

A Multi-Analytical Examination of the Self-Control Concept

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Abstract

Anchoring on the life, culture, experience, and language usage of respondents, the paper seeks to explore alternative perspectives relating to the structure and content of self-control phenomenon at individual and collective levels. It proposes using multifarious approaches to capture the equivalent, associative, and hierarchical relations of self-control concept. The study content analyzed self-control's words from a pool of 425 respondents, using three different qualitative methods: (1) judgment-based, (2) latent semantic analysis, and (3) latent dirichlet allocation. The judgment-based method revealed that self-control has twelve dimensions at the collective level. At individual level, self-control was partitioned into thirteen topics, using latent dirichlet allocation, and thirteen factors, using latent semantic analysis.

Main contributions: The paper uncovers multiple structures and content of self-control phenomenon, which provide solid foundation for future study of self-control phenomenon, such as scale development or literature synthesis of the concept as well as implications for public policy.

Keywords: Qualitative, Self-control, Latent Semantic Analysis, Latent Dirichlet Allocation, Judgment-based

Introduction

Ample evidence reveals links between natural word use and personality, social and situational fluctuations, and cognitive and mental processes (Pennebaker, Mehl, & Niederhoffer, 2003). Self-control as a concept has been examined extensively in criminology, psychology, sociology, neurology, physiology, and economics (Baumeister, Heatherton, & Tice, 1994; Gottfredson & Hirschi, 1990; Metcalfe & Mischel, 1999; Ochsner et al., 2004; Rothbaum, Weisz, & Snyder, 1982; Thaler & Shefrin, 1981). In marketing, many quantitative studies have explored a plethora of phenomena relating to self-control under various labels (e.g., impulsive and compulsive purchasing behaviors, productivity, decision making, regulatory focus, extravagant consumption and consumer spending self-control (Aydinoğlu & Krishna, 2011; Gal & Liu, 2011; Haws, Bearden, & Nenkov, 2012; Pyone & Isen, 2011; Sultan, Joireman, & Sprott, 2012; Trudel & Murray, 2011; Wilcox, Kramer, & Sen, 2011). Not surprisingly, Duckworth and Kern's (2011) meta-analysis found more than 100 context-specific multi-dimensional measurement scales

along with numerous descriptors (e.g., willpower, self-regulation, self-discipline, effortful control, inhibitory control) referring to self-control in the literature. The authors concluded that self-control is a “coherent but multidimensional construct best assessed using multiple methods” (Duckworth & Kern, 2011).

Recognizing the importance of the self-control concept, many researchers have attempted to explore a multitude of phenomena relating to what, how, where, when, and whom self-control influences (Baumeister, Sparks, Stillman, & Vohs, 2008; Bernheim, Ray, & Yeltekin, 2015; Casey, 2015; Fujita, 2011a; Hassin, Ochsner, & Trope, 2010; Muraven, Tice, & Baumeister, 1998; Strack & Deutsch, 2004). Conceptually, scholars have offered many perspectives revolving around the self-control phenomenon, ranging from external manifestations to underlying mechanisms of self-control or from individual to group responses in terms of behavior, cognition, and emotion (Baumeister et al., 2008; Fujita, 2011a; Hassin et al., 2010; Muraven et al., 1998; Strack & Deutsch, 2004). Self-control can be an asset but can also be a liability (Koval, Vandellen, Fitzsimons, & Ranby, 2015), an antecedent and an outcome (Bernheim et al., 2015), a nature and a nurture derivation (Casey, 2015), a trait and a state (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Gailliot et al., 2007), and good and bad (Fujita, 2011b; Kivetz & Keinan, 2006). These perspectives are sometimes consistent and overlapping but also distinctive and dissonant.

Therefore, from a qualitative approach, the present research seeks to explore alternative perspectives relating to the structure and content of the self-control phenomenon at individual and collective levels underpinning the social psychology approach. A review of the literature suggests that self-control is a complex phenomenon, containing rich and latent structures warranting comprehensive investigation using distinct multifarious approaches. Therefore, the focus of the current study is to perform a content analysis of words related to the self-control concept, partition the various perceptions of self-control, and examine its structures. More specifically, the investigation attempts to explore the self-control phenomenon using three qualitative methods: (1) traditional judgment-based, (2) latent semantic analysis (LSA) (Deerwester, Dumais, Furnas, Landauer, & Harshman, 1990), and (3) latent Dirichlet allocation (LDA) (Blei et al. 2003).

This research contributes to the literature in two important ways. First, it provides a deeper and broader exploration of the structure and content of the self-control concept that can serve as a foundation for future investigations, such as scale development (Churchill Jr, 1979). A second contribution is the introduction into the marketing discipline two relatively new automatic computer-based qualitative research methods that can be utilized to provide the least cost and a

less biased result (Ashton, Evangelopoulos, & Prybutok, 2014) vis-à-vis relying solely on judgments of multiple researchers and percentage of agreement between them to establish sufficient statistical rigor (e.g., internal reliability) (Bernard & Ryan, 2010).

Theoretical Background

Structuralism

From a social psychology perspective, structuralism is a theoretical paradigm in which elements of culture, language, and human life experiences are interrelated in structural forms that are best understood in terms of their relationships to the larger system. Structuralism is "the belief that phenomena of human life are not intelligible except through their interrelations. These relations constitute a structure, and behind local variations in the surface phenomena there are constant laws of abstract culture" (Blackburn, 1996). In content analysis, researchers seek to understand the underlying meanings of text (e.g., word frequency, rhetoric, tropes, schemes). Word frequency, rhetoric, tropes, and schemes are structural devices of language (McQuarrie & Mick, 1996). Stated differently, perceptions of the self-control concept can be influenced by culture, language, and life experiences at the individual respondent level. However, structuralism theory proposes that different perceptions of the self-control concept are interrelated, and the concept is best understood not only at individual but also at collective levels. Thus, an in-depth understanding of the self-control concept requires analyses performed at both individual and collective levels.

Word Level Content Analysis

In its simplest form, the word self-control means controlling the self. Beyond this simple meaning, researchers can elicit source perceptions, thoughts, feelings, and emotions (Yarkoni, 2010) by using word-level content analysis techniques. The result is a much richer understanding of source social and psychological words (Pennebaker et al., 2003). Word level content analysis categorizes words based on semantic relations of words (Osgood, 1952). Specifically, psycholinguistic research identifies three types of semantic relations: (1) hierarchical (e.g., self-control and calm), (2) associative (e.g., self-control and self-disciplined), and (3) equivalent (e.g., self-control and self-regulation) (Miller, Beckwith, Fellbaum, Gross, & Miller, 1990). Hierarchical relation of a word expresses super ordinate, basic, and subordinate structure of words (Miller et al., 1990). In practice, for example, Laros and Steen amp (2005) developed a structure of emotion where negative is a super ordinate word of anger, anger is a basic word, and irritated is a subordinate word of anger. From this structure, the authors derived a sophisticated hierarchical model of consumer emotions (Laros & Steenkamp, 2005).

Associative relation of a word refers to apart-whole relationship between words, which often prompts respondents to recall more quickly than other words (Winston, Chaffin, & Herrmann, 1987). For example, doctor is often associated with nurse. In a marketing context, serving as retrieval cues, associative relation of a word and the set size of association lead to higher brand name recall in the context of advertising (Krishnan, 1996; Meyers-Levy, 1989). Experimental researchers also use this property of words to induce automatic priming effects (Thompson-Schill, Kurtz, & Gabrieli, 1998).

The equivalent relation of a word is thought of as synonymous to the targeted word (Miller et al., 1990). Among all three types of semantic relations, the equivalence property of a word is widely used to analyze consumer-generated content, financial narratives of firms, or market-driven information. For example, researchers have performed equivalent word analysis (synonyms and antonyms) from micro-blog posts to classify opinions of web users (Montejo-Ráez, Díaz-Galiano, Martínez-Santiago, & Ureña-López, 2014). Also, frequency of synonymous words (e.g., will and shall) in a chairman's letters and narrative disclosures of the firm's annual reports has been found to strongly predict innovation outcomes and financial risks of firms (Smith & Taffler, 2000; Yadav, Prabhu, & Chandy, 2007). Similarly, Noble et al. (2002) studied each sentence of shareholder letters to identify linkages between firm performance and market orientation. No follows a discussion of extant literature revolving around the self-control concept.

Self-Control

Most scholars agree that "self-control is the exertion of control over the self by the self" (Muraven & Baumeister, 2000, p.247). Conflicting perspectives emerge when discussing the content and structure of self-control, such as stimulus, prerequisites, antecedents, types, underlying mechanism, consequences, and effects of the phenomena. Encompassing all-inclusive elements of a self-control framework is beyond the scope of this article. As such, this section attempts to presents elected dominant views of the content and structure of self-control.

Self-control includes controlling behavior (Gray & McNaughton, 1996), emotion (Gross, 1998), and cognition (Botvinick, Braver, Barch, Carter, & Cohen, 2001). Self-control is also viewed as the inhibition of impulses, temptations, or instincts. Under this perspective, self-control is defined as two system models to delineate the independent operation and output of the two separate systems: effortful/reflective and impulsive/reactive (Chaiken & Trope, 1999; Strack & Deutsch, 2004). Self-control is also the capacity for altering one's own responses in order to bring them into line with social standards and to support the pursuit of long-term goals (Baumeister, Vohs, &

Tice, 2007). Others view self-control as the process of advancing abstract motives over concrete motives when two motives conflict (Fujita, 2011a). Some scholars use self-control interchangeably with self-regulation (Muraven & Baumeister, 2000), while others view self-control as a subordinate of self-regulation (Carver & Scheier, 1998; Kuhl & Fuhrmann, 1998).

As a goal, self-control can be habitual or non-habitual. Engaging in self-control activity depletes subsequent self-control (Vohs et al., 2014), while practicing self-control improves its strength (Muraven, Baumeister, & Tice, 1999). Exerting self-control requires moral reasoning (Greene, Nystrom, Engell, Darley, & Cohen, 2004), intelligence (Locke & Braver, 2010), or even physical strength (Muraven & Baumeister, 2000). To exert self-control effectively, one must possess some form of monitoring system to scan the environment for conflicts, check for unwanted thoughts, and gather performance feedback (Botvinick et al., 2001; van Veen, Cohen, Botvinick, Stenger, & Carter, 2001). Conflicts are often measured against one's standard set of goals, values, and principles (Fellows, 2010). Interestingly, the anchoring of goals and values need not to be socially or morally acceptable for one to encounter conflicts (Fellows, 2010; Fujita, 2011a). Once conflict is detected, the ability to exert self-control is dependent upon one's willpower capacity (Metcalf & Mischel, 1999), self-control strength (Muraven et al., 1999), motivational skills (Locke & Braver, 2010), and personality traits (Locke & Braver, 2008).

Given the complexity of the concept, a closer view of the content and structure of self-control seems warranted. The present work utilizes judgment-based method to analyze equivalent semantic relations of self-control, while relying on LSA and LDA for examining associative and hierarchical semantic relations of self-control, respectively. Undertaking all three semantic relations of the word self-control should enrich understanding of the many facets of self-control, anchored on culture, language, and life experiences of respondents.

Judgment-Based Method

Specific to judgment-based qualitative research, efforts have been expended to analyze unstructured data composing of words, sentences, or paragraphs (Henry, 2008; Li, Xie, Chen, Wang, & Deng, 2014; Noble, Sinha, & Kumar, 2002; Short & Palmer, 2003; Short & Palmer, 2008; Yadav et al., 2007). Depending on the purpose of the research, content and structure of textual data are classified by researchers. This flexibility, though, also lends itself to being bereft of historical and social support from some researchers and reviewers (Hanson & Grimmer, 2007) owing to insufficient positivism, rigor, and objectivity (Lee, Saunders, & Goulding, 2005).

Computer-Based Methods

Compared with the judgment-based method, LSA and LDA are known to provide least cost and less bias in the results (Ashton et al., 2014). These techniques presume the existence of latent structures in textual data, classify them into categories, and depict them as vectors in space (Blei, Ng, Jordan, & Lafferty, 2003; Deerwester et al., 1990). To accomplish these tasks, the methods mine the underlying relationships within and between observations (e.g., words, sentences, paragraphs, documents) (Blei et al., 2003; Deerwester et al., 1990). Previous studies have used other computer-based methods to mine customer-generated, semi-structured, or unstructured textual content for the purpose of sentiment analysis and opinion mining (Pang & Lee, 2008). LSA and LDA, however, are specifically suited for exploring associative and hierarchical relations of self-control owing to their sophisticated underlying algorithms.

In addition, at the population level there are clusters of people with similar personality, characteristics, and thought patterns (McCrae and Costa, 2003). These similarities are encoded in language usage (Saucier, 2003; Goldberg, 1993). In other words, the general population can be partitioned into groups having similar language usage and views of self-control. Because LSA and LDA analyses cluster groups of respondents based on language, these two techniques were chosen to investigate the self-control concept at individual levels.

Latent Semantic Analysis

Fundamentally, LSA approaches the text-mining problem using a linear algebra algorithm (Deerwester et al., 1990). The underlying algorithm of LSA averages the differences in word choice to derive optimal dimensionality contained in a set of observations (Landauer, Foltz, & Laham, 1998). The method has been widely used in psychology and business applications, ranging from categorizing latent structures of words to word-semantic priming, for its ability to simulate human cognitive phenomena (Ashton et al., 2014; Landauer et al., 1998). For example, LSA is used to extract similar sentiments from customers' comments to explore different structures of customer dissatisfaction with a Fortune 500 firm's service quality (Ashton, Evangelopoulos, & Prybutok, 2015). In addition, LSA is particularly capable of extracting non-laddering (as opposed to hierarchical) latent factors. The algorithm of this technique has been useful in segmenting groups sharing common behavior characteristics (Miaskiewicz, Sumner, & Kozar, 2008).

Often referred to as a high dimensional associative model, LSA detects the association of the thought process in the human mind (Landauer & Dumais, 1997). Accounting for both polysemy and synonym of words, the resulting products capture higher-order associations within

observations (Deerwester et al., 1990; Landauer & Dumais, 1997). For example, if X is associated with Y, and Y is associated with Z, then LSA is able to detect the strength of association between XZ as well as XY and YZ. Moreover, due to its sophisticated mathematical algorithm, the results of LSA often provide deeper inferred relations among words and categories than judgment-based analysis (Landauer & Dumais, 1997).

Methodologically, LSA applies a singular value decomposition (SVD) algorithm to search for patterns of words associating together to identify a factor. SVD is a two-phase matrix factorization technique, based on a linear algebra process, which is very similar to the underlying algorithm of principal components factor analysis (PCA) for extracting factors. Similar to PCA, the SVD factor matrices are also rotated to reveal the resulting factors (Wall, Rechtsteiner, & Rocha, 2003). These factors are the extracted latent structures of the observations in which the first factor has the highest variance compared with the subsequent factors. The number of factors represents the optimal latent structures of a set of observations. Finally, the loadings of the words signify their probability of occurrence within that factor (Landauer et al., 1998).

Latent Dirichlet Allocation

While the LSA algorithm is based on linear algebra, LDA is a conditional, probabilistic, three-level hierarchical Bayesian model (Blei et al., 2003). The LDA technique assumes that a set of observations (e.g., documents) represent specified number of latent topics (e.g., factors). These latent topics are extracted based on the probability distribution of words and can be conceived intuitively by users (Chang, Gerrish, Wang, Boyd-Graber, & Blei, 2009). Moreover, the order of topics, words in a topic, and documents linked to topics and words are provisional upon their probability of occurrence (Blei et al., 2003). One can visualize the conjoint occurrence of words, topics, and documents in space conditional upon their probability of distribution over words in a set of observations (Blei et al., 2003). (For more detailed illustrations, see Chaney and Blei [2012] and Chang et al. [2009].)

Given its ability to capture and order the heterogeneity in a set of observations, the method is particularly suited for inherently hierarchical structured datasets, suggesting the ordinal or sequential nature of the content of interest (Chaney & Blei, 2012; Chang et al., 2009). For example, LDA has been used to identify opinion leaders by level of influence in social networking sites (Song, Chi, Hino, & Tseng, 2007; Zhang, Qiu, Giles, Foley, & Yen, 2007).

Methodologically, LDA uses a Bayesian probabilistic procedure to estimate a set of variational parameters for each respondent, namely E-step. In the second step, the variational parameters derived from E-step are used to

identify a set of model parameters by maximizing a log-likelihood lower bound, called M-step (Blei et al., 2003). These two steps are repeated until the log-likelihood lower bound converges, revealing latent topics (Blei et al., 2003). Specific to the context of word level content analysis, the number of topics represents the latent hierarchical structures identified in the set of observations. The resulting topics are present in each observation, but with different proportions. The order of topics, words, and observations are indicative of their probability of occurrence.

Methodology

Study Procedure

The sample consisted of 671 undergraduate students at a large state university. Data collection instructions asked respondents to provide five individual words describing the word “self-control” from their perspective. The survey was administered online. Respondent demographics were as follows: gender, 51% male; age, 51% between 20 and 23 years old; and ethnicity, 60% Caucasian. Nonresponsive bias was assessed by splitting the sample into early and late responses to measure differences in demographics data using the chi-square test (Armstrong & Overton, 1977). The result showed no significant differences ($p > .05$), suggesting nonresponsive bias was not an issue.

Phrases, sentences, and missing data were excluded from the analysis. Thus, the final data set included 425 respondents, in which there were 185 unique words, with a total sum of 2,125 word occurrences referring to self-control, and a frequency of occurrence ranging from a high of 144 (i.e., disciplined) to a low of 1 (i.e., universal, timid, psychological). The 2,125 generated words from the term self-control are purported to have multiple latent categories as they all describe self-control. This is the desirable fuzziness inherent in content analysis (Varki, Cooil, & Rust, 2000). The remaining sections detail the analysis procedure of the three methods and provide a comparison of the results.

Judgment-Based Method

Basing on the equivalent semantic relation of word, the 2,125 were grouped into similar categories (e.g., themes)-a widely used technique in qualitative analysis (Bernard, 2012)-by the researcher with the support of an American Heritage Dictionary (1995). Previous studies have also relied on either manual or computer-aided dictionaries to perform content analysis (Li et al., 2014; Yadav et al., 2007). The grouping of themes relied on similarity of the meaning of words (Bernard & Ryan, 2010). Identified themes were crosschecked for agreement by two experts in qualitative analysis to enhance inter-rater reliability. Disagreements were discussed and resolved to achieve internal reliability, a method that is often used for qualitative studies (Bernard & Ryan, 2010).

Computer-Based Methods

LSA Procedure. During the matrix preparation for the LSA analysis, the 185 unique words were reduced to 178 by stemming. Stemming is a technique that eliminates word redundancy by truncating words back to their roots. Prior to extracting clusters of similar word usage, LSA reweights the X-matrix (also called term weighing), to lower probabilities of words with high frequency and broad usage (e.g., that, is, and) and elevates the probabilities of words that appear with high frequency in a smaller number of observations (Salton & Buckley, 1988). The idea is that words concentrated in a few observations are representatives of latent dimensions, while widely used terms are not descriptive of a specific dimension. Weighing essentially elevates the probabilities of certain terms while simultaneously reducing others to facilitate extracting distinctive and meaningful factors.

Thus, term weighing was applied by using $\log\text{tf}$ (log of the term frequency) local weighting and entropy and others

$$(1 + \sum(p_{ij} * \frac{\log(p_{ij})}{\log(N)})$$

global weighting. The resulting matrix is subjected to the SVD algorithm with the results from the singular values inspected graphically to determine the optimal number of factors to extract. This graph, referred to as a scree plot, consists of 178 eigen values (squared singular values). During this inspection, the objective is to determine the center of the elbow, a point considered optimal as the number of factors to extract from the data without injecting excess noise (Cattell 1966; Zhu and Ghodsi 2006). This examination identified 13 as the optimal number of factors to extract. This finding was validated by an iterative application of Zhu and Ghodsi’s (2006) log likelihood technique. The SVD algorithm was then reapplied to the data extracting a reduced dimensional solution with 13 factors. Similar to PCA, the SVD output was rotated with Varimax rotation, and low loadings were eliminated. This method allows only the most frequent word occurrences to be included in the final solution. The final LSA output consists of 341 respondents, with 81 words and 177 loadings.

LDA Procedure. LDA analysis begins with the same 178×425 X-matrix as LSA. LDA does not use eigen values to determine the optimal number of factors to extract. Instead, a method called cross validation was used to determine the optimal number of topics to extract. Cross validation is a procedure in which data are partitioned into training and validation subsets. The training set starts with a random seed number for extracting a specified number of factors. The resulting factors are validated with the second subset. This process is repeated until the resulting factors have lowest average perplexity. Perplexity is a measurement used in natural language processing to evaluate how well a

model predicts (Manning & Schütze, 1999). Therefore, the best estimated model is one for k factors having the lowest perplexity value or lowest average perplexity. In this sample, cross validation process was repeated three times to have the lowest perplexity value, resulting in 13 factors recommended for extraction from the matrix. Unlike LSA, LDA does not weight the X -matrix.

In addition, LDA differs from LSA in that if the 178 word X -matrix is loaded into the algorithm, then the resulting solution will include probability calculations for all 178 words against each of the topics extracted. Such a solution is not meaningful, since as many as 50-percent of the probabilities will be far less than 1-percent. To reduce LDA output, a sparsity strategy was applied, where sparsity, $s = 1 - (\text{count of doc's term appears in}) / (N \text{ docs})$ (Feinerer, 2014). After a number of iteration, a satisfactory solution with sparsity set to 0.994 was found that consisted of 99 words. The LDA algorithm was then applied against this reduced matrix to extract the 13 factors. The final LDA output consisted of 73 words with 98 probabilities, which make up 13 extracted factors. In this output, each word loaded to a topic with a probability greater than 3.1% and each respondent correlated to a factor with a probability greater than 7.7%.

Results

Judgment-Based Analysis

The judgment based analysis (JBA) resulted in twelve categorized themes (Table 1) for self-control. These themes are derived based on commonality in word definition. The themes represent sub-dimensions of the self-control concept

in a definitional sense. Within the themes, words proceed in a hierarchical fashion with some words possessing higher levels of a common idea, whereas others possess fewer levels. These themes are disciplined, patient, necessary, good, strength, difficult, smart, powerful, virtue, boring, happiness, and life. Accordingly, the most observable theme of self-control is patience (424 occurrences), including patient (75), calm (53), moderation (19), composure (19), careful (18), and others. The second theme is disciplined (336), including disciplined (105), restrained (77), control (58), constraint (16), and others. The third theme of self-control is necessary (272), including necessary (72), vital (39), valuable (21), helpful (11), essential (6), and others. The fourth theme dimension is good (262), including good (68), responsible (57), mature (18), respectful (18), thoughtful (15) and others. The fifth theme is strength (259), including strength (51), willpower (48), confidence (23), determination (18), and others. The sixth theme is challenging (192), including challenging (62), difficult (37), resistance (16), endurance (14), and others. The seventh theme is smart (109), including smart (24), awareness (21), wisdom (16), mindfulness (9), and others. The eighth theme is powerful (75), including powerful (24), admirable (13), rare (10), uncommon (6), and others. The ninth theme is virtue (68), including virtue (16), honest (8), honor (8), dignity (6), and others. The tenth theme is boring (59), including boring (15), denial (8), annoying (3), bad (3), and others. The eleventh theme is pleasant (57), including pleasant (10), happiness (7), love (5), nice (5), beautiful (5), and others. Finally, the twelfth theme is life (12), including life (4), human (2), natural (1), universal (1), and others.

Table 1: Judgment-Based Method Solution

No	Dimension	Occurrences	Examples of Occurrences (not exhaustive)
1	Patient	424	Patient (75), calm (53), moderation (19), composure (19), careful (18), and more
2	Disciplined	336	Disciplined (105), restrained (77), control (58), constraint (16), and more
3	Necessary	272	Necessary (72), vital (39), valuable (21), helpful (11), desirable (7), and more
4	Good	262	Good (68), responsible (57), mature (18), respectful (18), and more
5	Strength	259	Strength (51), will-power (48), confidence (23), determination (18) and more
6	Challenging	192	Challenging (62), difficult (37), resistance (16), endurance (14), and more
7	Smart	109	Smart (24), awareness (21), wisdom (16), mindfulness (9), and more
8	Powerful	75	Powerful (24), admirable (13), rare (10), uncommon (6), and more
9	Virtue	68	Virtue (16), honest (8), honor (8), dignity (6), and more
10	Boring	59	Boring (15), denial (8), annoying (3), bad (3), and more
11	Pleasant	57	Pleasant (10), happiness (7), love (5), nice (5), beautiful (5), and more
12	Life	12	Life (4), human (2), natural (1), universal (1), and more

Note: The name of each of the dimensions was selected based on the highest frequency of occurrence in that category; total number of respondents was 425.

LSA

Self-control was partitioned into thirteen factors (per the SVD algorithm) which are defined by: composure, vital, self-control, manner, strength, calm, awareness, good, mature, rare, restrain, pleasant, and modest (Table 2). The name of the factor is selected based on the word with the highest factor loading. Each factor was composed of

multiple words. Only words with higher loadings will be reported for all thirteen factors. Twenty-eight respondents, who fell into factor one, defined self-control as composure, careful, sensible, and cool. The 62 respondents associated with factor two used the terms vital, challenging, necessary, valuable, possible, helpful, vary, continue, tiring, and easy to describe self-control. The 46 respondents associated with factor three used the terms self-control, internal, impulse,

and behavior concurrently to describe self-control. Factor four consisted of 14 respondents who defined self-control using the terms well mannered, responsible, confident, and work hard. The 28 respondents forming factor five defined self-control in terms of strength, determination, dedication, power, motivation, liberating, and dignity. The 34 respondents related to factor six defined self-control in terms of calm, patient, conscientious, tolerance, and pleasant.

Factor seven had 23 respondents who defined self-control using the terms awareness, goal, orient, boundaries and knowledge. Factor eight had 45 respondents who used the

words good, pleasant, necessary, intelligent, satisfying, bad, dependable, and respect. Factor nine consisted of 27 respondents who defined self-control in terms of mature, independent, responsible, moral and intellectual. Factor ten had 22 respondents who defined self-control in terms of rare, desire, leader, and practice. Factor eleven had 53 respondents who defined self-control in terms of willpower, moderation, discipline, and modest. Factor twelve had 18 respondents who expressed self-control in terms of pleasant, selfless, esteem, and motivation. Factor thirteen had 24 respondents who described self-control in terms of economic, honesty, godly, and healthy.

Table 2: LSA Method Solution

Words	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11	Factor12	Factor13
# of Respondents	28	62	46	14	28	34	27	45	27	22	53	18	24
Composure	1.4486	0	0	0	0	0	0	0	0	0	0.4096	0	0
Careful	0.5365	0	0	0	0	0	0	0	0	0	0	0	0
Sensible	0.3819	0	0	0	0	0	0	0	0	0	0	0.2306	0
Cool	0.2896	0	0	0	0	0	0	0	0	0	0	0	0
Vital	0	1.4121	0	0	0	0	0	0	0	0.5318	0	0	0
Challenging	0	1.3414	0	0	0.4265	0	0	0.3444	0	0	0	0	0.3175
Necessary	0	1.1138	0	0	0	0	0	0.5442	0.3814	0.5139	0	0	0
Valuable	0	0.8799	0	0	0.3054	0	0	0	0	0	0	0	0
Possible	0	0.7487	0	0	0	0	0	0	0	0	0	0	0
Helpful	0	0.4439	0	0	0	0	0	0.4208	0	0	0	0	0
Vary	0	0.3682	0	0	0	0	0	0	0	0	0	0	0
Continue	0	0.3162	0	0	0	0	0	0	0	0	0	0	0
Tiring	0	0.3137	0	0	0	0	0	0	0	0	0	0	0
Easy	0	0.3032	0	0	0	0	0	0	0	0	0	0	0
Self-control	0	0	2.1446	0	0	0	0	0	0	0	0.2836	0.4829	0
Internal	0	0	0.2835	0	0	0	0	0	0	0	0	0	0
Impulse	0	0	0.2487	0	0	0	0	0	0	0	0	0	0
Behavior	0	0	0.2375	0	0	0	0	0	0	0	0	0	0
Manner	0	0	0	1.2327	0	0	0	0	0	0	0	0	0
Responsible	0	0	0	0.8169	0	0	0	0.2802	0.6145	0	0	0	0
Confident	0	0	0.3331	0.5070	0.4513	0	0	0	0.2915	0	0	0	0.2901
Kindness	0	0	0	0.4604	0	0	0	0	0	0.3268	0	0	0
Work	0	0	0	0.3041	0	0	0	0	0	0	0	0	0
Hard	0	0	0	0.3041	0	0	0	0	0	0	0	0	0
Strength	0	0	0	0	1.1024	0	0	0	0.264	0	0	0	0
Determination	0	0	0	0	0.8125	0	0	0	0.2594	0	0	0.3663	0
Dedication	0	0	0	0	0.6885	0	0	0	0	0	0	0	0
Power	0	0	0	0	0.6386	0	0	0	0	0.3790	0	0	0.4238
Motivation	0	0	0	0	0.6151	0	0	0	0	0	0	0.5263	0
Liberating	0	0	0	0	0.2636	0	0	0	0	0	0	0	0
Dignity	0	0	0	0	0.2436	0	0	0	0	0	0	0	0
Calm	1.0470	0	0	0	0	1.4517	0	0	0.2847	0	0.2775	0	0
Patient	0	0	0	0	0.3300	1.3460	0	0	0.2433	0	0.3631	0	0
Conscientious	0	0	0	0	0	0.7252	0.6295	0	0	0	0	0	0
Tolerance	0	0	0	0	0	0.6301	0	0	0	0	0	0	0
Wisdom	0	0	0	0	0	0.3665	0	0.3332	0.2566	0	0	0.2693	0

Table 2 (cont.): LSA Method Solution

Words	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11	Factor12	Factor13
Awareness	0	0	0	0	0	0	1.0305	0	0.3024	0	0.2795	0	0.3816
Goal	0	0	0	0	0	0	0.7818	0	0	0	0	0	0
Orient	0	0	0	0	0	0	0.7652	0	0	0	0	0	0
Boundaries	0.2357	0	0	0	0	0	0.5093	0	0	0	0.2557	0	0.4378
Knowledge	0	0	0	0	0	0	0.4507	0	0	0	0	0	0
Managing	0	0	0	0	0	0	0.4498	0	0	0.3511	0	0.3386	0
Ability	0	0	0	0	0	0	0.3751	0	0	0	0	0	0
Positive	0	0.3043	0	0	0	0	0.3578	0	0	0	0	0	0
Obligation	0	0	0	0	0	0	0.2950	0	0	0	0	0	0
Good	0	0.2951	0	0	0	0	0	1.7282	0	0	0	0	0
Intelligent	0	0	0	0.3465	0	0	0.4403	0.4556	0	0	0	0	0
Satisfying	0.2473	0.3285	0	0	0	0	0	0.3757	0	0	0	0	0
Bad	0	0	0	0	0	0	0	0.2987	0	0	0	0	0
Dependable	0	0	0	0	0	0	0	0.2596	0	0	0	0	0

Respect	0	0	0	0	0	0	0	0.2535	0.2310	0	0	0	0
Mature	0.2757	0	0	0	0	0	0	0	1.2829	0	0	0	0
Independent	0	0	0	0	0	0	0.3847	0	0.6272	0	0	0.2967	0
Moral	0	0	0	0	0	0	0	0	0.4381	0	0	0	0
Intellectual	0	0	0	0	0	0	0	0	0.2688	0	0	0	0
Rare	0	0	0	0	0	0	0	0	0.4576	1.1206	0	0	0
Desire	0	0	0.4456	0	0	0	0	0.3492	0	0.7233	0	0.4681	0.3299
Leader	0	0	0	0	0	0	0	0	0	0.6433	0	0.2653	0
Practice	0.2907	0.5082	0	0.2834	0	0	0	0	0.3001	0.5246	0	0	0
Restrain	0.5143	0	0	0	0	0	0	0	0.2675	0	1.5000	0	0
Willpower	0	0	0	0.3774	0	0	0	0	0	0	1.1010	0	0
Moderation	0	0	0	0	0	0	0	0.2749	0	0.2400	0.9985	0.3194	0
Discipline	0.4072	0	0.332	0.2394	0.4596	0	0	0	0	0	0.9377	0	0
Indulgence	0	0	0	0.3252	0	0	0	0	0	0	0.3597	0	0
Stability	0	0	0	0	0.2446	0	0	0	0	0	0.3582	0	0
Self-denial	0	0	0	0	0	0	0	0	0	0	0.2718	0	0
Pleasant	0.4593	0	0	0	0	0.6476	0	0.5900	0.2928	0	0.2347	0.7709	0.5577
Selfless	0	0	0	0	0	0	0	0.2370	0	0	0.2476	0.7119	0
Esteem	0	0	0	0	0	0	0	0	0	0	0	0.6723	0
Admirable	0	0	0	0	0	0	0	0.2761	0	0.4006	0	0.4580	0.3547
Courage	0	0	0	0.2833	0	0	0	0	0	0	0	0.3671	0.2777
Modest	0	0	0	0	0	0	0	0	0	0	0.5683	0	0.9110
Economic	0	0	0	0	0	0	0.3198	0	0	0	0	0	0.7139
Honesty	0	0	0	0	0	0	0	0	0	0	0	0.5130	0.5482
Healthy	0	0	0	0	0	0	0	0.3406	0	0	0	0.2653	0.4145
Godly	0	0	0	0	0	0	0	0	0	0.2468	0	0	0.4056
Obedience	0.2550	0	0	0	0	0	0	0	0	0	0	0	0.4011
Select	0	0	0	0	0	0	0	0	0	0	0	0	0.3057

LDA

The best LDA solution extracted 13 topics (per the cross validation): mature, admiring, moderation, challenging, good, restrain, pleasant, necessary, self-control, desirable, calm, and discipline (Table 3). Similar to LSA results, only higher probabilities words are reported, and the name of each topic is selected based on its highest probabilities in that topic. In topic number one, 40 respondents defined self-control in terms of mature, confident, managing, and responsible. Twenty-eight respondents defined topic two in terms of vital, admirable, intelligent, and leader. Topic three had 40 respondents, who defined self-control in terms of awareness, moderation, boundary, honesty, self, modest, and stability. Thirty-five respondents comprised topic four, which was defined by challenging, valuable, satisfy, determination, vary, healthy, easy, successful, liberating, and good. Topic five was defined by good, rare, helpful, and frustrating, with 40 respondents. Topic six represented 47

respondents who used the terms restrain, willpower, kindness, and careful.

Topic seven was defined by pleasant, practice, courage, endurance, and sensible, with 31 respondents. Twenty-eight respondents were in topic eight, which was defined by composure, patient, motivation, respectful, and dignity. Topic nine was defined by necessary, strength, intellectual, dedication, and challenging, with 27 respondents. Self-control, challenging, possible, independent, and ability formed topic ten with 29 respondents. Twenty respondents constituted topic eleven, using the terms desirable, tolerance, positive, virtuous, tiring, godly, and calm. Topic twelve, composed of 29 respondents, was defined by calm, powerful, conscientious, and wisdom. Topic thirteen included 30 respondents and was defined in terms of disciplined, economic, well manner, indulgence, obedient, goal-oriented, and obligation.

Table 3: LDA Method Solution

Words	Topic1	Topic2	Topic3	Topic4	Topic5	Topic6	Topic7	Topic8	Topic9	Topic10	Topic11	Topic12	Topic13
# of Respondents	40	28	40	35	40	47	31	28	27	29	20	29	30
Mature	0.1808	0	0	0	0	0	0	0	0	0	0	0	0
Confident	0.1698	0	0	0	0	0	0	0	0	0	0	0	0
Managing	0.0829	0	0	0	0	0	0	0	0	0	0	0	0
Responsible	0.0822	0.0411	0	0	0.0317	0	0	0	0	0	0	0	0.0715
Moral	0.0490	0	0	0	0.0422	0	0	0	0	0	0	0	0
Mind	0.0440	0	0	0	0	0	0	0	0	0	0	0	0
Compromise	0.0377	0	0	0	0	0	0	0	0	0	0	0	0
Vital	0	0.4208	0	0	0	0	0	0	0	0	0.0656	0	0
Admire	0	0.1039	0	0	0	0	0	0	0	0	0	0	0
Intelligence	0	0.0972	0	0	0	0	0	0	0	0	0	0	0
Leader	0	0.0755	0	0	0	0	0	0	0	0	0	0	0
Aware	0	0	0.1941	0	0	0	0	0	0	0	0	0	0
Moderation	0	0	0.1620	0	0	0.0505	0	0	0	0	0	0	0
Boundary	0	0	0.1192	0	0	0	0	0	0	0	0	0	0
Honesty	0	0	0.0751	0	0	0	0	0	0	0	0	0	0

Self	0	0	0.0628	0	0	0	0	0	0	0	0	0	0
Modest	0	0	0.0536	0	0	0	0	0	0	0	0.0495	0	0
Stability	0	0	0.0512	0	0	0	0	0	0	0	0	0	0
Esteem	0	0	0.0439	0	0	0	0	0	0	0	0	0	0
Valuable	0	0	0	0.1378	0.0692	0	0	0	0	0	0	0	0
Satisfying	0	0	0	0.1007	0	0	0	0	0	0	0	0	0
Determination	0	0	0	0.0744	0	0	0	0	0	0	0	0	0
Vary	0	0	0	0.0630	0	0	0	0	0	0	0	0	0
Healthy	0	0	0	0.0571	0	0	0	0	0	0	0	0	0
Easy	0	0	0	0.0503	0	0	0	0	0	0	0	0	0
Success	0	0	0	0.0484	0	0	0	0	0	0	0	0	0
Liberty	0	0	0	0.0377	0	0	0	0	0	0	0	0	0
Good	0	0	0	0.1521	0.2529	0	0	0	0	0	0	0	0
Rare	0	0	0	0	0.2133	0	0	0	0	0	0	0	0
Help	0	0	0	0	0.1214	0	0	0	0	0	0	0	0
Frustrate	0	0	0	0	0.0439	0	0	0	0	0	0	0	0
Restrain	0	0	0.0651	0	0	0.4654	0	0.0510	0	0	0	0	0
Willpower	0	0	0	0	0	0.2876	0	0	0	0	0	0	0
Kind	0	0	0	0	0	0.0556	0	0	0	0	0	0	0
Care	0	0	0	0	0	0.0517	0	0	0	0	0	0	0
Pleasant	0	0	0	0	0	0	0.2826	0	0	0	0	0	0
Practice	0	0	0	0	0	0	0.1689	0	0	0	0	0	0

Table 3 (cont.): LDA Method Solution

Words	Topic1	Topic2	Topic3	Topic4	Topic5	Topic6	Topic7	Topic8	Topic9	Topic10	Topic11	Topic12	Topic13
# of Respondents	40	28	40	35	40	47	31	28	27	29	20	29	30
Composure	0	0	0	0	0	0	0	0.2178	0	0	0	0	0
Patient	0	0	0	0	0	0	0.0649	0.1886	0	0	0	0.1831	0
Motive	0	0	0	0	0	0	0	0.1110	0	0	0	0	0
Respect	0	0	0	0	0	0	0	0.0560	0	0	0	0	0
Dignity	0	0	0	0	0	0	0	0.0408	0	0	0	0	0
Necessary	0	0.0416	0	0	0	0	0	0	0.3758	0	0.0560	0	0
Strength	0	0	0	0	0	0	0	0	0.2736	0	0	0	0
Intellectual	0	0	0	0	0	0	0	0	0.0488	0	0	0	0
Dedication	0	0	0	0	0	0	0	0	0.0354	0	0	0	0
Self-Control	0	0	0	0	0	0	0	0	0	0.4020	0	0	0
Challenge	0	0	0	0.1881	0.0542	0	0.0901	0	0.1120	0.2481	0.0970	0	0
Possible	0	0	0	0	0	0	0	0	0	0.1293	0	0	0
Independent	0	0	0	0	0	0	0	0	0	0.0490	0	0	0
Ability	0	0	0	0	0	0	0	0	0	0.0409	0	0	0
Desire	0	0.0364	0	0	0	0	0	0	0	0	0.1251	0	0
Tolerance	0	0	0	0	0	0	0	0	0	0	0.0990	0	0
Posit	0	0	0	0	0	0	0	0	0	0	0.0790	0	0
Virtue	0	0	0	0	0	0	0	0	0	0	0.0687	0	0
Tire	0	0	0	0	0	0	0	0	0	0	0.0545	0	0
God	0	0	0	0	0	0	0	0	0	0	0.0472	0	0
Calm	0	0	0	0	0	0	0	0	0	0	0.0487	0.4401	0
Power	0	0	0	0	0	0	0	0	0	0	0	0.1167	0
Conscientious	0	0	0	0	0	0	0	0	0	0	0.0594	0.0655	0
Wisdom	0	0	0	0	0	0	0	0	0	0	0	0.0464	0
Discipline	0.1966	0	0	0	0	0	0	0.0715	0	0	0	0	0.3068
Economic	0	0	0	0	0	0	0	0	0	0	0	0	0.0799
Manner	0	0	0	0	0	0	0	0	0	0	0	0	0.0754
Well	0	0	0	0	0	0	0	0	0	0	0	0	0.0754
Indulgence	0	0	0	0	0	0	0	0	0	0	0	0	0.0628
Obedience	0	0	0	0	0	0	0	0	0	0	0	0	0.0595
Goal	0	0	0	0	0	0	0	0	0	0	0	0	0.0503
Orient	0	0	0	0	0	0	0	0	0	0	0	0	0.0440
Obligation	0	0	0	0	0	0	0	0	0	0	0	0	0.0352

Discussion

All three methods, judgment-based analysis (JBA), LSA, and LDA, revealed multiple contents and latent structures (dimensions, factors, topics) of self-control. However, each method offered unique insights into the concept. Specific to the judgment-based method, the twelve themes potentially represent the twelve dimensions of self-control that respondents have identified. Notably, the twelve dimensions

of self-control come from a holistic view of 425 respondents. In other words, self-control collectively encompasses twelve dimensions.

In JBA, dimension one seems to refer to higher-level cognitive processing top-down control in which higher-level goals direct lower-level goals. The application of this view includes research in consumer goal pursuit, goal evaluation, delay- gratification (Fishbach & Dhar, 2005;

Mischel, Shoda, & Rodriguez, 1989; Zhang, Huang, & Broniarczyk, 2010). The second dimension discusses the notion of discipline and restraint, which has been studied under impulsiveness tendency (Barratt, 1965). Similarly, the fifth dimension of self-control consists of strength, willpower, and confidence. From this view, the strength model of self-control theory and the dynamics of will-power were revealed (Baumeister, Kathleen D Vohs, & Dianne M Tice, 2007; Metcalfe & Mischel, 1999).

In addition, the frequency of word occurrences is indicative of the relative relevance of each theme to the central concept. One could argue that some of these themes can be categorized differently, depending on the perspective of the researchers. This proposition is seemingly valid, given the inherent biased nature of the judgment-based method. However, the flexibility characteristic of judgment-based methods also could potentially enrich and expand the interpretive insights of qualitative analysis.

Although LDA and LSA do not offer the same type of flexibility, they frequently discover multiple levels of dimensionality (Ashton et al., 2014). The key advantage of the computer-based analysis procedures is that they take individual differences (e.g., such as life, culture, experience, language usage) and cluster those into distinct groups. From the structuralism perspective, one can infer that these groups of respondents have similar life, culture, experience, and language usage, and self-control characteristics.

According to the LSA results, factor one seems to invoke self-control with its content, characterized as moderation, composure, and calm. Factor two seems to be compatible with Baumeister (2007) and Fujita (2011), in which self-control is an effortful self-regulation to align with values and ideals of society. According to factor three, eleven, and five, self-control is thought of as a control of internal impulse behavior, which appears to be consistent with Chaiken and Trope (1999), and Strack and Deutsch (2004).

Similarly, one can suggest that factor four comprises antecedents of self-control, (e.g., motivation, willpower, determination), which are in line with Locke and Braver (2010) and Metcalfe and Mischel (1999). Factor six and thirteen embody a religious origin (e.g., calm, patient, and conscientious)(McCullough & Willoughby, 2009). Factor seven appears to discuss the monitoring of conflicts against one's values (e.g., awareness, goal, boundaries). Factor eight discusses the outcomes of self-control (e.g., good, pleasant, satisfying), whereas factor nine consists of antecedents (e.g., mature, moral, and intellectual) of self-control (Locke & Braver, 2010). Factor ten emphasizes the procedural aspect of self-control in which strength and practice are required to exert self-control (e.g., rare, practice, restrain)(Muraven & Baumeister, 2000).

On the other hand, the contents and structures of the thirteen topics of LDA were not as intuitive as the LSA results. For

example, one can visualize the conjoint occurrence of topic one, which is defined by these terms in ordinal sequence: mature, confident, managing, and responsible, with mature having the highest probability. From the perspective of these forty respondents who made up topic one, self-control is mainly characterized by mature, then confident, then managing, then responsible, and so on. Based on the Bayesian algorithm, one can view that responsible is a subordinate word of managing, which is a subordinate word of confident, which is a subordinate word of mature. However, to the best of our knowledge, empirical studies investigating these relationships have not been established in the literature. Notably, the hierarchical structure of self-control in topic one is defined by forty respondents, not all 425 surveyed respondents. The remaining twelve topics can be interpreted in the same logic as the first topic.

Conclusion and Implications

Anchoring on the life, culture, experience, and language usage of respondents, the findings of the study offer insights into the self-control phenomenon at equivalent, associative, and hierarchical relations as well as at individual and collective levels. The study is unconventional in ways that it does not rely on most established theoretical underpinnings. Yet, the purpose of the study is to inquire bold advances in consumer behavior theoretical and empirical boundaries by venturing into a complex and central concept of human being.

Conjointly, self-control seems to have twelve dimensions. In addition, there are thirteen distinct groups of individuals having similar views of self-control. Each group offers a unique view of the associative and hierarchical nature of the self-control concept. This finding perhaps explains some contradicting and overlapping views of self-control in the literature (Baumeister et al., 2008; Fujita, 2011a; Hassin et al., 2010; Muraven et al., 1998; Strack & Deutsch, 2004).

This study provides a synthesis of self-control structure. In addition to confirming that self-control can be at an asset (powerful, admirable, rare- JBA) but can also be a liability (challenging, difficult, resistance- JBA)(Koval et al., 2015), an antecedent (motivation, willpower, determination – LSA) and an outcome (good, pleasant, satisfying – LSA)(Bernheim et al., 2015), a nature (mature, moral, intellectual – LSA) and a nurture born (life, human, natural, universal – JBA)(Casey, 2015), good (good, responsible, mature - JBA) and bad (boring, annoying – JBA)(Fujita, 2011b; Kivetz & Keinan, 2006), self-control possess associative (LSA) and hierarchical structure (LDA).

Beyond attitude and behavior, linguistic structuralism of social psychology are associated with ideas transformation. In this sense, there exists “individual variation” (p.11) of the self-control concept, which gives way to the transformational aspect of perception (Piaget, 2015), With twelve dimensions (JBA), thirteen factors (LSA), and

thirteen factors (LDA) as well as the associative and hierarchy relationships within LSA and LDA, the newly found contents and structures of the self-control are more elaborate and more refined perceptions. These establishments give ways to modern thoughts on individual and society interactions.

Contemporary issues spanning from individual (well-being) to global concerns (e.g. sustainability) have been suggested rooting from inadequate or lacking personal self-control (Chaudhury & Albinsson, 2014; Crescioni et al., 2011; Sheth, Sethia, & Srinivas, 2011). Notably, emerging thoughts propose that the future of global sustainability starts at individual consumers, and allude to the concept of mindful consumption, anchoring on customer-centric sustainability as a solution to global sustainability challenges (Chaudhury & Albinsson, 2014; Sheth et al., 2011). Obesity, heart failure, cancer, aids, and depression epidemics are a few health-related issues stemming from not having enough self-control (Crescioni et al., 2011; Friese, Hofmann, & Wiers, 2011; Kan, 2007). From individual problems to global sustainability concerns, self-control is suggested to be a viable solution for humanity. It has been suggested that exercising self-control in one domain simultaneously enhance self-control in many other related and unrelated domains (Tuk, Zhang, & Sweldens, 2015).

Limitations and Future Research

All three methods can be used to analyze, extract, index, classify, and uncover latent structures of unknown territory effectively. Notwithstanding the significance of the results, this study relied primarily on university students' interpretations of the self-control concept. The overall results, however, appear to be consistent with the content and structure of the self-control phenomenon in the literature. The universal theme of all three methods seems to conclude that self-control is good. However, some individuals also see a negative aspect of self-control (e.g., boring theme in judgment-based), and scholars agree (Fujita, 2011a). As structuralism theory suggests, this difference probably can be traced back to the life, culture, and experience of respondents. Therefore, understanding the self-control phenomenon requires holistic, multifarious approaches.

As the scope of marketing continues to broaden and expand (Hunt, 2010), and the influx of customer-generated, semi-structured, and unstructured textual data cause practitioners and academics to seek additional qualitative methods for working with big sets of data, the need to incorporate effective and efficient qualitative methods into the marketing discipline augments (Bernard, 2012; Hanson & Grimmer, 2007; Mertens, 2009). Computer software offers an orderly way to derive structures and hierarchies of data, resulting in increased productivity, efficiency, and effectiveness for researchers (Bazeley & Richards, 2000). Specific to LSA and LDA, language usage of data provides

important insights into the research in question. Perhaps the structure can shed lights on future research questions, such as where is the equilibrium of self-control? Is there a priori and internal mechanism directing self-control? What are the prerequisites of self-control resources? How does performance monitoring intervene with subsequent control tasks? Hopefully, the present work will encourage researchers to undertake future studies, providing in-depth understanding of self-control phenomena and utilizing computer-based methods to strengthen the marketing discipline.

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