of pursuing hopes and duties from Vaughn's (2017b) Studies 1a–1c. The current Study 1b and Study 2 are previously unpublished.

Reporting

I report all measures, manipulations, and exclusions in these studies through the page containing the writing samples. These studies did not have a back button, so participants' responses to subsequent questions could not have affected their responses to the writing questions. All data and materials are available for others to investigate (osf.io/m2cyn). The data files include .sav, .dat, and codebook files, as well as .docx files containing the writing samples. I analyzed data with SPSS 25 and JASP (JASP Team, 2018, Version 0.9.0.1).

Participants and Exclusion Criteria

For ease of comparing the results of the current Studies 1a and Vaughn (2018) with the same studies in the earlier research, I used exactly the same participants. Therefore,

Table 1: Data Sets, Manipulations, Word Counts, Participant Exclusion Criteria, and Basic Demographic Information.

Study in Current Paper	Description	Writing conditions	Excluded Cases	Final Sample	Mean Age	% Female
1a	New LIWC analysis of published data (Vaughn, 2017, Study 2)	High vs. low need support	Second time participating = 18 Did not follow instructions = 2 Not in U.S. or Canada = 5	503	33	49
1b	New LIWC analysis of previously unpublished data	High vs. low need support	Second time participating = 3 Did not follow instructions = 4 Not in U.S. or Canada = 12	438	35	57
2	New LIWC analysis of previously unpublished data	Hope vs. duty	Second time participating = 21 Not in U.S. or Canada = 9	446	34	56
Vaughn (2018)	Published LIWC analysis (Vaughn, 2018, Study 1) of previously-published data (Vaughn, 2017, Study 1)	Hope vs. duty	Second time participating = 3 Did not follow instructions = 6 Not in U.S. or Canada = 7	601	34	51

Note: Participants were MTurk workers with these requirements for participation: resided in the US or Canada, had 500–5000 completed MTurk tasks and at least 95% acceptance of those tasks. Each study used these methods of discouraging multiple responding: Qualtrics's "prevent ballot box stuffing" option and Peer et al.'s (2012) solution.

the exclusion criteria I used in the earlier research were the same ones I used the current Study 1b and Study 2. As described below, 90 responses (4.33%) were excluded from the total sample of 2,078, resulting in a final sample of 1,988 responses.

In the MTurk survey platform, I entered the following participation criteria. Eligible MTurk workers had to reside in the U.S. or Canada, in order to maximize the likelihood of English fluency while permitting relatively easy checking of latitude and longitude data that the survey automatically collected. Participants had to have 500–5000 accepted HITs, in order to exclude "Super Turkers" who have done many studies and are more likely to have seen materials like these before (Chandler, Mueller, & Paolacci, 2014). Participant non-naivety can reduce effect sizes (Chandler, Paolacci, Peer, Mueller, & Ratliff, 2015). Participants also had to have at least 95% acceptance of HITs, to exclude participants with a high rate of poor-quality work.

To discourage multiple responding, I used the "Prevent Ballot Box Stuffing" option in Qualtrics and Peer, Paolacci, Chandler and Mueller's (2012) procedure. Additionally, I checked the comma-separated values files from MTurk that contained participants' MTurk identifiers to find any participants who had done the current study or any of my previous, related studies more than once. When I found multiple responses from a participant, I used only their first response.

The 90 excluded cases, identified by study, condition, and reason for exclusion, are publicly available at osf.io/m2cyn. I have not examined the results with these excluded cases, because most were instances of multiple responding (45 cases; 2.17%) or failure to follow directions on open-ended questions (e.g., leaving the experience description blank or providing a nonsensical answer such as stating that the respondent's age was 2 years; 12 cases; 0.58%). The rest (33 cases; 1.59%) were from individuals who got past the requirement for location that I had entered into the MTurk survey platform. Other researchers are welcome to work with these excluded cases, using the already-published, peer-reviewed data files (Vaughn, 2017a) and/or the complete set of data files for the current investigation at osf.io/m2cyn.

Table 1 reports mean age and the percentage of participants who were female. Data on race/ethnicity, state of residence, occupation, and other demographic variables are available in the data files for Vaughn (2017a, 2017b) and at osf.io/m2cyn.

Power Analyses

I used Faul, Erdfelder, Lang, and Buchner's (2007) software for power analyses. **Table 2** presents the data I used for these analyses. All studies were two-condition, between-subjects experiments. In each study, I analyzed the categories that participants used at least 0.5% of the time. **Table 2** shows the Bonferoni adjustments to $p \leq .05$ for the number of analyses in each study. It also shows the required effect size for 80% power, with the study's sample size and Bonferoni-adjusted significance level, two-tailed. The highest minimum effect size for any study was $d = \pm.402$. To facilitate comparisons across studies, **Table 2** also shows the power to detect $d = \pm.402$ with each study's sample size and Bonferoni-adjusted significance level, two-tailed.

Study 1

This study examined descriptions of high versus low need support. The data set for the current Study 1a is from Vaughn's (2017b) foundational tests of the need-support

Table 2: Data for Power Analyses.

Study in Current Paper	Participants per condition	Number of word categories used more than 0.05% of the time	Bonferoni adjustment to $p \leq .05$	Required effect size for 80% power, with the study's sample size and Bonferoni-adjusted sig. level, two-tailed[a]	Power to detect $d = \pm.402$ with the study's sample size and Bonferoni-adjusted sig. level, two-tailed[a]
1a	High need support: 254 Low need support: 249	59	$p \leq .000847$	$d \geq \pm.375$	87.4%
1b	High need support: 218 Low need support: 220	60	$p \leq .000833$	$d \geq \pm.402$	80.0%
2	Hope: 223 Duty: 224	61	$p \leq .000820$	$d \geq \pm.399$	81.0%
Vaughn (2018)	Hope: 299 Duty: 302	62	$p \leq .000806$	$d \geq \pm.344$	94.0%
Combined sample	High need support: 472 Hope: 522	58	$p \leq .000862$	$d \geq \pm.266$	99.9%
Combined sample	Low need support: 469 Duty: 526	64	$p \leq .000781$	$d \geq \pm.268$	99.8%

Note: [a] I used G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) for power analyses.

model, whereas the current Study 1b is a previously unpublished study. I expected that descriptions of high (vs. low) need support would be more positive in emotional tone and indicate more attention to social relationships. The main text reports any differences between conditions that reached the minimum *p*-value and Cohen's *d* for their respective study. All analyses are included in the supplementary materials, including those not described in the main text.

Method

Materials and Procedure

Writing task

In Study 1a, the first page of stimulus materials was titled "A Personal Experience," and it asked participants to write about a personal experience of high versus low need support; instructions were based on Milyavskaya, Nadolny, and Koestner's (2014) Study 1. Specifically, participants in the high need-support condition wrote about a time when "You were free to make decisions and to do the things you want, you felt competent, and you felt connected to others." Participants in the low need-support condition wrote about a time when "You had a lot of pressures you could do without, you felt less competent than you would like to be, and you felt like you were not particularly connected to others." The text samples were from this page.

In Study 1b, the first page of stimulus materials was titled "An Activity You Engage in." It randomly assigned participants to write about an activity where they experience high versus low need support; instructions were from Milyavskaya et al.'s (2014) Study 1 (p. 704). Specifically, participants in the high need-support condition wrote about an activity that was like the following description: "This activity is important to you, you are free to make decisions and to do the things you want, and you feel competent and connected to others." Participants in the low need-support condition wrote about an activity that was like the following description: "This activity is important to you, but it makes you feel pressured or constrained, less competent than you would like to be, and not particularly connected to others."

Pages after the writing task

Participants next completed several pages of questions about the experience they described.[3] At the end of the questionnaire, participants arrived at a page where they provided demographic information and their impressions of the study. Finally, participants received a debriefing page and a code to indicate they had done the study on MTurk.

Linguistic Analyses

I analyzed the writing samples using LIWC (Pennebaker, Booth, et al., 2015), which calculates the percentages of words in a writing sample that match up with particular categories. Pennebaker, Boyd, Jordan, and Blackburn (2015) detail the development and psychometric properties of the linguistic categories in LIWC 2015. For most LIWC categories, mean values indicate the mean percentages of all of the words in a text sample that fall into a particular category. For example, a mean score of 3.38 for affiliation shows that 3.38% of the words participants used were associated with affliation (e.g., *ally, friend, social*). The exceptions were the mean values for word count, words per sentence, and the summary variables (analytical thinking, authenticity, clout/influence, and emotional tone). To arrive at these summary variables, Pennebaker, Booth, et al. (2015) derived indexes from their lab's previous research and converted them to percentiles based on standardized scores from large samples of writing from comparison groups. The analytical thinking variable is by Pennebaker, Chung, Frazee, Lavergne, and Beaver (2014), the authenticity variable is by Newman, Pennebaker, Berry, and Richards (2003), the clout/influence variable is by Kacewicz, Pennebaker, Davis, Jeon, and Graesser (2014), and the emotional tone variable is by Cohn, Mehl, and Pennebaker (2004). In the results sections, I will describe the summary variables that showed significant differences. I prepared the writing samples for LIWC by running each writing sample through Word's standard spell-check program and correcting spelling errors. These errors were rare.

Results

I examined between-condition differences on all word categories that participants used at least 0.5% of the time. In the supplementary materials at osf.io/m2cyn, Tables S1 and S3 show the means and standard deviations for all of the 81 LIWC word categories in Studies 1a and 1b. I used these means to determine the categories to include in the between-condition analyses. These tables also contain examples of each word type (Pennebaker, Boyd, et al., 2015).

Table 2 shows the Bonferoni adjustments to $p \leq .05$. It also shows the minimum effect sizes for determining statistical significance in the current studies. **Tables 3** and **4** show the word categories on which there were differences between conditions that met or exceeded these minimums in Studies 1a and 1b, respectively. In the supplementary materials, Tables S2 and S4 show the condition statistics and tests of all between-condition differences on the word categories that participants used more than 0.5% of the time in Studies 1a and 1b, respectively. Positive *t*-values indicate higher scores in the high need-support condition. For context, Tables S13 and S14 in the supplementary materials show the condition means for the word categories that showed significant differences in Studies 1a and 1b, along with base rates of word usage in other forms of writing: blogs, expressive writing, novels, natural speech, *New York Times*, and Twitter (Pennebaker, Boyd et al., 2015).

Representative Examples of High versus Low Need Support

To make the results more concrete, I selected the following examples. These represent the patterns of significant differences between conditions.

Table 3: Study 1a: Condition Statistics and Tests of Between-Condition Differences on LIWC Word Categories used at least 0.5% of the Time.

Word Type	Examples	High NS		Low NS		Tests of between-condition differences				
		M	*SD*	*M*	*SD*	*df*	*t*	Mean diff.	95% CI	*d*
High NS higher										
Clout/influence	[a]	26.53	25.25	17.46	19.74	477.41	4.50	9.07	[5.10, 13.05]	0.400
Emotional tone	[b]	69.53	31.15	23.69	29.17	499.96	17.04	45.84	[40.55, 51.13]	1.519
Personal pronouns	I, them, her	14.72	5.64	12.77	4.25	470.43	4.35	1.94	[1.07, 2.82]	0.388
Interrogatives	how, when, what	3.17	3.59	1.65	1.87	382.89	5.98	1.52	[1.02, 2.03]	0.531
Positive emotion	love, nice, sweet	3.94	3.66	1.59	2.18	413.96	8.80	2.36	[1.83, 2.88]	0.781
Causation	because, effect	2.81	3.84	1.53	2.05	387.75	4.70	1.28	[0.74, 1.82]	0.416
Drives	ally, win, danger	11.12	6.56	8.59	6.57	500.77	4.32	2.53	[1.38, 3.68]	0.385
Reward	take, prize, benefit	2.05	2.65	1.12	1.75	439.78	4.62	0.92	[0.53, 1.32]	0.410
Low NS higher										
Auxiliary verbs	am, will, have	7.99	4.88	10.16	4.47	498.68	−5.21	−2.17	[−2.99, −1.35]	−0.464
Negations	no, not, never	0.60	1.44	2.61	2.30	412.54	−11.71	−2.01	[−2.35, −1.67]	−1.049
Negative emotion	hurt, ugly, nasty	0.20	0.74	3.29	3.28	272.45	−14.51	−3.09	[−3.50, −2.67]	−1.306
Anxiety	worried, fearful	0.06	0.40	1.40	2.19	264.36	−9.50	−1.34	[−1.62, −1.07]	−0.855
Tentative	maybe, perhaps	1.26	2.13	2.39	2.41	491.97	−5.54	−1.13	[−1.52, −0.73]	−0.495
Differentiation	hasn't, but, else	1.84	2.68	3.73	3.02	491.79	−7.45	−1.90	[−2.40, −1.40]	−0.665

Note: NS = need support. To limit the potential for false-positive results in the linguistic analyses, I set a conservative limit for statistical significance at $p < .001$, two-tailed, and $d \geq \pm.375$. Degrees of freedom are adjusted for heterogeneity of variance. Mean values indicate the mean percentage of all of the words that participants used that fell into a particular category, except the mean values for words per sentence and the summary variables (clout and tone). [a] The clout/influence variable is by Kacewicz et al. (2014). [b] The emotional tone variable is by Cohn et al. (2004).

Study 1a. The first two examples are from the high need-support condition:

> When I was the leader of a work group, I was free to select people for my team and I was able to select the best and be as great as we could be. I enjoyed the process greatly.
>
> When I joined the military and I was on my own. It felt good to finally be on my own and independent. I was making a lot of new friends who I became very close with.

The next two examples are from the low need-support condition:

> I was in college and had a full time job. I felt like I couldn't put 100% into everything and I was concerned with only those things. I didn't have time for my social life or my family.
>
> I was a project manager and in over my head a little with a new project and new project team members. It was a bit overwhelming to feel that way and not have anyone I trusted to talk with about it.

Study 1b. The first two examples are from the high need-support condition:

> Playing guitar in a small local band. For me it's a great outlet and lets me be myself and express myself. I feel very much connected to my band mates, almost like a second family.
>
> I serve on a non-profit board. It is enjoyable for both a sense of purpose and the social interaction. The members value each other's opinions. Best of all, we work to put smiles on children's faces.

The next two examples are from the low need-support condition:

> I take a regular water fitness class that meets these criteria. I feel somewhat pressured to get the best workout possible, while contending with my

Table 4: Study 1b: Condition Statistics and Tests of Between-Condition Differences on LIWC Word Categories used at least 0.5% of the Time.

Word Type	Examples	High NS		Low NS		Tests of between-condition differences				
		M	*SD*	*M*	*SD*	*df*	*t*	Mean diff.	95% CI	*d*
High NS higher										
Analytical thinking	[a]	59.29	29.55	45.86	33.16	431.18	4.48	13.43	[7.53, 19.32]	0.427
Clout/influence	[b]	35.06	29.37	23.22	27.49	436.00	4.36	11.84	[6.50, 17.18]	0.416
Emotional tone	[c]	81.30	28.35	44.33	36.83	410.91	11.78	36.97	[30.79, 43.14]	1.124
Positive emotion	love, nice, sweet	7.54	7.93	4.34	6.00	404.01	4.75	3.20	[1.88, 4.52]	0.455
Social processes	mate, talk, they	8.32	7.48	5.38	7.01	433.59	4.26	2.95	[1.59, 4.31]	0.407
Friends	buddy, neighbor	1.06	2.66	0.22	0.84	371.71	4.48	0.84	[0.47, 1.21]	0.428
Affiliation	ally, friend, social	5.37	6.58	2.43	6.80	259.86	4.47	2.94	[1.69, 4.20]	0.440
Low NS higher										
Auxiliary verbs	am, will, have	5.69	4.47	9.04	6.46	390.08	−6.30	−3.34	[−4.39, −2.30]	−0.601
Common adverbs	very, really	3.05	3.23	5.15	4.52	396.37	−5.61	−2.10	[−2.84, −1.37]	−0.535
Negations	no, not, never	0.50	1.32	1.63	1.89	391.77	−7.27	−1.13	[−1.44, −0.82]	−0.694
Negative emotion	hurt, ugly, nasty	0.22	0.74	2.46	2.81	249.89	−11.45	−2.24	[−2.63, −1.86]	−1.090
Anxiety	worried, fearful	0.06	0.43	1.12	1.72	246.88	−8.84	−1.06	[−1.30, −0.82]	−0.842
Cognitive processes	cause, know, ought	10.00	7.01	14.30	8.36	424.28	−5.83	−4.30	[−5.75, −2.85]	−0.557
Differentiation	hasn't, but, else	2.22	2.84	3.68	3.39	424.47	−4.90	−1.46	[−2.05, −0.88]	−0.468
Feel	feels, touch	1.14	2.09	2.25	2.58	419.52	−4.93	−1.11	[−1.55, −0.66]	−0.471

Note: NS = need support. To limit the potential for false-positive results in the linguistic analyses, I set a conservative limit for statistical significance at $p < .001$, two-tailed, and $d \geq \pm.402$. Degrees of freedom are adjusted for heterogeneity of variance. Mean values indicate the mean percentage of all of the words that participants used that fell into a particular category, except the mean values for words per sentence and the summary variables (analytical thinking, clout, and tone). [a] The analytical thinking variable is by Pennebaker et al. (2015). [b] The clout/influence variable is by Kacewicz et al. (2014). [c] The emotional tone variable is by Cohn et al. (2004).

clumsy body. I am friendly with the other students but not particularly close.

Doing transcription jobs on MTurk is like that for me. I need to make money, and think I could achieve a reasonable hourly rate through transcription jobs, but my typing speed is not up to snuff.

Results across Studies 1a and 1b

To facilitate comparing results across studies, **Table 7** shows all of the variables with a between-condition difference of $d \geq \pm.402$ in at least one study. This *d* was the highest minimum for achieving statistical significance in any of the four studies. Bold font shows the *d*s $\geq \pm.402$, and underlined *d*s show differences that were statistically significant in their respective studies.

As expected, participants' descriptions of high need support were more positive in emotional tone than their descriptions of low need support. Emotional tone is a combination of positive emotion words and negative emotion words, on which higher scores indicate positive emotion (Cohn et al., 2004). Anxiety words are a subcategory of negative emotion words.

Consistent with the prediction about attention to social relationships, scores on the clout/influence summary variable were higher in descriptions of high need support. The clout/influence variable summarizes a pattern of pronoun use that shows attention to others: more use of first-person plural pronouns (e.g., *we*, *us*, *our*) and second-person pronouns (e.g., *you*, *your*) and less use of first-person singular pronouns (e.g., *I*, *me*, *my*; Kacewicz et al., 2015).

The following differences were ones that I did not predict. Negations (e.g., *no, not, never*), differentiation words (e.g., *hasn't, but else*), and auxiliary verbs (e.g., *am, will, have*) were more common in descriptions of low need support.

Discussion

As expected, descriptions of high need support were more positive in emotional tone and showed more attention to social relationships than descriptions of low need support. The most consistent evidence about attention to social relationships was on the clout/influence variable. This variable summarizes a pattern of pronoun use that indicates paying more attention to others (more *we* and

you) and being less self-focused (less *I* and *me*), which is more common among people higher in social influence (Kacewicz et al., 2014; Pennebaker, 2011).

There were also differences that I did not anticipate. Across Studies 1a and 1b, descriptions of high need support used fewer negations, differentiation words, and auxiliary verbs. Negations and differentiation words are so-called exclusive words (Pennebaker, 2011; Tausczik & Pennebaker, 2010), which people use to distinguish between what is and is not in a category (e.g., Newman et al., 2003; Pennebaker, 2011). Additionally, differentiation words are a subcategory of cognitive-process words, which people use when they are trying to figure something out (e.g., Pennebaker, 2011). Auxiliary verbs are more common in passive voice and informal writing (Tausczik & Pennebaker, 2010) and in writing by people lower in social status (Pennebaker, 2011). These findings suggest that participants in low need-support conditions attended more to trying to understand negative experiences in which they did not feel influential.

Study 1a asked about an experience participants have had, whereas Study 1b asked about an activity participants engage in. This difference allowed for a check of the robustness of findings across slightly different writing prompts. Future research could examine effects of identical writing prompts, or of writing prompts that are more different.

Study 2 and Vaughn (2018)

These studies examined descriptions of pursuing hopes versus duties. The current Study 2 is previously unpublished, and the study called Vaughn (2018) in the current research is Vaughn's (2018) Study 1. I expected the results from Vaughn's (2018) LIWC analyses to replicate in Study 2. For example, I expected descriptions of hopes to be more positive in tone and descriptions of duties to indicate more attention to social relationships. All analyses are included in the Supplementary Materials, including those not described in the main text.

Method

Materials and Procedure

In Study 2 and Vaughn (2018), the first page of stimulus materials was titled "A Personal Experience." This page randomly assigned participants to write about either a promotion-focused experience ("You were doing what you ideally wanted to, in order to fulfill a hope or aspiration you had") or a prevention-focused experience ("You were doing what you believed you ought to, in order to fulfill a duty or obligation you had"). Participants' text samples were from this page.

Participants next completed several pages of questions about the experience they described.[4] At the end of the questionnaire, participants arrived at a page where they provided demographic information and their impressions of the study. Finally, participants received a debriefing page and a code to indicate they had done the study on MTurk. I prepared the writing samples for LIWC by running each writing sample through Word's standard spell-check program and correcting spelling errors, which were rare.

Results

I analyzed between-condition differences on all word categories that participants used at least 0.5% of the time. In the supplementary materials at osf.io/m2cyn, Tables S5 and S7 show the means and standard deviations for all 81 LIWC word categories in Study 2 and Vaughn (2018).

Table 2 shows the Bonferoni adjustments to $p \leq .05$ and the minimum effect sizes for determining statistical significance in these studies. **Tables 5** and **6** show the word categories that had significant between-condition differences in Study 2 and Vaughn (2018). In the supplementary materials, Tables S6 and S8 show the condition statistics and tests of all between-condition differences on the word categories that participants used more than 0.5% of the time in Study 2 and Vaughn (2018). Positive *t*-values indicate higher scores in the hopes condition. For context, Tables S15 and S16 in the supplementary materials show the condition means for the word categories that showed significant differences in Study 2 and Vaughn (2018), along with base rates of word usage in other forms of writing (Pennebaker, Boyd et al., 2015).

Representative Examples of Hopes versus Duties

The first example is from the hopes condition in Study 2, and the second example is from the hopes condition in Vaughn (2018, p. 4):

> I wanted to go to school to get my BA degree from college. This was important to me because I overcame a learning disability as a child. I studied hard and made sure I did well. I am pleased to say in 1999, I received my BA degree.
>
> Once, I wanted to learn how to sew. I bought a sewing machine and started researching on the internet. I started out small and sewed a dress. Now, I am able to sew very well and make some extra money from learning to do this.

The next example is from the duties condition of Study 2, and the final example is from the duties condition of Vaughn (2018, p. 4):

> Recently, my aunt had to work and was unable to pick up my cousin from college. My cousin can't drive and although he and I aren't very close, I decided to pick him up from school to help my aunt.
>
> I was babysitting my younger cousin who is 5 years old, and I refused to let her eat packaged ramen noodles for lunch because I thought it was unhealthy. She got upset, but I ignored it because I believe her physical health was more important.

Results across Study 2 and Vaughn (2018)

To facilitate comparing results across studies, **Table 7** shows all of the variables with a between-condition difference of $d \geq \pm.402$ in at least one study. Bold font shows the *d*s $\geq \pm.402$, and underlined *d*s show differences that were statistically significant in their respective studies.

Table 5: Study 2: Condition Statistics and Tests of Between-Condition Differences on LIWC Word Categories used at least 0.5% of the Time.

Word Type	Examples	Hopes		Duties		Tests of between-condition differences				
		M	*SD*	*M*	*SD*	*df*	*t*	Mean diff.	95% CI	*d*
Hopes higher										
Emotional tone	[a]	61.77	34.27	43.13	34.48	599.00	6.64	18.63	[13.13, 24.14]	0.580
Words with more than six letters	–	18.88	12.64	13.66	8.15	379.11	5.158	5.19	[3.21, 7.27]	0.488
Positive emotion	love, nice, sweet	3.82	4.32	2.27	3.06	536.24	5.09	1.56	[0.96, 2.16]	0.465
Reward	take, prize, benefit	3.56	5.06	1.80	2.83	466.50	5.24	1.75	[1.10, 2.41]	0.425
Work	job, majors, read	9.72	9.27	5.88	6.55	535.95	5.87	3.84	[2.56, 5.13]	0.448
Duties higher										
LIWC dictionary words	–	91.28	8.58	94.31	6.03	398.04	–4.32	–3.03	[–4.41, –1.65]	–0.409
Total function words	it, to, no, very	53.33	10.33	58.40	8.46	599.00	–6.58	–5.07	[–6.58, –3.55]	–0.515
Total pronouns	I, them, itself	15.54	7.13	19.24	6.93	599.00	–6.45	–3.70	[–4.83, –2.57]	–0.536
Personal pronouns	I, them, her	12.31	6.02	14.80	6.02	599.00	–5.07	–2.49	[–3.46, –1.53]	–0.517
Third person singular	she, her, him	0.20	1.07	1.86	3.48	358.05	–7.93	–1.66	[–2.08, –1.25]	–0.651
Negations	no, not, never	0.42	1.10	1.27	2.13	452.50	–6.16	–0.85	[–1.12, –0.57]	–0.631
Negative emotion	hurt, ugly, nasty	0.41	1.37	1.53	2.95	426.97	–5.98	–1.12	[–1.49, –0.75]	–0.450
Social processes	mate, talk, they	4.39	6.23	9.82	8.70	545.33	–8.82	–5.44	[–6.65, –4.22]	–0.691
Family	daughter, dad, aunt	0.70	2.64	2.01	3.65	548.25	–5.04	–1.31	[–1.82, –0.80]	–0.482
Female references	girl, her, mom	0.31	1.60	2.03	4.30	383.37	–6.49	–1.72	[–2.24, –1.19]	–0.487
Differentiation	hasn't, but, else	1.31	2.35	2.67	3.48	528.34	–5.66	–1.37	[–1.84, –0.89]	–0.602

Note: To limit the potential for false-positive results, I set a conservative limit for inclusion in this table at $p < .001$, two-tailed, and $d \geq \pm.399$. Degrees of freedom are adjusted for heterogeneity of variance. Mean values indicate the mean percentage of all of the words that participants used that fell into a particular category, except the mean values for words with more than six letter, LIWC dictionary words, and the summary variable (tone). [a] The emotional tone variable is by Cohn et al. (2004).

References to social processes were more frequent in descriptions of duties. Words about social processes include references to family (e.g., *daughter, dad, aunt*) and to females (e.g., *girl, her, mom*), which also showed significant differences. Additionally, words about social processes include third-person singular pronouns and personal pronouns, which are subcategories of total pronouns, all of which showed large differences between conditions.

Function words were more frequent in descriptions of duties. This category of words includes pronouns, articles (e.g., *a, an, the*), prepositions (e.g., *up, with, in, for*), auxiliary verbs (e.g., *is, don't, have*), negations (e.g., *no, not, never*), conjunctions (e.g., *but, and, because*), quantifiers (e.g., *few, most, some*), and common adverbs (e.g., *very, really*). People use function words more when they provide context for someone's thoughts, feelings, and behaviors (e.g., Pennebaker, 2011).

Negations and differentiation words were more frequent in descriptions of duties. These words distinguish between what is and is not in a category (e.g., Newman et al., 2003; Pennebaker, 2011). Additionally, differentiation words are a subcategory of cognitive-process words, which people use when they are trying to figure something out (e.g., Pennebaker, 2011).

In descriptions of hopes, emotional tone was more positive, and there were more references to reward (e.g., *take, prize, benefit*) and work (e.g., *job, majors, read*). Categories of emotional content included positive emotion, negative emotion, and tone, all of which showed significant differences between conditions.

Discussion

Study 2 replicated many of the findings in Vaughn's (2018) Study 1. Across the two studies, descriptions of duties were more about social processes, family, and other people, and they used more negations, differentiation words, and function words. In contrast, descriptions of hopes were more positive in emotional tone, and they referred more to reward and work. These findings suggest

Table 6: Vaughn (2018): Condition Statistics and Tests of Between-Condition Differences on LIWC Word Categories used at least 0.5% of the Time.

Word Type	Examples	Hopes		Duties		Tests of between-condition differences				
		M	*SD*	*M*	*SD*	*df*	*t*	Mean diff.	95% CI	*d*
Hopes higher										
Analytical thinking	[a]	69.01	28.30	53.94	32.77	588.19	6.04	15.07	[10.17, 19.98]	0.492
Emotional tone	[b]	61.77	34.27	43.13	34.48	599.00	6.64	18.63	[13.13, 24.14]	0.542
Positive emotion	love, nice, sweet	3.82	4.32	2.27	3.06	536.24	5.09	1.56	[0.96, 2.16]	0.416
Achievement	win, success, better	4.38	5.38	2.38	3.85	539.66	5.24	2.00	[1.25, 2.75]	0.428
Reward	take, prize, benefit	3.56	5.06	1.80	2.83	466.50	5.24	1.75	[1.10, 2.41]	0.429
Work	job, majors, read	9.72	9.27	5.88	6.55	535.95	5.87	3.84	[2.56, 5.13]	0.479
Leisure	cook, chat, movie	2.89	5.64	0.90	2.09	377.53	5.73	1.99	[1.31, 2.67]	0.469
Duties higher										
Clout/influence	[c]	24.73	23.57	34.59	30.00	569.65	−4.48	−9.86	[−14.19, −5.54]	−0.365
Words per sentence	–	15.52	6.68	18.26	8.05	599.00	−4.53	−2.73	[−3.92, −1.55]	−0.369
Total function words	it, to, no, very	53.33	10.33	58.40	8.46	599.00	−6.58	−5.07	[−6.58, −3.55]	−0.537
Total pronouns	I, them, itself	15.54	7.13	19.24	6.93	599.00	−6.45	−3.70	[−4.83, −2.57]	−0.526
Personal pronouns	I, them, her	12.31	6.02	14.80	6.02	599.00	−5.07	−2.49	[−3.46, −1.53]	−0.414
Third person singular	she, her, him	0.20	1.07	1.86	3.48	358.05	−7.93	−1.66	[−2.08, −1.25]	−0.645
Conjunctions	and, but, whereas	4.69	4.05	6.62	4.47	599.00	−5.55	−1.93	[−2.62, −1.25]	−0.453
Negations	no, not, never	0.42	1.10	1.27	2.13	452.50	−6.16	−0.85	[−1.12, −0.57]	−0.501
Negative emotion	hurt, ugly, nasty	0.41	1.37	1.53	2.95	426.97	−5.98	−1.12	[−1.49, −0.75]	−0.487
Social processes	mate, talk, they	4.39	6.23	9.82	8.70	545.33	−8.82	−5.44	[−6.65, −4.22]	−0.718
Family	daughter, dad, aunt	0.70	2.64	2.01	3.65	548.25	−5.04	−1.31	[−1.82, −0.80]	−0.411
Female references	girl, her, mom	0.15	0.93	0.92	2.70	371.71	−4.63	−0.76	[−1.09, −0.48]	−0.376
Male references	boy, his, dad	0.31	1.60	2.03	4.30	383.37	−6.49	−1.72	[−2.24, −1.19]	−0.528
Differentiation	hasn't, but, else	0.41	1.70	1.38	3.54	433.92	−4.29	−0.97	[−1.41, −0.52]	−0.348
Affiliation	ally, friend, social	1.31	2.35	2.67	3.48	528.34	−5.66	−1.37	[−1.84, −0.89]	−0.451

Note: To limit the potential for false-positive results, I set a conservative limit for inclusion in this table at $p < .001$, two-tailed, and $d \geq \pm.344$. Degrees of freedom are adjusted for heterogeneity of variance. Mean values indicate the mean percentage of all of the words that participants used that fell into a particular category, except the mean values for words per sentence and the summary variables (analytical thinking, tone, and clout). [a] The analytical thinking variable is by Pennebaker et al. (2015). [b] The emotional tone variable is by Cohn et al. (2004). [c] The clout/influence variable is by Kacewicz et al. (2014).

that descriptions of duties were more about figuring out and managing social relationships, whereas descriptions of hopes were about success at work.

The writing prompts in the current hopes and duties studies were identical, which was a strength and a weakness of these studies. On the one hand, the direct replication allowed for a check of the robustness of the findings in different samples. No effects that reached significance in one study were entirely absent or in the opposite direction in the other. On the other hand, the direct replication did not allow for a check of the robustness of findings across even slightly different writing prompts. Future research could examine effects of different operational definitions of promotion and prevention focus (e.g., expanding your horizons vs. sticking with what you know, for promotion vs. prevention; cf. Vaughn, Bauman, & Klemmann, 2008).

Combined Dataset for the Four Studies

I combined the datasets for the current studies to examine differences between descriptions of hopes and high need support, and between descriptions of duties and low need support. I expected that descriptions of hopes would convey less attention to social relationships than descriptions of high need support. Additionally,

Table 7: LIWC Word Categories with Between-Condition Differences of d ≥ ±.402 in at Least One Study.

LIWC category	High versus low need support		Hope versus duty	
	Study 1a	Study 1b	Study 2	Vaughn (2018)
Analytical thinking	0.088	**0.427**	0.385	**0.492**
Clout/influence	0.400	**0.416**	–0.169	–0.365
Emotional tone	**1.519**	**1.124**	**0.580**	**0.542**
Words per sentence	–0.199	–0.243	–0.312	–0.369
Words with more than six letters	0.181	–0.008	**0.488**	0.343
LIWC dictionary words	–0.124	–0.123	**–0.409**	–0.310
Total function words	–0.257	–0.245	**–0.515**	**–0.537**
Total pronouns	0.305	0.078	**–0.536**	**–0.526**
Personal pronouns	0.388	0.231	**–0.517**	**–0.414**
Third-person singular	–0.036	0.032	**–0.651**	**–0.645**
Auxiliary verbs	**–0.464**	**–0.601**	–0.074	–0.120
Common adverbs	–0.002	**–0.535**	–0.022	–0.116
Conjunctions	0.262	0.033	–0.340	**–0.453**
Negations	**–1.049**	**–0.694**	**–0.631**	**–0.501**
Interrogatives	**0.531**	0.116	0.025	–0.156
Positive emotion	**0.781**	**0.455**	**0.465**	**0.416**
Negative emotion	**–1.306**	**–1.090**	**–0.450**	**–0.487**
Anxiety	**–0.855**	**–0.842**	–0.0001	–0.213
Social processes	0.237	**0.407**	**–0.691**	**–0.718**
Family	0.076	0.324	**–0.482**	**–0.411**
Friends	0.294	**0.428**	–0.237	–0.376
Female references	0.104	0.033	**–0.487**	**–0.528**
Cognitive processes	–0.207	**–0.557**	–0.300	–0.262
Causation	**0.416**	–0.047	–0.171	–0.073
Tentative	**–0.495**	–0.387	0.026	0.114
Differentiation	**–0.665**	**–0.468**	**–0.602**	**–0.461**
Feel	–0.199	**–0.471**	–0.240	–0.310
Affiliation	0.363	**0.440**	–0.349	**–0.451**
Achievement	0.347	–0.063	0.316	**0.428**
Reward	**0.410**	0.057	**0.425**	**0.429**
Work	0.150	–0.261	**0.448**	**0.479**
Leisure	**0.440**	0.217	0.187	**0.469**

Note: The variables shown had a between-condition difference $d \geq \pm.402$ in at least one study. The *d*s ≥ ±.402 are in bold font. Underlined *d*s were statistically significant in their respective study. Positive *d*s indicate higher scores in the high (vs low) need-support conditions of Studies 1a and 1b and in the hopes (vs. duties) conditions of Study 2 and Vaughn (2018) Study 1. [a] The analytical thinking variable is by Pennebaker et al. (2015). [b] The clout/influence variable is by Kacewicz et al. (2014). [c] The emotional tone variable is by Cohn et al. (2004).

I expected that descriptions of duties would be more positive in emotional tone and show more attention to social relationships than descriptions of low need support.

Table 2 shows the number of word categories that participants used at least 0.5% of the time in the hopes-high need support and duties-low need support parts of the combined dataset. In the supplementary materials

at osf.io/m2cyn, Tables S9 and S11 show the means and standard deviations for all of the 81 LIWC word categories in these parts of the dataset. I used these means to determine which categories to include in the between-condition analyses.

Table 8 shows the word categories with differences of at least $d \geq \pm.402$ between hopes and high-NS conditions, and **Table 9** shows the word categories with differences of at least $d \geq \pm.402$ between duties and low need-support conditions. I set a conservative limit for inclusion in **Tables 8** and **9** at $d \geq \pm.402$ in order to facilitate comparisons with the bold-font effect sizes in **Table 7**. In the supplementary materials, Tables S10 and S12 show the condition statistics and tests of all between-condition differences on the word categories that participants used more than 0.5% of the time in these pairs of conditions. Within the analyses on hopes and high need support, positive *t*-values indicate higher scores in the hopes condition, and within the analyses on duties and low need support, positive *t*-values indicate higher scores in the duties condition.

Hopes versus High Need Support

Representative examples

The first two are from the hopes condition:

> I proposed a project at work that would allow me to work in an area I've always had a special interest in. It was approved, and so I get to work on something I'm passionate about for a living.
>
> I had wanted to own and operate a Christian sports camp after college. I was able to work for a city doing day sports camps the summer after I graduated from college. This helped me prepare for the goal I had in my life.

The second two examples are from the high need-support conditions:

> I like going to NHL [National Hockey League] games. I can get whatever food I want and yell whatever I want. I feel connected to other fans that I am sitting near.
>
> When I was a new college student, I felt like I had all the freedom in the world. I had friends and was free to do what I wanted to do when I wanted to do it.

Comparing high need-support and hopes conditions

As expected, descriptions of high need support showed more attention to social relationships than descriptions of hopes. The word categories that showed these differences were about affiliation and social processes.

The rest of the differences were ones that I did not predict. Descriptions of hopes referred more to work. These words include references to paid employment (e.g., *job*), school (e.g., *majors*) and other kinds of work (e.g., *read*).

Interrogatives (e.g., *when, where, how*) were more common in descriptions of high need support than in descriptions of hopes. People use these words, for example, *when* describing experiences *where* they did *what* they wanted.

Descriptions of high need support used more conjunctions (e.g., *and, but, whereas*). These words link ideas together and help tell a coherent story (Tausczik & Pennebaker, 2010).

Pronouns were more common in descriptions of high need support. To interpret this finding, it helps to consider effect sizes on subcategories of pronouns. Table S10 shows that impersonal pronouns (e.g., *it, it's, those*) had the largest effect size, $d = -.360$. Descriptions of activities

Table 8: Hopes and High Need-Support Conditions of the Combined Dataset: Condition Statistics and Tests of Between-Condition Differences on LIWC Word Categories used at least 0.5% of the Time.

Word Type	Examples	Hopes		High NS		Tests of between-condition differences				
		M	*SD*	*M*	*SD*	*df*	*t*	Mean diff.	95% CI	*d*
Hopes higher										
Work	job, majors, read	9.95	9.12	6.34	8.83	987.32	6.33	3.61	[2.79, 4.73]	0.402
High NS higher										
Total pronouns	I, them, itself	15.52	7.39	18.58	7.30	992.00	–6.56	–3.06	[–3.97, –2.14]	–0.417
Conjunctions	and, but, whereas	4.88	4.12	7.32	4.47	992.00	–8.99	–2.45	[–2.98, –1.91]	–0.571
Interrogatives	how, when, what	1.13	2.47	2.58	3.27	872.54	–7.80	–1.45	[–1.81, –1.08]	–0.502
Social processes	mate, talk, they	4.38	6.21	7.40	6.62	992.00	–7.44	–3.03	[–3.83, –2.23]	–0.473
Feel	feels, touch	0.55	1.55	1.58	2.20	836.15	–8.48	–1.03	[–1.27, –0.79]	–0.548
Affiliation	ally, friend, social	1.51	3.21	4.30	5.42	749.49	–9.74	–2.79	[–3.35, –2.23]	–0.634

Note: NS = need support. To facilitate comparisons with the bold-font effect sizes in Table 7, which were $d \geq \pm.402$, I set a conservative limit for inclusion in Table 8 at $p < .001$, two-tailed, and $d \geq \pm.402$. Degrees of freedom are adjusted for heterogeneity of variance. Mean values indicate the mean percentage of all of the words that participants used that fell into a particular category.

Table 9: Duties and Low Need-Support Conditions of the Combined Dataset: Condition Statistics and Tests of Between-Condition Differences on LIWC Word Categories used at least 0.5% of the Time.

Word Type	Examples	Duties		Low NS		Tests of between-condition differences				
		M	*SD*	*M*	*SD*	*df*	*t*	Mean diff.	95% CI	*d*
Duties higher										
Clout/influence	[a]	33.33	29.38	20.16	23.84	984.41	7.80	13.17	[9.85, 16.48]	0.489
Personal pronouns	I, them, her	15.08	6.24	12.09	5.30	990.73	8.18	2.99	[2.28, 3.71]	0.515
Third-person singular	she, her, him	1.92	3.53	0.17	0.84	590.59	11.02	1.75	[1.44, 2.06]	0.665
Social processes	mate, talk, they	9.58	8.35	5.41	5.66	928.78	9.31	4.17	[3.29, 5.05]	0.579
Family	daughter, dad, aunt	2.02	3.48	0.47	1.56	746.76	9.26	1.56	[1.23, 1.89]	0.566
Female references	girl, her, mom	2.13	4.39	0.24	1.00	586.23	9.58	1.89	[1.50, 2.27]	0.578
Past focus	ago, did, talked	9.64	6.08	6.13	6.41	965.80	8.83	3.51	[2.73, 4.29]	0.563
Motion	arrive, car, go	2.80	3.96	1.33	2.15	827.63	7.42	1.48	[1.09, 1.87]	0.457
Low NS higher										
Negations	no, not, never	1.27	2.08	2.15	2.17	969.56	–6.45	–0.87	[–1.14, –0.61]	–0.411
Affective processes	happy, cried	3.56	3.95	5.91	5.26	862.61	–7.91	–2.36	[–2.94, –1.77]	–0.511
Negative emotion	hurt, ugly, nasty	1.32	2.62	2.90	3.09	921.82	–8.64	–1.58	[–1.94, –1.22]	–0.554
Anxiety	worried, fearful	0.16	0.75	1.27	1.99	587.45	–11.37	–1.11	[–1.30, –0.92]	–0.754
Cognitive processes	cause, know, ought	10.35	7.32	14.02	7.48	993.00	–7.80	–3.66	[–4.59, –2.74]	–0.496
Insight	think, know	2.00	2.65	3.64	3.58	855.68	–8.14	–1.64	[–2.04, –1.25]	–0.526
Tentative	maybe, perhaps	1.20	2.13	2.52	2.67	893.23	–8.55	–1.32	[–1.62, –1.02]	–0.550
Perceptual processes	look, heard, feeling	1.79	2.66	3.34	4.44	746.44	–6.57	–1.55	[–2.01, –1.09]	–0.429
Feel	feels, touch	1.04	2.01	2.34	2.54	888.69	–8.87	–1.30	[–1.58, –1.01]	–0.571

Note: NS = need support. To facilitate comparisons with the bold-font effect sizes in Table 7, which were $d \geq \pm.402$, I set a conservative limit for inclusion in Table 9 at $p < .001$, two-tailed, and $d \geq \pm.402$. Degrees of freedom are adjusted for heterogeneity of variance. Mean values indicate the mean percentage of all of the words that participants used that fell into a particular category, except for the clout/influence summary variable. [a] The clout/influence variable is by Kacewicz et al. (2014).

where people feel free to do whatever they want may often use impersonal pronouns (e.g., "I can get *whatever* food I want and yell *whatever* I want").

The words "feel" or "felt" were more common in descriptions of high need support. The need-support writing prompts used these words three times, whereas the hopes and duties writing prompts did not use them at all.

Duties versus Low Need Support

Representative examples

The first two are from the duties condition:

> We went and spent Mother's Day over at my husband's grandmother's house. I would have rather stayed home but we knew that she needed the company and it would make her feel better to get to see our daughters and my husband. (Vaughn, 2018, p. 4)

> I had offered to return the favor and help a friend move. He was moving into a new apartment and needed my help (and the use of my truck) for the move. He had helped me move a couple of years earlier so I felt obligated.

The second two examples are from low need-support conditions:

> It is important to play some of the sports with my friends that they play. However, I am not good at these team sports. Instead of making me feel connected, when I have a poor performance I feel ashamed and defensive.

> I was asked to manage a project in the company. I was not familiar with the systems or business owners. I had difficulty identifying the people to contact and the tasks and dependencies. The time frame was short and a lot of pressure was felt.

Comparing low need-support and duties conditions

As expected, descriptions of duties showed more attention to social relationships than descriptions of low need support. These differences were on the clout/influence summary variable; personal pronouns, which included third-person singular pronouns; and words about social processes, which included references to family and females.

There also were large to very large differences in words about affective processes (e.g., happy, cried), especially negative emotion words and anxiety words. As expected, negative emotion words were more common in descriptions of low need support.

The following differences were ones that I did not predict. Descriptions of low need support used fewer motion words (e.g., *arrive, car, go*). Motion words provide detailed information about what someone did (e.g., Newman et al., 2003; Pennebaker, 2011).

Additionally, descriptions of low need support used more words about cognitive processes, especially insight words (e.g., *think, know*) and tentative words (e.g., *maybe, perhaps*). People use cognitive-process words when they are trying to figure something out (e.g., Pennebaker, 2011).

Descriptions of low need support also used more negations (e.g., *no, not, never*) than descriptions of duties. People use these words when they distinguish between what is and is not in a category (e.g., Newman et al., 2003).

The words "feel" and "felt" were more common in descriptions of low need support than in descriptions of duties. **Table 8** shows a similarly large difference in use of feeling words between descriptions of high need support and descriptions of hopes.

Finally, past-focus words (e.g., *ago, did, talked*) were more common in descriptions of duties. Similarly, Table S10 in the supplementary materials shows that participants used more past-focus words in descriptions of hopes than in descriptions of high need support (d = .353). Both of the regulatory focus studies asked about a past experience, whereas one of the need-support studies asked about a past experience and one asked about a current activity.

Summary and Conclusions

As expected, descriptions of high need support (vs. hopes) showed more attention to social relationships. In contrast, descriptions of low need support (vs. duties) were less positive in emotional tone and showed less attention to social relationships. There also were unexpected differences. Compared to descriptions of hopes, descriptions of high need support linked ideas together more, and emphasized what, when, and with whom participants felt free to do whatever they wanted, often in activities not described as work. Compared to descriptions of duties, descriptions of low need support showed more evidence of participants trying to figure something out, and these descriptions provided less detailed information about what someone did.

The wording of the writing prompts may have caused other observed differences. For example, the need-support prompts contained the word "felt" or "feels," whereas the hopes and duties prompts did not. Participants used these words more when writing about high or low need support. Additionally, the regulatory focus studies only asked about past experiences, whereas one of the need-support studies asked about a current activity. Descriptions of hopes and duties had more past-focus words than descriptions of high and low need support, on average.

General Discussion

This research is the first to use LIWC to distinguish between descriptions of constructs in self-determination theory (support of needs for autonomy, competence and relatedness; e.g., Deci & Ryan, 2000) and in regulatory focus theory (hopes and duties, which are promotion and prevention-focused goals; e.g., Higgins, 1998). Research on the need-support model (Vaughn, 2017b), which bridges self-determination theory and regulatory focus theory, has shown that participants report more need support in pursuit of hopes than in pursuit of duties (also see Kim et al., 2019). It is natural for tests of a bridging model to concentrate on positive relationships between constructs in the theories it bridges. However, examining differences between these constructs is also important because it can suggest new areas for research and reduce binary thinking about how the theories relate. The following discussion addresses what I view as important patterns of differences, rather than each of the many significant effects.

High versus Low Need Support

Research on self-determination theory shows that need support relates to higher subjective well-being and includes feeling close and connected to others (e.g., Houle & Philippe, 2017; for reviews, see Deci & Ryan, 2000, 2008; Ryan & Deci, 2000, 2008). LIWC can distinguish between positive and negative emotions, and many LIWC categories convey attention to social processes (for reviews, see Pennebaker, 2011; Tausczik & Pennebaker, 2010). As expected based on earlier research, descriptions of high need support were more positive in tone. They also showed more attention to social relationships than descriptions of low need support, as indicated by the descriptions of high need support scoring higher on the clout/influence summary variable. This variable summarizes a pattern of pronoun use that shows more attention to others and less to the self, which is more common among communicators with higher social power (Kacewicz et al., 2014). An unexpected set of findings was that descriptions of low need support contained more exclusive words, which distinguish between what is inside and outside of categories and include cognitive-process words that people use when they are trying to figure something out (e.g., Pennebaker, 2011). They also contained more auxiliary verbs, which people use more when they are low in status (e.g., Pennebaker, 2011). These patterns of word use suggest that participants in low need-support conditions may have been trying more to figure out experiences of low status.

Future research could examine how different construals of power relate to need support, regulatory

focus, and clout. Construing power as a responsibility is associated with listening more to subordinates (De Wit, Scheepers, Ellemers, Sassenberg, & Scholl, 2017), which the clout/influence summary variable could detect. Yet construals of power as responsibility may naturally involve a focus on duties and obligations, which could mean these construals are more prevention-focused than construals of power as opportunity. Examining how different construals of power relate to need support and regulatory focus could be an important area for future research, given that duties are not always low in autonomy support (Buchtel et al., 2018) – it may depend on how much one identifies with the relationships in which one pursues these goals.

Hopes versus Duties

Research on regulatory focus theory shows that in a promotion (vs. prevention) focus, people experience higher-intensity positive mood states (Higgins, 1997, 1998; Idson et al., 2000) selectively attend to positive information when distracted (Yoon et al., 2012), and bring to mind more positive information about the self (Scholer et al., 2014). Additionally, people in a promotion focus recall events more positively (Pattershall et al., 2012), and people recall promotion-focused experiences as having been more positive (Vaughn, 2017b). Accordingly, across Study 2 and Vaughn (2018), descriptions of hopes were more positive in emotional tone. These descriptions were also more about reward and work, which suggests that descriptions of hopes often were about success at work.

People commonly define duties and obligations as responsibilities to others (e.g., Buchtel et al., 2018). Additionally, research on regulatory focus theory shows that prevention-focused goals – not limited to duties – are more important than promotion-focused goals when people are oriented more toward interdependence with others (e.g., Lee et al., 2000). Accordingly, across Study 2 and Vaughn (2018), descriptions of duties were more about social relationships. These descriptions also contained more words that distinguished between what was inside and outside of categories – possibly between what the self or others may have wanted and what they did.

In the current research, many participants who wrote about hopes wrote about relationships – the means of the relevant LIWC categories were not zero in this condition. Likewise, many participants who wrote about duties wrote about work. However, participants tended to bring to mind different kinds of activities for hopes and duties. The most common way to manipulate regulatory focus is to ask participants to describe their hopes versus duties (e.g., Cesario, Grant, & Higgins, 2004; Hui, Molden, & Finkel, 2013; Hong & Lee, 2008; Scholer et al., 2014; Vaughn, Hesse, Petkova, & Trudeau, 2009; Vaughn, O'Rourke, et al., 2006; Vaughn, Malik, et al., 2006). The current findings suggest that common manipulations of regulatory focus could be more effective if they let participants choose the domains of activity they write about than if they do not, because people often think of different activities with hopes and duties.

High Need Support versus Hopes, and Low Need Support versus Duties

As expected, descriptions of high need support (vs. hopes) showed more attention to social relationships, whereas descriptions of low need support (vs. duties) were more negative in emotional tone and were less about social relationships. Additionally, descriptions of high need support (vs. hopes) linked ideas together more and emphasized what, when, and with whom participants felt free to do whatever they wanted, often in activities not described as work. Descriptions of low need support (vs. duties) provided less detailed information about what people did, and they showed more attention to trying to figure something out.

Except for differences in emotional tone and use of exclusive words (negations and differentiation words), the differences between descriptions of high and low need support did not look much like the differences between hopes and duties. The comparisons between high need support and hopes, and between low need support and duties, also showed differences on various word categories. Altogether, the current sets of comparisons provide support for a proposal of the need-support model (Vaughn, 2017b), which is that important constructs in regulatory focus theory and self-determination theory do not reduce to each other, even though they are related.

Limits on Generality of the Current Findings

Writing prompts

Whether writing prompts are questionnaires from researchers, letters from a romantic partner (Ireland & Pennebaker, 2010), shared historical events (e.g., Cohn et al., 2004), or other things, they can influence how and what people write. In the current research, the need-support writing prompts contained the words, "feel" or "felt" and the regulatory-focus writing prompts did not. LIWC analyses detected this difference. Similarly, the regulatory-focus writing prompts only asked participants about the past, whereas one set of need-support writing prompts asked about the present. LIWC analyses also detected this difference. The writing prompts in the current research may have created other patterns of word use, too, that the standard LIWC 2015 dictionary did not detect. For example, descriptions of hopes probably used the word "hope" more, descriptions of need support probably used the word "competent" more, and so on. Researchers are welcome to use the publicly accessible data files at osf.io/m2cyn to see how results differ with custom LIWC dictionaries they can construct. Future research also could examine how well the current findings generalize to differently worded writing prompts.

The current research used self-guide definitions of regulatory focus – that is, promotion as hopes and ideals and prevention as duties and oughts (e.g., Summerville & Roese, 2008), which is the most common way to manipulate regulatory focus. There are other ways to vary regulatory focus (for a review, see Molden, Lee, & Higgins, 2007), and more are being discovered (e.g., Bullard & Manchanda, 2017; Lount, Pettit, & Doyle, 2017). A concern about using

hopes and duties to test hypotheses of the need-support model could be that common definitions of hopes and duties confound these constructs with high versus low need support, at least support of the need for autonomy. Setting aside the question of why hopes and duties have served so well in tests of regulatory focus theory, the current research could certainly be viewed as a conservative test of differences between need support and regulatory focus. Other writing prompts could vary regulatory focus as well, such as asking participants about a time when they expanded their horizons versus stuck with the familiar (cf. Vaughn et al., 2008). Future research that uses different writing prompts for promotion and prevention focus could examine how well the current findings generalize beyond self-guide definitions of regulatory focus.

Samples and settings

Although studies with MTurk participants tend to show the same findings as studies with laboratory participants (e.g., Klein et al., 2014; Paolacci, Chandler, & Iperiotis, 2010), participants in different kinds of settings could describe somewhat different things. For example, college students sitting in a classroom could focus write more about work and less about social relationships than participants in the current studies did.

Another potential limit on the generality of the current findings is cultural context. The participants in this research resided in the U.S. and Canada, which are highly individualist cultures. Although balanced support for autonomy, competence, and relatedness predicts psychological well-being in collectivist and individualist cultures (Chen et al., 2015; Chirkov, Ryan, Kim, & Kasser, 2003; Deci & Ryan, 2000), cultures can differ in the value placed on these needs (Chen et al., 2015). In relatively collectivist cultures, which emphasize the satisfaction of fulfilling responsibilities to others (e.g., Buchtel et al., 2018; Miller, Das, & Chakravarthy, 2011), descriptions of high need-support could feature social relationships more prominently, and descriptions of duties could be more positive than in the current research.

Conclusion

Building and testing models that bridge theories naturally involves examining positive relationships between the theories' constructs. However, it also involves identifying ways in which these constructs are not the same. The current research is important because it shows that differences between descriptions of high and low support for autonomy, competence, and relatedness generally do not look the same as differences between descriptions of hopes and duties. As expected, descriptions of high need support and hopes were more positive in emotional tone than low need support and duties, whereas high need support and duties showed more attention to social relationships than low need support and hopes. These and additional findings of the current research suggest new directions of research on relationships between self-determination theory and regulatory focus theory. They also support a key proposal of the need-support model, which bridges these theories: need support and regulatory focus do not reduce to each other, even though they are related.

Data Accessibility Statement

All the stimuli, presentation materials, participant data, and supplementary materials can be found on this paper's project page on the OSF. https://osf.io/m2cyn.

Notes

[1] Gamache, McNamara, Mannor, and Johnson (2015) created a 27-word promotion dictionary and a 25-word prevention dictionary for LIWC, as a way to assess CEO regulatory focus through analyzing CEOs' letters to shareholders for the fiscal years 1997–2006 in a sample of companies. These custom dictionaries were not developed for – or validated on – the kinds of short descriptions of personal experiences that participants in the current research provided. Assessing whether these custom dictionaries are valid for brief, personal descriptions was beyond the scope of the present research.

[2] The need-support measure was the Balanced Measure of Psychological Needs (BMPN; Sheldon & Hilpert, 2012). The BMPN contains six-item subscales that measure support for autonomy (e.g., "I was free to do things my own way"), competence (e.g., "I took on and mastered hard challenges"), and relatedness (e.g., "I was lonely"; reverse-scored); (1 = *strongly disagree*, 7 = *strongly agree*). I calculated an index of need support for the analysis in the current footnote by averaging the 18 items after appropriate reverse scoring. Cronbach's alpha was .91 for this index in the studies called Study 1a and Vaughn (2018) in the current research. There was a significant and large difference between duties and low need-support conditions, $t(549) = 17.48$, $p < .001$, mean difference = 1.31, 95% C.I. [1.16, 1.45], $d = 1.496$. Need support was higher in the duties condition ($M = 4.68$, $SD = 0.91$) than in the low-need-support condition ($M = 3.38$, $SD = 0.83$). There was a smaller, significant difference between high need-support and hopes conditions, $t(551) = 5.40$, $p < .001$, mean difference = 0.37, 95% C.I. [0.24, 0.51], $d = 0.461$. Need support was higher in the high need-support condition ($M = 5.66$, $SD = 0.77$) than in the hopes condition ($M = 5.29$, $SD = 0.84$).

[3] The methodology file at osf.io/m2cyn provides the verbatim materials described below. In Studies 1a and 1b, the additional questions about the activity included the BMPN (Sheldon & Hilpert, 2012), which contains six-item subscales that measure support for autonomy, competence, and relatedness. I calculated an index for each subscale by taking the mean of the relevant items after appropriate reverse scoring. Vaughn (2017b, combined data for Studies 2a & 2b) reported the results on this scale for what is called Study 1a in the current research. The following results for the current Study 1b replicated these earlier findings. In the current Study 1b, the Cronbach's alphas for autonomy, competence, and relatedness were .85, .84, and .83, respectively. For autonomy, there was a significant difference between high and low need support, $t(417.45) = 17.41$, $p < .001$, mean difference = 1.67, 95% C.I. [1.48, 1.86], $d = 1.66$. Autonomy support was higher in the high need-support condition ($M = 5.65$, $SD = 0.89$) than in

the low need-support condition (M = 3.98, SD = 1.11). For competence, there was a significant difference between high and low need support, $t(436) = 13.41$, $p < .001$, mean difference = 1.33, 95% C.I. [1.14, 1.53], d = 1.28. Competence support was higher in the high need-support condition (M = 5.46, SD = 0.98) than in the low-need-support condition (M = 4.13, SD = 1.10). For relatedness, there was a significant difference between high and low need support, $t(427.49) = 14.81$, $p < .001$, mean difference = 1.52, 95% C.I. [1.32, 1.73], d = 1.42. Relatedness support was higher in the high need-support condition (M = 5.59, SD = 0.99) than in the low need-support condition (M = 4.06, SD = 1.15). As shown in the methodology file (osf.io/m2cyn), there were two samples in Study 1b. In Sample 1, the BMPN was the first set of questions participants received about the experience they described. In Sample 2, it was the second; the first was the Rosenberg Self-Esteem Scale (Rosenberg, 1965). I phrased the self-esteem items to be about the activity participants described (e.g., "I certainly feel useless in this activity"); (1 = *strongly disagree*, 4 = *strongly agree*). The items that reflected low self-esteem were reverse scored, and I averaged the self-esteem items to create an index (in the current Study 1b Sample 2, Cronbach's alpha = .94). There was a significant difference between high and low need support, $t(219.49) = 13.05$, $p < .001$, mean difference = 0.89, 95% C.I. [0.76, 1.03], d = 1.67. Recalled self-esteem was higher in the high need-support condition (M = 3.59, SD = 0.43) than in the low need-support condition (M = 2.69, SD = 0.62). The final page of questions about the recalled activity in Study 1b contained materials not reported here.

[4] The methodology file at osf.io/m2cyn provides the verbatim materials described below. The additional questions about the activity included the BMPN (Sheldon & Hilpert, 2012). The study called Vaughn (2018) in the current paper used a previously published data set (Vaughn, 2017a, Study 1); Vaughn (2017b) reported the BMPN results for that study. In the current Study 2, the Cronbach's alphas for autonomy, competence, and relatedness were .77, .69, and .77, respectively. For autonomy, there was a significant difference between hopes and duties, $t(426.01) = 7.70$, $p < .001$, mean difference = 0.86, 95% C.I. [0.64, 1.09], d = 0.728. Autonomy support was higher in the hopes condition (M = 5.18, SD = 1.05) than in the duties condition (M = 4.32, SD = 1.31). For competence, there was a significant difference between hopes and duties, $t(445) = 3.86$, $p < .001$, mean difference = 0.37, 95% C.I. [0.18, 0.55], d = 0.365. Competence support was higher in the hopes condition (M = 5.48, SD = 1.03) than in the duties condition (M = 5.11, SD = 0.98). For relatedness, there was a significant difference between hopes and duties, $t(455) = 4.33$, $p < .001$, mean difference = 0.49, 95% C.I. [0.27, 0.71], d = 0.409. Relatedness support was higher in the hopes condition (M = 5.30, SD = 1.13) than in the duties condition (M = 4.81, SD = 1.26). As shown in the methodology file (osf.io/m2cyn), there were two samples in Study 2. In Sample 1, the BMPN was the first set of questions participants received about the experience they described. In Sample 2, it was the second; the first was the Rosenberg Self-Esteem Scale (Rosenberg, 1965) phrased to be about the experience participants described (in the current Study 2 Sample 2, Cronbach's alpha = .90). There was a significant difference between hopes and duties, $t(250) = 4.52$, $p < .001$, mean difference = 0.29, 95% C.I. [0.16, 0.41], d = 0.569. Recalled self-esteem was higher in the hopes condition (M = 3.54, SD = 0.48) than in the duties condition (M = 3.25, SD = 0.53). The final page of questions about the recalled activity in Study 2 contained materials not reported here.

Supplementary Materials

All supplementary materials are publically available at osf.io/m2cyn

Contents:

Additional File

The additional file for this article can be found as follows:

- **File Information.** Studies 1 and 2 excluded cases. DOI: https://doi.org/10.1525/collabra.185.s1

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