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THE ROLE OF BRAND NAME FLUENCY: A PHARMACEUTICAL MARKETING  
PERSPECTIVE

Presented as partial fulfillment of requirements for the Doctor of  
Philosophy Degree in the Department of Pharmacy Administration  
The University of Mississippi

David E. Wamble

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## ABSTRACT

**Background:** Consumers are exposed to thousands of advertisements, most all of which are designed to promote a particular brand and accompanying brand name. The selection of a brand name is a critical strategic decision and is an important means to building brand equity. The importance of branding elements, specifically brand names, has led pharmaceutical manufacturers to become more creative and open the possibilities of language in brand name development. Given the complexities associated with brand name development in the US pharmaceutical industry and the trends observed in recent pharmaceutical brand names, advancing the understanding of how brand name selection can affect patient judgments will be beneficial and extend previous research findings to this distinct arena. When consumers or patients see complex, often unfamiliar pharmaceutical brand names, the brand names alone may convey certain feelings and negative judgments, potentially affecting multiple aspects of the pharmacologic intervention. The purpose of this research was to explore the relationship between pharmaceutical brand name fluency and subsequent patient judgments associated with processing a pharmaceutical brand name.

**Methods:** A total of 100 study participants were selected from a patient panel who have self-reported rheumatoid arthritis. Study participants were assigned to one of two groups of pharmaceutical brand names, fluent or disfluent and then exposed to the associated 10 pharmaceutical brand names. Participants were instructed to imagine they were reading the pharmaceutical brand name as part of an advertisement for the product and asked to assess the

perceived risk, familiarity, and willingness to request the pharmaceutical product from their physician. A two-condition between-subject approach was used for testing statistical significance of a single mediation model for the effects of fluency on perceived risk through familiarity. A moderated serial mediator model was incorporated to assess the effects of fluency and risk perception on willingness to request the product and to determine the moderating role of disease severity on the relationship between perceived risk and willingness to request.

**Results:** Results showed that participants exposed to fluent brand names did not consider the products to be more familiar and there was no evidence that the fluency of the brand names influenced the perceived risk of the product independent of the effects of fluency on familiarity. Additionally, willingness to request the pharmaceutical product is not affected by the perceived risk of the product regardless of the level of disease severity.

**Conclusion:** The current research is the first study to our knowledge that demonstrates pharmaceutical brand name fluency does not affect perceived risk of the product or willingness to request the medication in actual patients who are evaluating drug names indicated to treat their condition or disease.

## LIST OF ABBREVIATIONS AND SYMBOLS

CEDR	Center for Drug Evaluation and Research
CPG	Consumer Packaged Goods
DDMAC	Division of Drug Marketing, Advertising, and Communications
DMEPA	Division of Medication Error Prevention and Analysis
FDA	Food and Drug Administration
OPDP	The Office of Prescription Drug Promotion
OSE	Office of Surveillance and Epidemiology
US	United States
USANC	United States Adopted Names Council
VAS	Visual Analogue Scale

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## CHAPTER I: INTRODUCTION

### Traditional Brand Name Development

Research has indicated that on any given day, a person can be exposed to thousands of advertisements, most all of which are designed to promote a particular brand and accompanying brand name (Johnson 2006; Story 2007). Throughout many consumer product categories, brand names come in a multitude of forms. Such brand names are designed with a specific target market in mind, and the choice of the brand name is a critical strategic decision, requiring significant consideration. No matter the origin of a brand name or market for which the product is targeted, the choice of a brand name has been suggested as an important means to building brand equity (Aaker 1991; Keller et al. 1998). This is paramount to a brand's profitability and sustainability because, in many of today's fast-paced markets, it is difficult to maintain a competitive advantage on performance attributes alone (Kohli and LaBahn 1997). Such market dynamics require strong brand imagery to be established and leveraged.

Extant literature suggests brands with strong brand images can influence choice and command a premium (Aaker 1991; Kohli and LaBahn 1997). The brand name is a fundamental part of brand image and considered the anchor for brand positioning initiatives (Kohli and LaBahn 1997). Recognizing the significance of a brand name, marketing research has proposed various normative approaches to developing and selecting an effective brand name.

Keller et al. (1998 pg. 48) posited that selecting "inherently meaningful" brand names, such that the name itself conveys relevant product information, is one strategic opportunity to

enhance brand name awareness and identification within a product category. The researchers also prescribed a second strategy, which involves choosing a “suggestive” brand name (Keller et al. 1998 pg. 48). The suggestive approach to brand naming is considered to facilitate and assist with positioning efforts. Additionally, Collins (1977) provided two basic naming strategies, which were referred to as the “Juliet Principle” and the “Joyce Principle.” The first strategy, the “Juliet Principle”, focuses on choosing a brand name and establishing the name in the consumers’ mind through repetition (Kohli and LaBahn 1997). The second strategy, the “Joyce Principle”, involves choosing a brand name that has the desirable phonetic symbolism for the product, which refers to the non-arbitrary relationship between sound and meaning (Kohli and LaBahn 1997). Although these examples and others within extant literature address many aspects of the brand naming process for conventional consumer products and categories, little focus has been directed towards the brand naming processes and implications of brand name selection within the pharmaceutical industry.

### Brand Name Development within the US Pharmaceutical Industry

An effective pharmaceutical brand name has been considered by many researchers and marketing practitioners alike to play a critical role in building and maintaining customer loyalty and accordingly, as a very important element in contributing to the value and wealth creation of a pharmaceutical brand (Blackett and Robins 2001). Indeed, the brand name of a pharmaceutical product is likely the one element that will remain constant throughout the product’s lifetime. Because of this significance, many pharmaceutical manufactures spend considerable resources in developing and selecting the ideal brand name for their products (Russell 2007). However, unlike many consumer product categories, the development and choice of a pharmaceutical brand name

in the United States (US) has significant regulations governing the process. Pharmaceutical manufacturers do not have the same autonomy found within consumer-packaged goods (CPG) markets for brand name selection and, therefore, are limited in their ability to use many of the prescribed and aforementioned naming strategies found within the marketing literature.

### Regulatory Environment for Pharmaceutical Brand Name Development

As US pharmaceutical manufacturers' pipelines produce more diminished returns and overcoming the increasing use of generic alternatives becomes onerous, strategic focus on the development and management of a pharmaceutical brand becomes quite conspicuous. During the 1980s and 1990s, naming a drug within the US pharmaceutical marketplace was less complex than today's environment (Blackett and Robins 2001). Increases in the number of products entering the market and increases in the regulatory requirements put forth by the US Food and Drug Administration (FDA) regarding naming a pharmaceutical product have challenged companies attempting to successfully differentiate their products through brand name development.

In recent years, the FDA has focused on increasing the safe use of drug products by minimizing user errors attributed to unclear nomenclature, labels, labeling and other packaging aspects of pharmaceutical products. This is primarily due to the growth in medication errors that has been realized throughout the US health system. Furthermore, as consumers become exposed to more and more pharmaceutical advertisements and pharmaceutical brand names, the role of the US FDA in reducing brand name confusion takes on an ever-growing importance (Fish and Richardson 2010). Pharmaceutical manufacturers must ensure that the investment associated with developing a brand name is not offset by failing to pass this FDA rigor of approving the name.

The Center for Drug Evaluation and Research (CDER) received approximately 126,000 reports of medication errors from 2000 – 2009, many of which were considered to be directly related to the similar sound and appearance of drug name pairs (FDA Guidance Document 2014). Additionally, there are approximately 3 billion retail prescriptions adjudicated annually in the US. Of these prescriptions, about 12.5% of medication errors are attributed to confusion by healthcare practitioners between drug names (World Trademark Review 2016). Because of this trend, CDER, a component of the US FDA, has developed and refined internal procedures for evaluating the potential for a proposed brand names to cause or contribute to medication errors as part of the Center’s focus on the safe use of drug and therapeutic biologic products (FDA Guidance Document 2014).

The review of proposed pharmaceutical brand names is conducted by the Division of Medication Error Prevention and Analysis (DMEPA) in CDER’s Office of Surveillance and Epidemiology (OSE). The Office of Prescription Drug Promotion (OPDP), formerly the Division of Drug Marketing, Advertising, and Communications (DDMAC), works in consultation with DMEPA to determine the acceptability of proposed pharmaceutical brand names seeking marketing approval. These regulatory agencies provide broad guidance to manufacturers, which, if followed, will increase the likelihood of acceptance or approval of a proposed pharmaceutical brand name.

Adding to the complexity associated with brand naming processes in the US pharmaceutical industry, pharmaceutical manufacturers must also be cognizant of the generic name of the pharmaceutical product, which differs from the brand name or trade name. In the US, the generic name of the pharmaceutical product is a by-product of the USAN, which stands for

the United States Adopted Name. The USAN is obtained through collaboration with the United States Adopted Names Council (USANC), which serves the health profession in the US by selecting simple, informative, and unique nonproprietary names (i.e. “stems”) for drugs by establishing logical nomenclature classifications based on pharmacological and chemical relationships (AMA 2016). A pharmaceutical manufacturer is responsible for applying and receiving approval for a USAN (typically completed in Phase II) before the brand name can be filed with the FDA. Although the generic name is not always translated directly into the pharmaceutical brand name, many products have traces of the generic name or ‘stem’ in the brand name. One famous example of this naming strategy exist with the product Lipitor®, which combines a portion of the word “lipid” with a portion of the stem “-tor” from the generic name (atorvastatin).

### Brand Naming Trends within the US Pharmaceutical Industry

It becomes apparent that within the US pharmaceutical industry, manufacturers are wedged between the tried-and-true brand naming strategies that extant marketing literature prescribes and the stringent boundaries that are imposed by regulatory bodies responsible for approving pharmaceutical brand names. Due to these peculiar market conditions, one is left to wonder just how pharmaceutical brand names are actually created and how these names are perceived by prescribers and patients. Although there are a host of opinions and difficult to decipher meanings in pharmaceutical brand name development, there has been little consensus among firms in approach. Trends in pharmaceutical brand names have been noted among choices that make use of linguistic tricks such as plosive letters ‘P’, ‘T’, and ‘D’ in an effort to convey power (Ipaktchian 2005). Other trends have been observed with the use of fricative letters such as



‘X’, ‘F’, ‘Z’, and ‘S’ to imply speed (Ipaktchian 2005). This, in part, helps explain the number of Xs and Zs that have been present within drug names in recent years.

The importance of branding elements, specifically brand names, has led pharmaceutical manufacturers to become more creative and open the possibilities of language in brand name development. More classic vowel/consonant constructions have ceded to more “innovative” approaches, such as the conjunction of consonants seen with products like Vfend® and Qvar® (Blackett and Robbins 2001). Such unnatural brand names may seem “strategic” at first glance but could end up being problematic in more ways than imagined. Many of the new generation drug names can be hard to spell and more importantly hard to pronounce.

Given the complexities associated with brand name development in the US pharmaceutical industry and the trends observed in recent pharmaceutical brand names, advancing the understanding of how brand name selection can affect patient judgments will be beneficial and extend previous research findings to this distinct arena. That is, when consumers or patients see complex, often unfamiliar pharmaceutical brand names, the brand names alone may convey certain feelings and negative judgments. Such judgments and perceptions of pharmaceutical products inferred through the brand name could potentially affect multiple aspects of the pharmacologic intervention, to include treatment choice, willingness to inquire about the medication, primary adherence, and other important and associated outcomes. If evidence supports that such feelings are indeed associated with certain pharmaceutical brand names, this could prove to be harmful to advertisement initiatives that are intended to promote patient and physician dialogue. Patients may shy away from asking about or discussing a potentially beneficial pharmaceutical product with their healthcare provider simply because of the brand name. Furthermore, these unintended consequences of pharmaceutical brand name

judgments could easily be avoided by considering the risk perceptions of consumers and patients in brand name development initiatives.

### Study Aims

The broad purpose of this research is to explore the relationship between pharmaceutical brand name fluency and subsequent patient judgments associated with processing a pharmaceutical brand name. To achieve these broad objectives, the study had the following aims:

1. To evaluate the perceived risk associated with a pharmaceutical product based on the pharmaceutical brand name fluency.
2. To investigate whether the effects of linguistic fluency on perceived risk is mediated by patients' perceived familiarity of the pharmaceutical brand name.
3. To assess the effects of linguistic fluency and risk perception associated with pharmaceutical brand name fluency on a patient's willingness to request a pharmaceutical product.
4. To assess whether disease severity moderates the relationship between perceived risk and patients' willingness to request a pharmaceutical product.

## CHAPTER II: REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

### Processing Fluency

Human judgment reflects not only the content of our thoughts but also the metacognitive experience of processing the thoughts (Alter and Oppenheimer 2009). Many theories involving consumer judgments make the assumption that peoples' judgments are formed based on informational aspects that are pertinent to the target and serendipitously come to mind at the time of evaluation (Schwarz 2004). If this were indeed the case, consumers would ideally assess a product more favorably when more positive attributes of the product come to mind. Similarly, from a normative perspective, consumers should evaluate the validity of a product claim by drawing on relevant accessible knowledge about the respective content domain (Schwarz 2004). Based on this rationale, a pharmaceutical product which includes the most superior efficacy and safety data, would surely "win" in the minds of patients when direct-to-consumer advertising is conducted. Empirical evidence does not support this proposition and research surrounding metacognitive experiences in consumer judgment and decision-making provides some explanation into this matter.

Consumers' thought processes are guided by metacognitive experiences, such as the ease or difficulty with which the information presented can be brought to mind or the fluency with which new information can be processed (Schwarz 2004). Because of this, research has demonstrated that an individual's judgment often departs from what one would predict based on the accessible declarative information (Schwarz 2004). Schwarz (2004) posited that such findings

show that the subjective experiences that accompany the thought process qualify the implications of accessible declarative information, sometimes to the extent that the judgment is paradoxical to what the accessible content would suggest.

Schwarz (2004) concluded that based on an individual's metacognitive experiences, the person's conclusion depends on their naïve theories of memory and cognition. In other words, an evaluation is based on an individual's assumption about just how easy or difficult the stimulant causes one to think of certain things or to process new information. This assertion is intriguing and relevant to the development of pharmaceutical brand names, especially at it relates to consumers who are intrinsically less informed and knowledgeable about the specific utility and clinical attributes of drug therapies. The issue becomes more concerning when considering the increasing level of exposure that many consumers have to drug names and advertisements. Additional research regarding the effects of processing fluency may help shed light on this issue.

Lee (2004) extended the work by Schwarz (2004) and proposed that the metacognitive route to judgment could occur more often than Schwarz first suggested. More specifically, Lee (2004) refined Schwarz's examination regarding the effects of processing fluency on judgments of liking and preference by making salient the distinction between how individuals process a target and how individuals process information about the target.

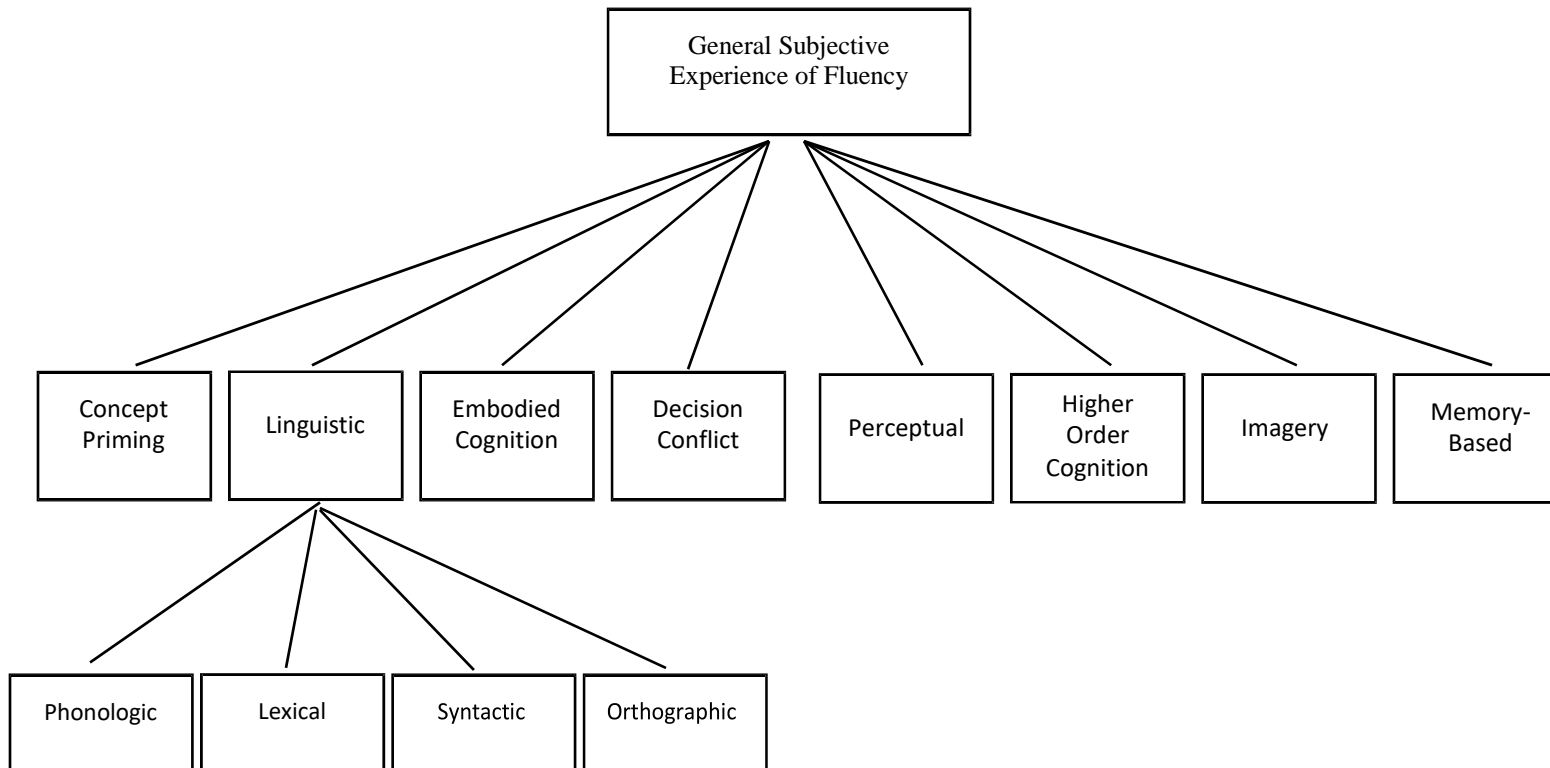
Schwarz (2004) posited that an individual's metacognitive experience may be the basis for judgments of truth, but the individual's positive experience of processing fluency actually drives judgments of preference (Lee 2004; Schwarz 2004). In other words, Lee (2004) hypothesized that an individual's attitude toward a target (e.g. the brand) will become more favorable when the target is perceptually fluent. In a thorough review of the literature surrounding this topic, Lee (2004) concluded that judgments often depend on how easy it is for an individual to process the

target rather than information about the target at the time of evaluation. In addition to the work by both Lee (2004) and Schwarz (2004) regarding processing fluency, other research has argued that processing fluency is one component of fluency but other forms of fluency should also be considered when addressing the effects of subjective feelings or ease of fluency.

### Additional Forms of Fluency

Researchers have addressed the broad construct of fluency in various manners since Schwarz (1990) showed that fluency influences judgment independently of the retrieved content that accompanies the experience of fluency. Alter and Oppenheimer (2009) summarized the idea of fluency by positing that every cognitive task can be described along a continuum from *effortless* to *highly effortful*, which produces a corresponding metacognitive experience that ranges from *fluent* to *disfluent*. The researchers went on to further categorize the various byproducts or forms of fluency including perception, memory, embodied cognition, linguistic processing, and higher order cognition (Alter and Oppenheimer 2009). Using this classification (Figure 1), it is the specific aspects of linguistic processing that are of interest as it relates to the effects of pharmaceutical brand names on patient perceptions.

**Figure 1: Classification of Various Instantiations of Fluency**



Source: Alter and Oppenheimer 2009

## The Components of Linguistic Processing and Effects on Fluency

One area of linguistic fluency that has been addressed by prior research and will be further examined within this research is phonological fluency. Simply put, certain letter strings are easier to process than others (Alter and Oppenheimer 2009). Phonological fluency helps explain why the difficulty, or lack thereof, in pronouncing certain names engenders the experience of disfluency. Research has indicated that English speakers struggle to pronounce certain names and obscure words and that these experiences translate into intriguing judgments (Alter and Oppenheimer 2009).

Alter and Oppenheimer (2006) investigated the impact of phonological fluency on the ability to predict short-term stock share fluctuations. In coordination with prior research findings, Alter and Oppenheimer (2006) hypothesized that when people attempt to understand complicated information, they often simplify the task by relying on mental shortcuts, or heuristics. In other words, the researchers wanted to analyze whether people tend to judge stimuli that were fluent, or in this case easy to pronounce, more positively on a range of evaluative dimensions (Alter and Oppenheimer 2006). By manipulating phonological fluency through the complexities of fabricated stock and company names, or how easy the names were to pronounce, the researchers were able to demonstrate that people prefer to invest in stocks and the companies with fluent rather than disfluent names (Alter and Oppenheimer 2006). Additionally, the researchers sought to support these findings by analyzing actual market data based on the ease of pronunciation of ticker codes as a predictor of actual stock performance (Alter and Oppenheimer 2006). The findings aligned with prior studies and showed that shares with pronounceable ticker codes outperformed those with unpronounceable ticker codes.

With similar research aims in mind, Laham et al. (2012) addressed phonologic fluency by investigating what the researchers coined as the *name-pronunciation effect*. This phenomenon is essentially synonymous with the construct of phonologic fluency that other research has addressed but differs slightly by leveraging the hedonic marking hypothesis (Winkielman et al. 2003). Simply put, the researchers posited that experiencing a name activates a rich set of semantic information, which impacts impression formation and evaluation (Laham et al. 2012). Throughout a series of experiments in a range of laboratory settings, the researchers demonstrated the name-pronunciation effect and found that easy- to-pronounce names are evaluated more positively than difficult-to-pronounce names. This effect was even realized in one experiment by demonstrating that subjects rated one potential candidate running for office as more suitable than another, with all information presented held constant except for the ease of pronunciation of the candidate's name (Laham et al. 2012). One of the most important takeaways from this research and one that is not addressed in similar research is that the researchers were able to demonstrate the robustness of fluency effects, even in potentially information-rich contexts. This is relevant to the current research in that consumers often have access to other information in addition to the pharmaceutical brand name. Some may argue that because consumers often make judgments about a pharmaceutical product in an information-rich environment, the brand name and associated linguistic fluency may contribute little to impression formation. The work by Laham et al. (2012) was able to demonstrate that the name pronunciation impacts liking and other evaluative measures strongly and consistently, even when other cues are accessible.

A considerable amount of research has evaluated phonologic fluency associated with names and found that people tend to prefer easy to pronounce names over difficult to pronounce names (Song and Schwarz 2009; Alter and Oppenheimer 2006, 2009). After reviewing social



psychology and consumer behavior literature, these relationships may seem intuitive. However, one may ask why does this phenomenon matter and how does it relate to brand naming trends among pharmaceutical products? An inspection of additional research regarding fluency and perceived risk helps to connect the dots.

### Effects of Fluency on Familiarity and Perceived Risk

Since the initial introduction to the marketing literature of the concept of perceived risk, many researchers have focused on leveraging the ideas of risk and risk reduction (Bauer 1960; Bettman 1973). Perceived risk has been defined as the expectations of losses associated with a decision or purchase (Ganther and Kreling 1999). The concept of loss can be a monetary loss or a non-monetary loss. Bettman (1973) posited that there are two main components to perceived risk: the chance component, which refers to the probability of a loss, and the severity component.

It has also been demonstrated that people respond differently to the hazards that they perceive (Slovic et al. 1981). Some perceived hazards are accompanied with extensive objective evaluative inputs while others may be based on direct experience. Despite some instances of objectivity, all forms of risk assessment are considered to include a large component of subjective judgment (Slovic et al. 1981). Accordingly, consumers are often asked to evaluate risks in situations where they seldom have in-depth evidence on hand to support their judgments. In these types of positions, extant literature has identified a number of general inferential rules that people use (Slovic et al. 1981). These rules are referred to as heuristics and are used to reduce difficult mental task to simpler ones or mental shortcuts (Slovic et al. 1981). This particularly important implication directly relates to the perceived risks people may deduce, which can be affected by processing fluency.

Slovic et al. (2004) addressed the affective components of risk, which is the specific quality of goodness or badness experienced as a feeling of state, with or without consciousness. The researchers posited that affective responses occur rapidly and automatically and that the reliance of such feelings could be characterized as “the affect heuristic” (Slovic et al. 2004). Affect plays an important role in what literature suggests as the dual-process theories of thinking, knowing, and information processing (Chaiken and Trope 1999; Kahneman and Fredrick 2002; Slovic 1996; Slovic et al. 2004). These two routes are referred to as the experiential and analytic systems.

One of the main characteristics of the experiential system is its affective basis (Slovic et al. 2004). Zajonc (1984) posited that affective reactions to stimuli are often the first reactions to stimuli, occurring automatically and subsequently guiding information processing and judgment. Even though analysis is important in some decision-making situations, reliance on affect and emotions is quicker, easier, and more efficient. Studies indicate that even though risk and benefit tend to be positively correlated in the world, they are negatively correlated in people’s minds (Slovic et al. 2004; Fischhoff et al. 1978). In other words, people base their judgments of an activity or technology not only on what they think but also on how they feel about it (Alhakami and Slovic 1994; Slovic et al. 2004). These findings are important for the current research such that if consumer feelings toward processing a brand name are favorable, then they may likely be moved toward judging the risks as low and the benefits as high.

Song and Schwarz (2009) sought to extend prior research surrounding risk perception (Lowenstein et al. 2001), which conceptualized ordinary risk judgment as one that is an intuitive rather than analytic process, involving the role of feelings such as like, fear, and anxiety in risk perception. The researchers did so by exploring how fluency contributes to the concept of “risk as

feelings” (Slovic et al. 2004; Song and Schwarz 2009). Extant literature has demonstrated that information that is fluent is perceived as more familiar and therefore evokes a more positive affective response than disfluent information (Schwarz 2004). The logic behind these findings is that because familiar material is easier to process than novel material, consumers infer familiarity from ease of processing (Pocheptsova et al. 2010; Song and Schwarz 2009). It has been demonstrated that in general, consumers will attribute the metacognitive difficulty experiences when processing information or thinking about an advertised product to unfamiliarity with the product (Pocheptsova et al. 2010).

Researchers believe that the positive impact of metacognitive ease of processing on evaluative judgments is due to a perceived connection between ease and familiarity or between difficulty and unfamiliarity (Song and Schwarz 2009).

Accordingly, Song and Schwarz (2009) hypothesized that if apparent familiarity does indeed play a prominent role in intuitive judgments of risk, then novel information or stimuli should be perceived as less risky when the information is easy rather than difficult to process. By using ease of pronunciation to manipulate processing fluency, Song and Schwarz (2009) demonstrated that people perceive disfluently processed stimuli as riskier than fluently processed stimuli. The findings for this research extend prior work by suggesting that fluency manipulations, and specifically ease of pronunciation, may shed light on management of perceived risk (Song and Schwarz 2009). In other words, disfluent product names may infer risk, erroneously or not, to a consumer simply based on the ease of pronunciation of the brand name.

### Phonetic Effects and Heuristic Cues of Brand Names

Literature indicates that a specific component of linguistic fluency is phonological fluency (Alter and Oppenheimer 2009). The relevant aspect to phonological fluency in regard to the goals of this research stems from the belief that phonetic symbolism, or the relation between sound and meaning (Lowrey and Shrum 2007), conveys certain cues to a person. The idea that the mere sound of a word, apart from the actual definition, has itself meaning and is important to brand name selection. Such sounds are derived from phonemes, which are the smallest units of a sound (i.e. the sound of an individual letter). Sound symbolism has been recognized as an important factor in how a person infers specific meaning from a brand that is considered as unfamiliar (Yorkston and Menon 2004). Although marketing researchers might have been aware of the presence of sound qualities in names, the work by Klink (2000, 2001, 2003) first applied the principles of phonology to marketing research. Klink investigated the idea that different vowels and consonants are articulated in different areas of the mouth (e.g. front of mouth or back of mouth) and that such front/back articulation affects consumers' perceptions of the quality of the sound in a name, thereby inducing inferred attributes in the brand name of a product.

In building upon the work by Klink (2000, 2001, 2003), Yorkston and Menon (2004) hypothesized that if a brand name contains phonemes that represent attributes a consumer desires, then the consumer will hold more positive attitudes and exhibit higher purchase intentions toward that brand. The researchers were able to demonstrate through two different experiments, manipulating a single vowel sound in a brand name, the process by which sound symbolism manifests in consumer judgments and that the process is uncontrollable, outside of awareness, and effortless, therefore making it automatic (Yorkston and Menon 2004). Furthermore, this research seems to indicate that sound symbolism, although evaluated on the attribute level, affects overall

evaluations.

Additional research has indicated that certain sounds seem to be consistently related to concepts such as disgust or dislike in the English language (Jespersen 2013; Lowrey and Shrum 2007). If this is indeed occurring in the minds of consumers, then brand names that contain these sounds might also be regarded as negative (Lowrey and Shrum 2007).

Indeed, Smith (1998) demonstrated this logic through an experiment using names of candidates containing vowel sounds that are used to express disgust and candidate names that might be less favorably perceived. By constructing a “comfort index” surrounding phonetics and analyzing US presidential election outcomes, beginning in 1824 through 1992, he found that the candidate with the highest comfort index won the popular vote in 35, or 83%, of the elections (Smith 1998). He then extended this analysis to local elections, US Senate and House elections and found overwhelming evidence that favorably named candidates won a majority of elections over less favorably named candidates (Smith 1998).

### The Effects of Fluency within the Pharmaceutical Marketplace

Although research assessing the effects of brand name fluency within the pharmaceutical marketplace is limited, recent research has emerged which helps to demonstrate the impact of pharmaceutical brand names on consumers’ evaluations and behavioral intentions. Dohle and Siegrist (2013) examined the impact of a pharmaceutical’s brand name on evaluations and behavioral intentions, appealing to the representativeness heuristic and fluency theory. In a series of experiments on a student population with hypothetical scenarios, the researchers demonstrated that participants judged pharmaceutical products with simple names as safer and were more willing to buy the products. Additional research by Tasso, Gavarzzi, and Lotto (2014)

investigated whether drug names affect judgments surrounding efficacy, risk, and other properties associated with the products. In a series of experiments, the researchers found evidence to support the notion that the name of a drug may involve a promise, influencing the perceived power of the product and that this psychological power is conveyed through persuasive drug names (Tasso, Gavarzzi, and Lotto 2014). Cho (2014) extended the work by Dohle and Siegrist (2013) by exploring the malleability of the name fluency effect on pharmaceutical drug perception by examining the fluency effect in the domain of risk versus advancedness judgment. In an experiment among students, the researchers were able to demonstrate that the simplicity or complexity of a drug name can affect patient perceptions, evaluations, and potentially medication-use behaviors. Finally, Dohle and Montoya examined the effects of processing fluency for pharmaceutical brand names on dosing behavior (Dohle and Montoya 2017). In two experiments among university students and survey panel participants in Europe, the researchers demonstrated that fluent drug names resulted in lower dosage of drugs compared to disfluent names (Dohle and Montoya 2017). However, their experiments did not find support for the previously presented evidence for the mediating role of familiarity to the fluency-risk relationship (Dohle and Montoya 2017).

Aligned with the increasing body of research surrounding the effects of fluency, with specific focus aimed at the unique aspects of the US pharmaceutical industry, the aim of this research was to assess the effects of pharmaceutical brand name fluency on familiarity and perceived risk. More specifically, and as demonstrated by Song and Schwarz (2009), this study assesses the effects of linguistic fluency associated with pharmaceutical brand names on a patients' perceived risk of the product. Furthermore, this study addresses the role of familiarity as a possible mediating variable to this relationship.

## The Effects of Disease Severity on Patient Acceptance of Perceived Risk

It is apparent from the prior discussion surrounding various effects of fluency that both lay consumers and patients may derive certain judgments about a pharmaceutical product simply based on the brand name. This is an important component to this research; however, it is also important to consider the effects of disease severity on patients' judgments. Most pharmaceutical products are accompanied by both the possibility of therapeutic or desirable effects and the possibility of adverse events or undesirable effects. Because of this, healthcare providers often attempt to use the attitudes of patients regarding the risks and benefits of a drug as one factor in their choice of therapy (Eraker and Sox 1981). From the patient's perspective, perceived risk and their willingness to proceed down a particular treatment path may be influenced by the severity of their condition. Much of this cognitive process may be explained through adaptation theory and the hedonic treadmill theory.

Brickman and Campbell (1971) described the hedonic treadmill as a process similar to sensory adaptation with people's emotional reactions to life events (Diener, Lucas, and Scollon 2006). The researchers posited that one's emotion system adjusts to one's current life circumstances and that all reactions are relative to one's prior experience (Brickman and Campbell 1971; Diner, Lucas, and Scollon 2006). This was characterized in the work by Brickman, Coates, and Janoff-Bulman (1978) when the researchers showed empirical support for the treadmill model. They concluded that lottery winners were not happier than non-winners and that people with paraplegia were not substantially less happy than those who could walk (Brickman, Coates, and Janoff-Bulman 1978; Diner, Lucas, and Scollon 2006). Relevant to this research, the idea of hedonic adaptation aids in understanding how different patients may have

conflicting responses to the perceived risks associated with a particular pharmaceutical product based on their state of well-being and the severity of their disease.

In following this logic, Johnson et al. (2009) assessed whether adult patients are more tolerant of treatment risks than parents of juvenile patients and found that adult patients and parents of juvenile patients with Crohn's disease (CD) were willing to accept similar levels of severe adverse event risk. The authors posited that these findings might be explained by adaptation theory (Johnson et al. 2009). In their position for using adaptation theory to explain this finding, the researchers explained that patients with less serious cases have to imagine what it would be like to have more serious symptoms and that because patients with more severe cases often learn to adapt over time, more serious symptoms may not be as detrimental to quality of life as the less severe patients imagine (Johnson et al. 2009). In fact, Johnson et al. (2007) found that patients with more severe CD are actually less tolerant of severe adverse event risk than patients with less severe CD. The researchers also found that patients whose symptoms had little or no effect on their activities of daily living were willing to take more risks compared with patients who reported considerable problems in daily activities (Johnson et al. 2007).

Other research surrounding patients' assessments towards and willingness to take risks associated with pharmaceutical products has demonstrated conflicting evidence to these findings. For example, Lacy et al. (2012) explored patients' risk-taking behavior and their willingness to take medication risks in irritable bowel syndrome (IBS). The researchers found that IBS patients with severe symptoms were more willing to take significant medication risks than those with mild or moderate symptoms, which is in direct contrast to the studies within CD (Lacy et al. 2012). Specific to rheumatoid arthritis, research has indicated a pattern of reluctance in arthritis patients to accept the risk of drug-related adverse effects. Fraenkel et al. (2001) found that in general,



rheumatoid arthritis patients are very concerned about potential drug toxicity. The researchers demonstrated that risk adversity appeared to be attenuated by a patient's past experience with adverse events and that patients with milder disease activity may be more hesitant to accept commonly used medications if they are aware of potential adverse events (Fraenkel et al. 2001).

Throughout multiple conditions and across various types of pharmacologic options, the literature demonstrates mixed findings in the extent and direction to which disease severity can affect patients' judgments and willingness to pursue a treatment option. This may in part be due to the nature of the symptoms associated with a condition as some symptoms become more apparent than others. Addressing these individual differences among various conditions is outside the scope of this current research. However, it is clear that the disease severity of a patient can indeed affect the perceived risks and willingness to pursue a pharmaceutical intervention. Because of this, it is considered relevant and necessary to include disease severity as a component to the assessing the effects of fluency on judgments with a specific patient population and accordingly, will be included in this current proposal.

### The Effects of Fluency and Perceived Risks on Patient Medication Requests

Although direct-to-consumer advertisements (DTCA) for branded pharmaceutical products are a marketing tactic, designed to increase market share of a particular product over a competitive alternative, a potentially positive effect of advertisements lies in the idea that the ads may encourage patients to visit their healthcare providers to inquire about the medical condition and therapeutic options for treatment (Sinkinson and Starc 2015). This marketing channel addresses the changes in patient behavior, such that in recent decades, patients have become more active participants in their medical care (McKinlay et al. 2014). In fact, since the FDA began

allowing DTCA in 1997, research has indicated that approximately 30% of Americans talk with their doctor about a medicine they saw advertised, of whom approximately 44% report that their doctor prescribed the medication requested (Berger et al. 2001; McKinlay et al. 2014).

Active requests from patient to provider regarding specific medications have been demonstrated to significantly affect prescribing behavior. For example, in a study by McKinlay and colleagues, one in five physicians reported that they would prescribe oxycodone to patients requesting the drug (for sciatica patients) compared to only 1% of physicians who viewed the same clinical scenario with a patient who made a passive request for pain relief (McKinlay et al. 2014).

### General Study Purpose

As demonstrated in previous research and findings from a review of the literature, brand names are considered to be a critical component to establishing a brand's equity and competitive advantage in the marketplace. Because of the significance of brand names in a product's marketing effectiveness, extant literature has proposed various normative approaches to constructing brand names. Although such strategies may be leveraged in many consumer product categories, pharmaceutical manufacturers do not have the autonomy to employ such prescribed brand naming methods. Because of the intricacies within the pharmaceutical market, there has been little consensus regarding effective brand naming strategies among pharmaceutical manufacturers, resulting in a variety of pharmaceutical brand naming tactics, considered by many to be complicated and difficult to pronounce brand names.

Given the complexities associated with pharmaceutical brand names, advancing understanding of how brand name selection may affect patient judgments and calls to action will

be beneficial to the healthcare community and pharmaceutical manufacturers, while also extending previous findings to this important field. Thus, the general focus of this research is to understand the relationship between the fluency associated with pharmaceutical brand names and patient perceptions and judgments that are experienced while processing the brand names.

### Specific Aims and Hypotheses

In order to meet the specific aims previously listed, the study sought to test the following sets of hypotheses based on the literature:

**Aim 1: Evaluate the perceived risk associated with a pharmaceutical product based on the pharmaceutical brand name fluency.**

H1a: There is a statistically significant relationship between the linguistic fluency of individual pharmaceutical brand names and patients' perceived risk of the pharmaceutical product.

**Aim 2: Investigate whether the effects of linguistic fluency on perceived risk is mediated by patients' perceived familiarity of the pharmaceutical brand name.**

H2a: The relationship between linguistic fluency of the pharmaceutical brand names and perceived risk is mediated by familiarity.

**Aim 3: Assess the effects of fluency and risk perceptions on willingness to request**

H3a: There is a statistically significant relationship between linguistic fluency and a patient's perceived risk of a pharmaceutical product and the patients' willingness to request a

pharmaceutical product.

**Aim 4: Assess whether disease severity moderates the relationship between perceived risk and patients' willingness to request a pharmaceutical product**

H4a: Disease severity moderates the relationship between the perceived risk of a pharmaceutical product and willingness to request the pharmaceutical product.

## CHAPTER III: METHODS

Using a non-scientific website (Wordlab Drug-O-Matic Name Generator 2016), 45 randomly generated, fictitious pharmaceutical brand names were developed. The pharmaceutical brand names differed in length, consonant and vowel frequencies, and beginning letter selection. The goal of the process was to develop a thorough list of names that could be tested in a pre-test setting with consumers and then subsequently used in the experiment with patients. The purpose of creating fictitious names was to use the pharmaceutical brand names to measure the various effects of fluency on patient judgments, without bias to prior exposures or experiences with branded pharmaceutical products.

### Measuring the Construct of Fluency

As previously discussed, the broad construct of fluency can refer to virtually any cognitive task described along a continuum from *effortless* to *highly effortful*, which then produces a corresponding metacognitive experience that can be described along a continuum from *fluent* to *disfluent* (Alter and Oppenheimer 2009). For the purposes of this research, fluency was defined as the ease of pronunciation of the fictitious pharmaceutical brand names.

Accordingly, an ease of pronunciation measure was incorporated as a proxy measure for the construct of linguistic fluency.

### Pre-test

Having established the 45 fictitious pharmaceutical brand names, pre-testing the names for

ease of pronunciation was conducted. A pre-test survey was fielded using Amazon's Mechanical Turk (MTurk). Participants followed a link to the survey. Briefing instructions were provided and participants were asked to rate the ease of pronunciation of the 45 pharmaceutical brand names. Pre-test participants were asked to rate the ease of pronunciation of the pharmaceutical brand name products individually using the 7-point response scale. Fluency was measured by having participants rate the ease of pronunciation of the fictitious pharmaceutical brand products. This measure was captured using a single-item interval response scale ranging from 1 = very difficult to pronounce, 7 = easy to pronounce with each scale value between poles labeled (appendix A). Once the ratings for all 45 products were obtained, the pharmaceutical brand names were categorized based on the level of fluency ratings. This provided two groups of 10 pharmaceutical brand names based on fluency ratings that were used to manipulate fluency in the forthcoming experiment: one group of easy-to-pronounce names and one group of difficult-to-pronounce names.

In order to assess that the two groups of names were statistically different from one another, a t-test was conducted to compare the easy to pronounce group with the difficult to pronounce group. The *a priori* significance level (alpha) was set at 0.05. Although participation in the pretest was voluntary, an Institutional Review Board (IRB) application was obtained before commencement of the pretest and subsequent research.

### Sample Selection

A total of 100 study participants were selected from a patient panel maintained by L&E Research. The patient panel is voluntary and comprises approximately 1,000 patients who have self-reported rheumatoid arthritis (RA). Payments to patients are provided for individual study

participation only and not for membership on the panel. Study participants were required to be 18 years of age or older, have a self-reported diagnosis of RA, and speak English. The selection criteria and online survey link were provided to L&E Research with a target sample of 100 participants.

### Procedure

Using the 20 pharmaceutical brand names (10 easy to pronounce and 10 difficult to pronounce) determined as a result of the pre-test, study participants were assigned to one of two groups of pharmaceutical brand names, fluent or disfluent. Participants in each group were then exposed to the associated 10 pharmaceutical brand names, with order of the pharmaceutical brand names presented randomly. Similar to the procedures used for the pre-test, briefing instructions were provided at the beginning of the survey and participants were asked if they understood everything, and were ready to begin the procedure. At the end of the experiment, participants were provided debriefing information.

Since the participants in the study were not asked to rate the level of fluency associated with the pharmaceutical brand names as part of the main experiment, it was important to ensure fluency was indeed being manipulated. Accordingly, a manipulation check for the independent variable of fluency for the pharmaceutical brand names was included at the end of each survey for both groups. To conduct the manipulation check, participants from each group rated the fluency for each of the ten associated pharmaceutical brand names. The fluency ratings for fluent and disfluent groups were compared to data from the pre-test subjects to ensure the perceptions of fluency were not statistically different. A directional t- test was performed comparing pre-test mean ratings for both fluent and disfluent name ratings.

### Perceived Risk

Participants were instructed to imagine they were reading the pharmaceutical brand name as part of an advertisement for the product and asked to assess the perceived risk they believe was associated with the pharmaceutical product based solely on the brand name. Perceived risk was conceptualized as physical risk. More specifically, participants were asked to rate the level of concern they would have about using the product based on the brand name (Stone and Gronhaug 1993). The measure was captured on a 7-point scale ranging from 1 = very harmful, 7 = very safe.

### Familiarity

In addition to rating the perceived risk the participants associated to the pharmaceutical brand name, participants were also asked to rate the perceived familiarity of the products based on the pharmaceutical brand name. To capture the construct of familiarity, a proxy measure of perceived novelty of the product was assessed using a single item interval response scale ranging from 1 = very old, 7 = very new. The brand name of the pharmaceutical products was the only stimuli presented (appendix C).

### Disease Severity

Disease severity is hypothesized as moderating the relationship between perceived risk and willingness to request a pharmaceutical product. In order to capture the moderating variable of disease severity, a portion of the Health Assessment Questionnaire Disability Index (HAQ-DI)



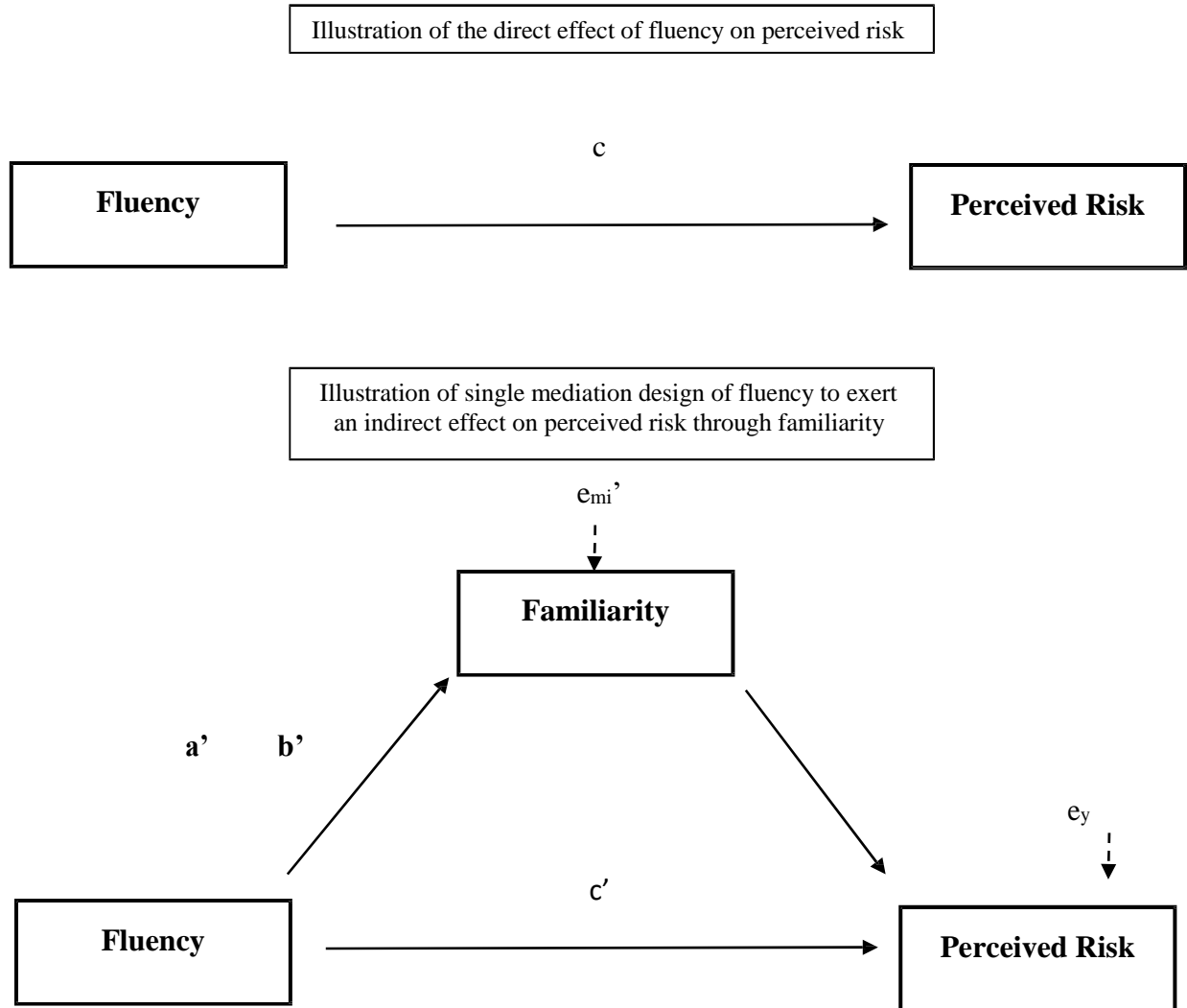
was administered. Two visual-analog scale (VAS) items within the HAQ-DI to assess pain and health were incorporated as a global assessment of disease severity. Participants were asked to indicate how much pain they had because of their RA in the past week on a scale of 0 to 100, where zero represents “no pain” and 100 represents “severe pain”. Participants were also asked to consider all of the ways their arthritis affects them on a scale of 0 to 100, where zero represents “very well” and 100 represents “very poor” health. The two VAS items were summed to form the measure of disease severity for each participant.

### Willingness to Request

The participants’ willingness to request the pharmaceutical products served as the dependent variable in the study. The goal of this measure was to investigate the effects of fluency, perceived risk, and disease severity on a patient’s willingness to request the product to which they have been exposed to in a promotional channel.

Similar measures of willingness regarding the use of pharmaceutical products have been assessed in extant literature. For example, Peters and colleagues (2014) investigated various formats for presenting medication risk information as it relates to a patient’s willingness to take the drug. In their study, willingness was measured on a 7-point scale with 0 = not likely, 6 = very likely. For the purpose of this study, the construct of willingness to request a pharmaceutical product was measured using a 7-point scale ranging from 1 = very unlikely, 7 = very likely. The hypothesized relationships among these variables and statistical designations are presented in Figure 2 and Figure 3. Data were analyzed using the PROCESS macro in SPSS v23 (Hayes 2013).

**Figure 2: Conceptual and Statistical Diagram of Single Mediator Model for Effects of Fluency on Familiarity and Perceived Risk**



Analysis

The data analysis plan for the first two specified aims of the study is discussed below.

**Aim 1. Evaluate the perceived risk associated with a pharmaceutical brand name based on the pharmaceutical brand name fluency.**

**Aim 2. Investigate whether the effects of pharmaceutical brand name fluency on perceived risk is mediated by familiarity.**

To address the first two aims of the study and test the corresponding hypotheses, a two-condition between-subject approach was used for testing statistical significance of the single mediation model. Using the two-condition between-subject design, three linear equations were used to estimate the components of the hypothesized single-mediator model (MacKinnon 2008; Montoya and Hayes 2015). The first step was to regress perceived risk (Y) on pharmaceutical brand name fluency (X) and is used to assess the main effect of fluency on perceived risk (equation 1).

$$Y = \alpha_1 + cX + \varepsilon_1 \quad (1)$$

Consistent with the single mediation model presented in Figure 2, Y represents the dependent variable of perceived risk, X represents the independent variable of pharmaceutical brand name fluency, c represents the relationship between pharmaceutical brand name fluency and perceived risk,  $\alpha_1$  represents the intercepts, and  $\varepsilon_1$  is the unexplained or error variance (MacKinnon 2008). This equation defines the total effect model and c, the parameter estimate, represents the effect of fluency on perceived risk.

Even if the relationship between these two variables is found to be statistically significant, a mediated effect may still be present. Following the recommendations by MacKinnon (2008), the following two regression equations are then analyzed and assessed for mediation:

$$Y = \alpha_2 + cX + bM + \varepsilon_2 \quad (2)$$

$$M = \alpha_3 + aX + \varepsilon_3 \quad (3)$$

Consistent with the model presented in Figure 2,  $c'$  represents the strength of prediction of perceived risk from fluency, with the strength of the relationship between familiarity and perceived risk removed (MacKinnon 2008; MacKinnon and Fairchild 2010). Next, the notation  $b$  represents the coefficient for the strength of the relationship between familiarity and perceived risk with the strength of the relationship between fluency and perceived risk removed. Finally, the notation of  $a$  represents the coefficient for the strength of the relationship between fluency and familiarity. The intercepts for each equation, representing the average score for each variable are represented by  $\alpha_{1-3}$  and the error terms are represented by  $\varepsilon_{1-3}$  (MacKinnon 2008; MacKinnon and Fairchild 2009).

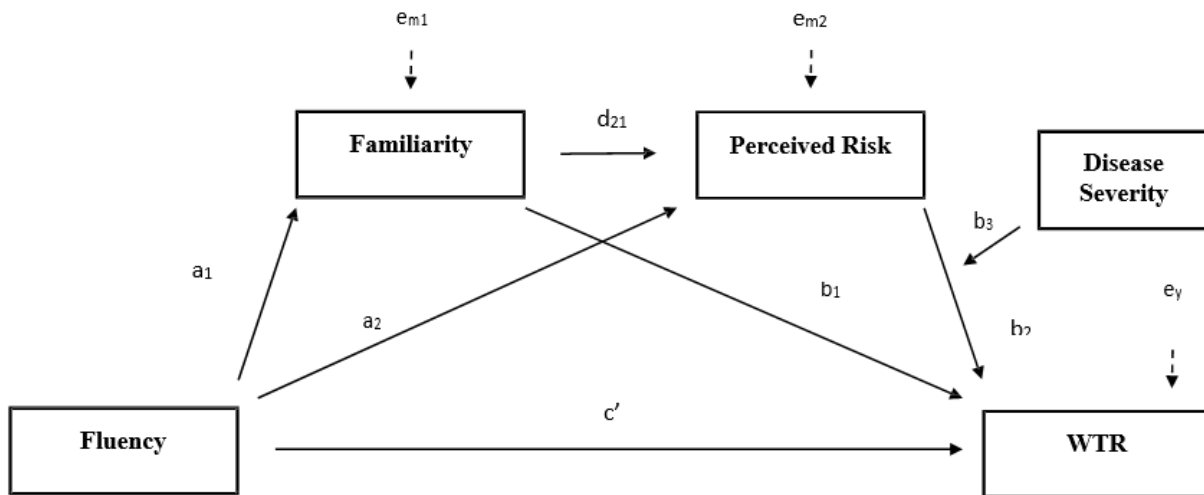
To evaluate the hypothesized mediation effect, the bootstrap resampling method was used (Bollen and Stine 1992; Efron 1992,1988; MacKinnon 2008). This statistical approach to estimating and testing mediation effects has been shown to perform better than the Baron and Kenny (1986) approach in small sample size studies (20-80) such as this study (Zhang and Wang 2007).

The bootstrapping method has no distributional assumption on the indirect effect of  $ab$  from Figure 2. Instead, this method approximates the distribution using its bootstrap distribution (Zhang and Wang 2007). Using the original data set as a population, a bootstrap sample of  $N$  subjects with paired  $Y$ ,  $X$ , and  $M$  randomly with replacement from the original data set was

obtained. Next, from this bootstrap sample, estimates of  $ab$  ( $\underline{a}\underline{b}$ ) through the OLS method were obtained based on the second and third equation previously listed. Both  $c$  and  $c'$  from Figure 2 are parameters relating fluency to perceived risk, but  $c'$  is a partial effect, adjusted for the effects of familiarity (MacKinnon 2008). The estimate of the mediated effect is considered equal to  $\hat{c} - c'$ .

Repeating these first two steps, the empirical distribution of  $\underline{a}\underline{b}$  based on the bootstrap procedure can be viewed as the distribution of  $ab$ . Then  $(1-\alpha) \times 100\%$  confidence interval of  $ab$  can be constructed using the  $(\alpha/2) \times 100\%$  and  $(1-\alpha/2) \times 100\%$  of the empirical distribution. Accordingly, if mediation effects have occurred, the indirect effect  $ab$  should be significantly different from zero (Zhang and Wang 2007; MacKinnon 2008).

**Figure 3: Conceptual and Statistical Diagram of Moderated Serial Mediation Model of Effects of Fluency on Familiarity, Perceived Risk, and Willingness to Request**



## CHAPTER IV: RESULTS

The data analysis plan for the remaining two specified aims of the study is discussed below.

**Aim 3. Assess the effects of linguistic fluency and risk perception associated with pharmaceutical brand name fluency on a patient's willingness to request the product.**

**Aim 4. Assess whether disease severity moderates the relationship between perceived risk and patients' willingness to request a pharmaceutical product**

To address the third and fourth aim of the study and test the statistical significance of the moderated serial mediator model, the statistical model is represented with the following three equations:

$$M1 = iM1 + a1X + eM1 \quad (4)$$

$$M2 = iM2 + a2X + d1M1 + eM2 \quad (5) \quad Y = iy + c1'X + b1M1 + b2M2$$

$$+ c2M2W + eY \quad (6)$$

The serial mediator model has three specific indirect effects and one direct effect (Hayes 2013). One pathway is indirect and runs from fluency to willingness to request through familiarity only. A second indirect path runs from fluency to willingness to request through perceived risk only. A third indirect influence passes through both familiarity and perceived risk sequentially, with familiarity affecting perceived risk (Hayes 2013). The remaining effect of fluency is direct to willingness to request without passing through either familiarity or perceived risk (Hayes 2013).

The three indirect effects are estimated as the product of regression weights linking fluency to willingness to request through at least one mediator, familiarity or perceived risk (Hayes 2013). The specific indirect effect of fluency on willingness to request through familiarity only is represented as  $a1b1$ , the specific indirect effect through perceived risk only is represented as  $a2b2$ , and the specific indirect effect through both familiarity and perceived risk in serial is  $a1d21b2$ . (Hayes 2013). Combining these three indirect effects sum to the total indirect effect of fluency, represented as  $a1b1 + a2b2 + a1d21b2$  (Hayes 2013). When the total indirect effect of fluency is added to the direct effect of fluency, the result is  $c$ , which is the total effect of fluency, and can be estimated from the following regression equation:

$$c = c' + a1b1 + a2b2 + a1d21b2 \quad (7)$$

The total indirect effect of fluency on willingness to request in the serial mediator model is the difference between the total effect of fluency on willingness to request and the direct effect of fluency on willingness to request, as represented by the following equation:

$$c - c' = a1b1 + a2b2 + a1d11b2 \quad (8)$$

Similar to the bootstrapping procedure described previously, bootstrap confidence intervals for indirect effects were calculated repeatedly resampling from the data with replacement, estimating the model in each bootstrap sample, calculating the indirect effects described, and deriving endpoints of confidence intervals for each (Hayes 2013). An indirect effect can be determined different from zero when the confidence interval does not contain zero (Hayes 2013).

An analysis of the manipulation check indicated that the ten disfluent drug names were considered more difficult to pronounce compared to the ten fluent drug names ( $t = 5.612$ ,  $p < 0.001$ ). Rankings for each of the ten drug names for both fluent and disfluent groups are provided in table 1.

**Table 1: Fluency Ratings for Pharmaceutical Brand Names**

Fluent Group			Disfluent Group		
Drug Name	Mean Fluency Rating	Std. Dev.	Drug Name	Mean Fluency Rating	Std. Dev.
Velcin	6.07	1.181	Quthutix	2.65	1.780
Trivete	5.48	1.346	Niyxob	2.83	1.579
Naxalon	5.46	1.486	Oxgnue	3.21	1.864
Altorex	5.43	1.455	Vetlixfi	3.50	1.924
Cutrino	4.98	1.832	Asbixat	3.54	1.890
Runfina	4.63	1.743	Enyvfo	3.65	1.940
Vithoria	4.57	1.940	Subridke	3.69	1.858
Solotho	4.43	1.747	Qxibinle	3.75	1.707
Evafir	4.39	1.612	Docilge	4.17	1.730
Solatu	4.13	1.655	Oxtieze	4.23	1.574

Interval response scale ranging from 1 = very difficult to pronounce, 7 = easy to pronounce

A total of 94 participants with a self-reported diagnosis of rheumatoid arthritis completed the



study (94% response rate). Participants averaged 52 years in age, with most being female (82%) and Caucasian (65%). Of the 94 participants who completed the study, 95% were native English speaking, and no participant indicated that they worked in a healthcare related field or for a healthcare organization. More than half of the participants (57%) reporting taking four or more prescription medications, and 82% indicated taking at least one prescription medication specifically for their rheumatoid arthritis. An overview of study participant demographics and sample characteristics is provided in table 2.

**Table 2: Study Participant Demographics and Sample Characteristics**

<b>Demographic Characteristic</b>	<b>Total</b>	<b>Fluent names</b>	<b>Disfluent names</b>
<b>Age, years</b>	52.7 (29-71)	53.2 (29-69)	52.3 (31-71)
<b>Sex</b>			
Male	17 (18%)	7 (15%)	10 (21%)
Female	77 (82%)	39 (85%)	38 (79%)
<b>Ethnicity</b>			
White	61 (65%)	32 (70%)	29 (60%)
Hispanic or Latino	9 (10%)	3 (7%)	6 (13%)
Black or African American	21 (22%)	11 (24%)	10 (21%)
Native American or American Indian	0 (0%)	0 (0%)	0 (0%)
Asian/Pacific Islander	1 (1%)	0 (0%)	1 (2%)
Other	2 (2%)	0 (0%)	2 (4%)
<b>Native English (US) speaker</b>			
Yes	89 (95%)	44 (96%)	45 (94%)
No	5 (5%)	2 (4%)	3 (6%)
<b>Highest degree or level of school</b>			
High school or diploma equivalent (e.g., GED)	25 (27%)	7 (15%)	18 (38%)
Associate degree	33 (35%)	17 (37%)	16 (33%)
Bachelor's degree	28 (30%)	17 (37%)	11 (23%)
Master's degree	7 (7%)	4 (9%)	3 (6%)
Professional degree	1 (1%)	1 (2%)	0 (0%)
Doctorate degree	0 (0%)	0 (0%)	0 (0%)
<b>Work in healthcare related field</b>			
Yes	0 (0%)	0 (0%)	0 (0%)
No	94 (100%)	46 (100%)	48 (100%)
<b>Total number of prescriptions</b>			
None	5 (5%)	1 (2%)	4 (8%)
1-3 prescriptions	36 (38%)	23 (50%)	13 (27%)
4-6 prescriptions	30 (32%)	12 (26%)	18 (38%)
More than 6 prescriptions	23 (25%)	10 (22%)	13 (27%)
<b>Number of RA prescriptions</b>			
None	17 (18%)	9 (20%)	8 (17%)
1	32 (34%)	17 (37%)	15 (31%)
2	28 (30%)	15 (33%)	13 (27%)
3 or more	17 (18%)	5 (11%)	12 (25%)
<b>Type of RA medication</b>			
Injected or infused	9 (10%)	6 (13%)	3 (6%)
Oral	40 (43%)	19 (41%)	21 (44%)
Both injected or infused and oral	28 (30%)	12 (26%)	16 (33%)
Not sure	0 (0%)	(0%)	(0%)
<b>Disease severity</b>			
Pain score*	51.50*	42.00*	61.00*
Health score*	40.00*	30.50*	50.00*

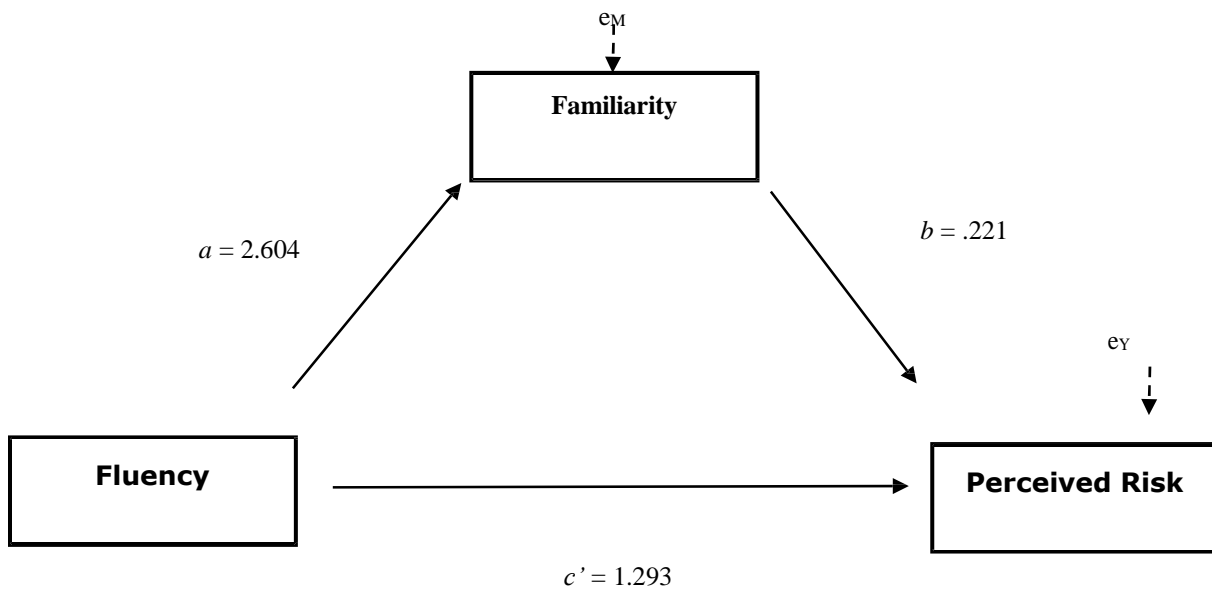
\*Median VAS score

The first and second hypotheses stated that there is a statistically significant relationship between the fluency of individual pharmaceutical brand names and patients' perceived risk of the pharmaceutical product and that the relationship between linguistic fluency of pharmaceutical brand names and perceived risk is mediated by familiarity. As indicated in Table 3, results from a single mediation analysis showed that participants exposed to fluent brand names did not consider the products to be more familiar ( $a = 2.604, p = 0.237$ ); however, participants who considered the brand names to be familiar did consider perceived risk to be lower ( $b = 0.221, p = 0.006$ ). A bias-corrected bootstrap confidence interval for the indirect effect ( $ab = 0.575$ ) based on 10,000 bootstrap samples was not found to be significant (-0.239, 1.808). Furthermore, there was no evidence that the fluency of the brand names influenced the perceived risk of the product independent of the effects of fluency on familiarity ( $c' = 1.293, p = 0.434$ ).

**Table 3: Regression Coefficients, Standard Errors, and Model Summary for Single Mediation Model for Effects of Brand Name Fluency on Perceived Risk**

Variable	Familiarity (M)				Perceived Risk (Y)			
	Coeff.	SE	P		Coeff.	SE	P	
Fluency (X)	<i>a</i>	2.604	2.187	0.237	<i>c'</i>	1.293	1.644	0.434
Familiarity (M)	---	---	---	---	<i>b</i>	0.221	0.078	0.006
Constant	<i>i<sub>1</sub></i>	16.00	1.563	<.001	<i>i<sub>2</sub></i>	36.618	1.705	<.001
$R^2 = 0.015$				$R^2 = 0.093$				
$F(1,92) = 1.4185, p = 0.237$				$F(2,91) = 4.689, p = 0.012$				

**Figure 4: Statistical Diagram of Single Mediation Model for Effects of Brand Name Fluency on Perceived Risk**



Next, a serial mediation model with a second-stage moderating variable was analyzed to assess the third and fourth hypotheses. The estimated regression coefficients from the serial mediation model are presented in Table 4. Brand name fluency did not affect familiarity of the product ( $a1 = 2.604, p = 0.237$ ) or the perceived risk of the product ( $a2 = 1.293, p = 0.434$ ). Like findings from the single mediation analysis, perceived risk of the pharmaceutical product is associated with the familiarity of the brand name ( $d1 = 0.221, p = 0.006$ ); however, willingness to request the pharmaceutical product is not affected by the perceived risk of the product ( $b2 = 0.364, p = 0.423$ ), regardless of the level of disease severity ( $b3 = 0.003, p = 0.382$ ).

The first indirect effect assessing the indirect effect of brand name fluency on willingness

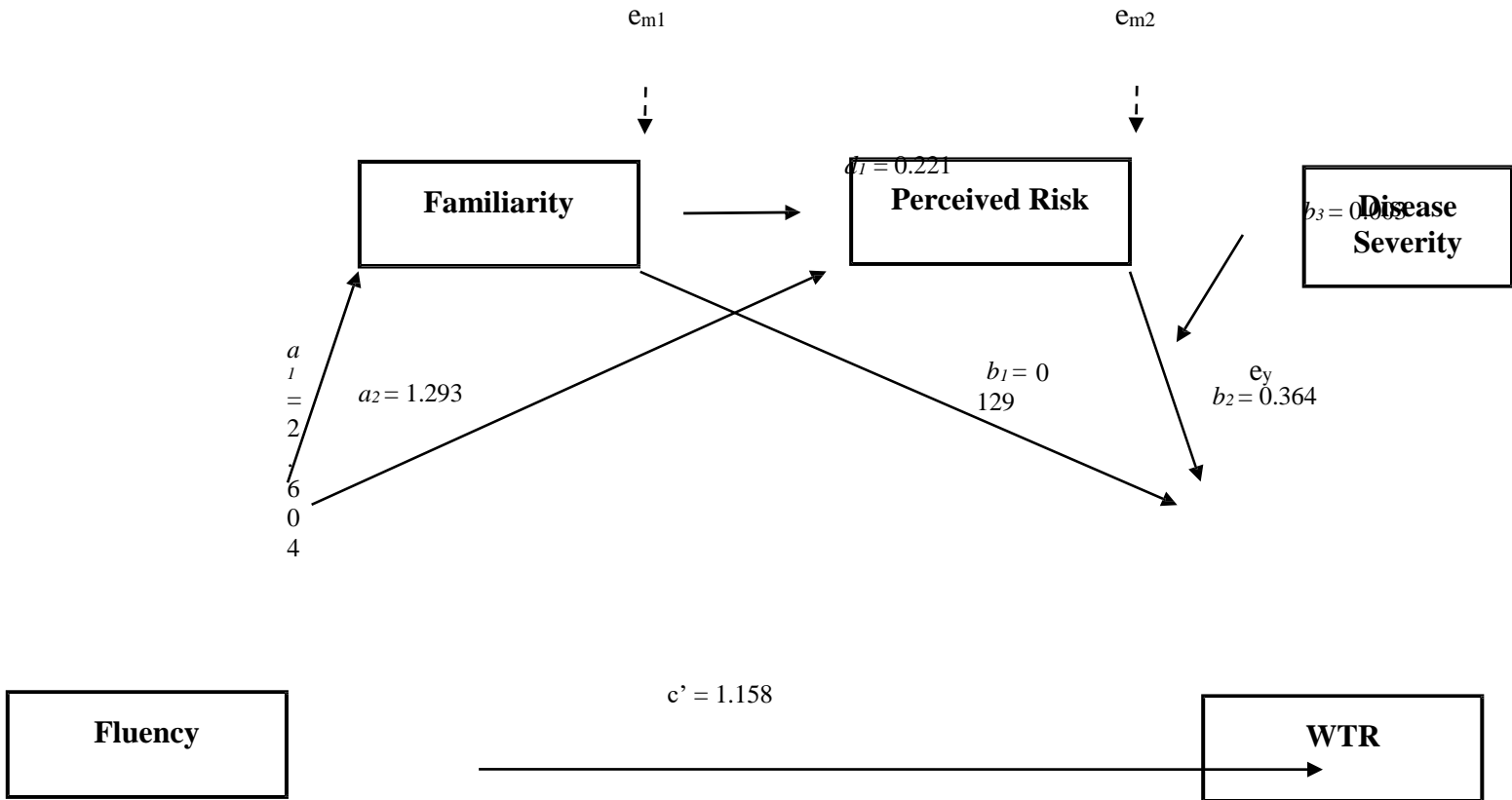
to request the product through familiarity, estimated as  $a1b1$ , was not found to be significant ( $a1b1 = 0.336, -0.336, 1.452$ ). The second indirect effect assessing the effect of brand name fluency on willingness to request the product through both familiarity and perceived risk, estimated as  $a1d1b2$ , was also found to not be significant ( $a1d1b2 = 0.209, -0.463, 1.084$ ). Finally, the third indirect effect of brand name fluency on willingness to request the product through perceived risk, estimated as  $a2b2$  was found to not be significant ( $a2b2 = 0.471, -0.829, 3.611$ ). The total indirect effect estimating the sum of all three indirect effects was determined to not be different from zero ( $1.017, -0.795, 4.908$ ).

Using PROCESS (Hayes 2013), all possible pairwise comparisons between the three specified indirect effects are calculated to inform inference about differences between the specific indirect effects. The confidence intervals for the three contrasts ([C1 = -0.837, 1.359], [C2 = -3.288, 1.639], and [C3 = -3.156, 1.218]) include zero and are not statistically different from each other.

**Table 4: Regression Coefficients, Standard Errors, and Model Summary for Serial Mediation Model for Effects of Brand Name Fluency on Willingness to Request**

	Familiarity (M <sub>1</sub> )			Perceived Risk (M <sub>2</sub> )			Willingness to Request (Y)		
		Coeff.	95% CI		Coeff.	95% CI		Coeff.	95% CI
Fluency (X)	<i>a</i> <sub>1</sub>	2.604	-1.738, 6.947	<i>a</i> <sub>2</sub>	1.293	-1.972, 4.559	<i>c</i> '	1.158	-3.966, 6.281
Familiarity (M <sub>1</sub> )		---	---	<i>d</i> <sub>1</sub>	0.221	0.066, 0.375	<i>b</i> <sub>1</sub>	0.129	-0.125, 0.383
Perceived Risk (M <sub>2</sub> )		---	---		---	---	<i>b</i> <sub>2</sub>	0.364	-0.535, 1.253
Disease Severity (W)		---	---		---	---		---	---
M <sub>2</sub> x W		---	---		---	---	<i>b</i> <sub>3</sub>	0.003	-0.004, 0.010
Constant	<i>i</i> <sub>M1</sub>	16.000	12.897, 19.103	<i>i</i> <sub>M2</sub>	36.618	33.230, 40.005	<i>i</i> <sub>Y</sub>	18.695	-18.159, 55.549
		R <sup>2</sup> = 0.15 F (1,92) = 1.4185, p = 0.237			R <sup>2</sup> = 0.093 F (2,91) = 4.689, p = 0.012			R <sup>2</sup> = 0.274 F (5,88) = 6.632, p = <0.001	

**Figure 5: Statistical Diagram of Serial Mediation Model for Effects of Brand Name Fluency on Willingness to Request**



Sensitivity analyses

Following formal testing of the four study hypotheses, sensitivity analyses were conducted to assess sensitivity of key study measures across varied settings. First, the original single mediation model assessing the relationship between fluency of individual pharmaceutical brand names and patients’ perceived risk of the pharmaceutical product and whether the relationship between linguistic fluency of pharmaceutical brand names and perceived risk is mediated by familiarity was analyzed. The difference in the sensitivity analyses and the original hypothesis

testing for the first two study hypotheses included three different settings for the study measures.

In the first sensitivity analysis, perceived novelty instead of familiarity was analyzed to determine if novelty mediated the relationship between pharmaceutical brand name fluency and perceived risk. As can be seen in table 5, results from a single mediation analysis showed that participants exposed to fluent brand names did not consider the products to be more novel ( $a = 3.788, p = 0.099$ ) and novelty did not influence perceived risk ( $b = 0.150, p = 0.052$ ). A bias-corrected bootstrap confidence interval for the indirect effect ( $ab = 0.568$ ) based on 10,000 bootstrap samples was not found to be significant (-0.01, 2.066). Furthermore, there was no evidence that the fluency of the brand names influenced the perceived risk of the product independent of the effects of fluency on familiarity ( $c' = 1.300, p = 0.445$ ).

**Table 5: Regression Coefficients, Standard Errors, and Model Summary for Single Mediation Model for Effects of Brand Name Fluency on Perceived Risk (Sensitivity Analysis with Novelty as Mediator)**

Variable	Novelty (M)				Perceived Risk (Y)			
	Coeff.	SE	P	Coeff.	SE	P		
Fluency (X)	$a$	3.788	2.276	0.099	$c'$	1.299	1.692	0.445
Novelty (M)	---	---	---	---	$b$	0.150	0.076	0.052
Constant	$i_1$	45.587	1.626	<0.001	$i_2$	33.299	3.680	<0.001
R <sup>2</sup> = 0.029				R <sup>2</sup> = 0.053				
F (1,92) = 2.771, p = 0.099				F (2,91) = 2.566, p = 0.082				

In the second post-hoc analysis, the three study variables included in the single mediation analysis were only assessed based on the first pharmaceutical brand name presented to the participant, as opposed to each participant evaluating all ten brand names within the randomized



group assignment. As seen in table 6, results from a single mediation analysis using responses from the first brand name presented only showed that the participants exposed to the first fluent brand name only did not consider the products to be more familiar ( $a = 0.157, p = 0.379$ ) and familiarity was not associated with the perceived risk of the product ( $b = 0.244, p = 0.064$ ). A bias-corrected bootstrap confidence interval for the indirect effect ( $ab = 0.38$ ) based on 10,000 bootstrap samples was not found to be significant (-0.029, 0.193). Furthermore, there was no evidence that the fluency of the brand names influenced the perceived risk of the product independent of the effects of fluency on familiarity ( $c' = -0.025, p = 0.912$ ).

**Table 6: Regression Coefficients, Standard Errors, and Model Summary for Single Mediation Model for Effects of Brand Name Fluency on Perceived Risk (Sensitivity Analysis with First Name)**

Variable	Familiarity (M)			Perceived Risk (Y)				
	Coeff.	SE	P	Coeff.	SE	P		
Fluency (X)	<i>a</i>	0.157	0.177	0.379	<i>c'</i>	-0.025	0.221	0.912
Familiarity (M)	---	---	---	<i>b</i>	0.244	0.130	0.064	
Constant	<i>i<sub>1</sub></i>	1.239	0.127	<0.001	<i>i<sub>2</sub></i>	3.872	0.225	<0.001
R <sup>2</sup> = 0.008			R <sup>2</sup> = 0.037					
F (1,92) = 0.782, p = 0.379			F (2,91) = 1.764, p = 0.177					

Finally, in the third sensitivity analysis, the three study variables included in the single mediation analysis were only assessed based on the either the most fluent or disfluent pharmaceutical brand name presented to the participant, as opposed to each participate evaluating all ten brand names within the randomized group assignment. As seen in table 7, results from a single mediation analysis using responses from the most fluent or most disfluent brand name presented only showed that fluency was not associated with familiarity ( $a = 0.456, p = 0.122$ )

and familiarity was not associated with the perceived risk of the product ( $b = 0.093, p = 0.234$ ). A bias-corrected bootstrap confidence interval for the indirect effect ( $ab = 0.042$ ) based on 10,000 bootstrap samples was not found to be significant (-0.011, 0.200). Furthermore, there was no evidence that the fluency of the brand names influenced the perceived risk of the product independent of the effects of fluency on familiarity ( $c' = 0.228, p = 0.305$ ).

**Table 7: Regression Coefficients, Standard Errors, and Model Summary for Single Mediation Model for Effects of Brand Name Fluency on Perceived Risk (Sensitivity Analysis with Most Fluent and Disfluent Name)**

Variable	Familiarity (M)			Perceived Risk (Y)					
	Coeff.	SE	P	Coeff.	SE	P			
Fluency (X)	$a$	0.456	0.292	0.122	$c'$	0.228	0.221	0.305	
Familiarity (M)	---	---	---	---	$b$	0.093	0.078	0.234	
Constant	$i_1$	1.565	0.209	<0.001	$i_2$	3.877	0.198	<0.001	
			$R^2 = 0.026$				$R^2 = 0.032$		
			F (1,92) = 2.434, p = 0.122				F (2,91) = 1.485, p = 0.232		

Using the same post-hoc variables as analyzed in the single mediation models, we then assessed the variables in the serial mediation model to determine sensitivity in key study measures within the full model. First, perceived novelty instead of familiarity was analyzed as the first mediating variable in the serial mediation model. The first indirect effect assessing the indirect effect of brand name fluency on willingness to request the product through novelty, estimated as  $a1b1$ , was not found to be significant ( $a1b1 = 0.515, -0.939, 1.936$ ). The second indirect effect assessing the effect of brand name fluency on willingness to request the product through both novelty and perceived risk, estimated as  $a1d1b2$ , was also found to not be

significant ( $a1d1b2 = 0.205, -0.383, 1.082$ ). Finally, the third indirect effect of brand name fluency on willingness to request the product through perceived risk, estimated as  $a2b2$  was found to not be significant ( $a2b2 = 0.468, -0.861, 4.050$ ). The total indirect effect estimating the sum of all three indirect effects was determined to not different from zero ( $1.187, -1.068, 5.465$ ). The estimated regression coefficients from the serial mediation model are presented in Table 8.

**Table 8: Regression Coefficients, Standard Errors, and Model Summary for Serial Mediation Model for Effects of Brand Name Fluency on Willingness to Request (Sensitivity Analysis with Novelty)**

	Novelty (M <sub>1</sub> )			Perceived Risk (M <sub>2</sub> )			Willingness to Request (Y)		
		Coeff.	95% CI		Coeff.	95% CI		Coeff.	95% CI
Fluency (X)	<i>a</i> <sub>1</sub>	3.788	-0.732, 8.308	<i>a</i> <sub>2</sub>	0.150	-0.001, 0.302	<i>c</i> '	0.853	-4.296, 6.002
Novelty (M <sub>1</sub> )	---	---	---	<i>d</i> <sub>1</sub>	0.150	-0.001, 0.302	<i>b</i> <sub>1</sub>	0.136	-0.095, 0.367
Perceived Risk (M <sub>2</sub> )	---	---	---	---	---	---	<i>b</i> <sub>2</sub>	0.360	-0.537, 1.257
Disease Severity (W)	---	---	---	---	---	---	---	---	---
M <sub>2</sub> x W	---	---	---	---	---	---	<i>b</i> <sub>3</sub>	0.003	-0.004, 0.010
Constant	<i>i</i> <sub>M1</sub>	16.000	12.897, 19.103	<i>i</i> <sub>M2</sub>	36.618	33.230, 40.005	<i>i</i> <sub>Y</sub>	18.695	-18.159, 55.549
R <sup>2</sup> = 0.292 F (1,92) = 2.771, p = 0.099			R <sup>2</sup> = 0.053 F (2,91) = 2.566, p = 0.082			R <sup>2</sup> = 0.277 F (5,88) = 6.726, p = <0.001			

Next, the three main study variables (fluency, familiarity, and perceived risk) included in the single mediation analysis were only assessed based on the first pharmaceutical brand name presented to the participant, as opposed to each participant evaluating all ten brand names within the randomized group assignment. The first indirect effect assessing the indirect effect of brand name fluency on willingness to request the product through familiarity, estimated as  $a1b1$ , was not found to be significant ( $a1b1 = 0.121, -0.049, 0.068$ ). The second indirect effect assessing the effect of brand name fluency on willingness to request the product through both familiarity and perceived risk, estimated as  $a1d1b2$ , was also found to not be significant ( $a1d1b2 = 0.007, -0.026, 0.054$ ). Finally, the third indirect effect of brand name fluency on willingness to request the product through perceived risk, estimated as  $a2b2$  was found to not be significant ( $a2b2 = -0.004, -0.138, 0.184$ ). The total indirect effect estimating the sum of all three indirect effects was determined to not differ from zero ( $0.015, -0.143, 0.219$ ). The estimated regression coefficients from the serial mediation model are presented in Table 9.

Finally, the three main study variables (fluency, familiarity, and perceived risk) were only assessed for the brand name considered most fluent (i.e., easiest to pronounce) and the brand name considered the most disfluent (i.e., hardest to pronounce).

The first indirect effect assessing brand name fluency on willingness to request the product through familiarity, estimated as  $a1b1$ , was not found to be significant ( $a1b1 = 0.063, -0.024, 0.225$ ). The second indirect effect assessing the effect of brand name fluency on willingness to request the product through both familiarity and perceived risk, estimated as  $a1d1b2$ , was also found to not be significant ( $a1d1b2 = 0.019, -0.046, 0.081$ ). The third indirect effect of brand name fluency on willingness to request the product through perceived risk, estimated as  $a2b2$  was found to not be significant ( $a2b2 = -0.100, 0.088, 0.501$ ). The total indirect

was determined to not differ from zero (0.182, -0.049, 0.613). The estimated regression coefficients from the serial mediation model are presented in Table 10.

**Table 9: Regression Coefficients, Standard Errors, and Model Summary for Serial Mediation Model for Effects of Brand Name Fluency on Willingness to Request (Sensitivity Analysis with First Name)**

	Familiarity (M <sub>1</sub> )			Perceived Risk (M <sub>2</sub> )			Willingness to Request (Y)		
		Coeff.	95% CI		Coeff.	95% CI		Coeff.	95% CI
Fluency (X)	<i>a</i> <sub>1</sub>	0.456	-0.124, 1.036	<i>a</i> <sub>2</sub>	0.228	-0.211, 0.666	<i>c</i> '	0.107	-0.439, 0.652
Familiarity (M <sub>1</sub> )	---	---		<i>d</i> <sub>1</sub>	0.093	-0.061, 0.247	<i>b</i> <sub>1</sub>	0.139	-0.049, 0.327
Perceived Risk (M <sub>2</sub> )	---	---		---	---		<i>b</i> <sub>2</sub>	0.441	-0.338, 1.220
Disease Severity (W)	---	---		---	---		---	---	---
M <sub>2</sub> x W	---	---		---	---		<i>b</i> <sub>3</sub>	0.002	-0.004, 0.008
Constant	<i>i</i> <sub>M1</sub>	1.565	1.151, 1.980	<i>i</i> <sub>M2</sub>	3.876	3.484, 4.268	<i>i</i> <sub>Y</sub>	1.569	-1.682, 4.821
R <sup>2</sup> = 0.026			R <sup>2</sup> = 0.032			R <sup>2</sup> = 0.315			
F (1,92) = 2.434, p = 0.122			F (2,91) = 1.484, p = 0.232			F (5,88) = 8.092, p = <0.001			

**Table 10: Regression Coefficients, Standard Errors, and Model Summary for Serial Mediation Model for Effects of Brand Name Fluency on Willingness to Request (Sensitivity Analysis with Most Fluent and Disfluent Name)**

	Familiarity (M <sub>1</sub> )			Perceived Risk (M <sub>2</sub> )			Willingness to Request (Y)					
		Coeff.	95% CI		Coeff.	95% CI		Coeff.	95% CI			
Fluency (X)	<i>a</i> <sub>1</sub>	0.157	-0.195, 0.509	<i>a</i> <sub>2</sub>	0.150	-0.001, 0.302	<i>c</i> '	0.244	-0.323, 0.811			
Familiarity (M <sub>1</sub> )		---	---	<i>d</i> <sub>1</sub>	0.244	-0.014, 0.501	<i>b</i> <sub>1</sub>	0.077	-0.253, 0.407			
Perceived Risk (M <sub>2</sub> )		---	---		---	---	<i>b</i> <sub>2</sub>	0.176	-0.473, 0.824			
Disease Severity (W)		---	---		---	---		---	---			
M <sub>2</sub> x W		---	---		---	---	<i>b</i> <sub>3</sub>	0.004	-0.001, 0.010			
Constant	<i>i</i> <sub>M1</sub>	16.000	12.897, 19.103	<i>i</i> <sub>M2</sub>	36.618	33.230, 40.005	<i>i</i> <sub>Y</sub>	18.695	-18.159, 55.549			
		R <sup>2</sup> = 0.008 F (1,92) = 0.782, p = 379				R <sup>2</sup> = 0.037 F (2,91) = 1.764, p = 0.177				R <sup>2</sup> = 0.288 F (5,88) = 7.121, p = <0.001		



## CHAPTER V: DISCUSSION

The current research is the first study to our knowledge that demonstrates pharmaceutical brand name fluency does not affect perceived risk of the product or willingness to request the medication in actual patients who are evaluating drug names indicated to treat their condition or disease. In a study among participants with rheumatoid arthritis, we did not find evidence that the difficulty of pharmaceutical brand names affected evaluations of the product's perceived risk or willingness to request the medication from a prescribing physician, even for patients with more advanced disease. Furthermore, and contrary to most previous fluency theory research with drug names, the perceived familiarity, or newness of the product, was not associated with the fluency of the pharmaceutical brand name. Our findings do align with recent research by Dohle and Montoya (2017) in which the researchers demonstrated that fluent drug names resulted in a positive as opposed to a negative affective response, which reduced the perceived risks of the drugs. Dohle and Montoya (2017) also did not find evidence to support the mediating role of familiarity between the fluency-risk relationship. Additionally, recent work by Bahník and Vranka (2017) reported that the relationship between fluency and perceived risk may be much less robust or even nonexistent. Through a series of experiments, the researchers concluded that the association between fluency and perceived safety was explained by the length of the name being evaluated by participants (Bahník and Vranka 2017). Thus, although findings from the current study contradict much of the previous fluency theory research involving brand names, particularly in the context of drug names, recent studies have brought into question the robustness

and generalizability of the association between processing fluency and judgements of risk.

Two important distinctions between this research and previous fluency theory research involving drug names are worth noting. First, this is the first study we are aware of that used study participants who have direct experience with pharmaceuticals in general, and more specifically, pharmaceuticals indicated to treat a specific condition in which participants are known to have. Previous fluency theory research involving drug names have not been conducted with patients in a specific condition or category. This is important difference as actual patients may be more conditioned to evaluating pharmaceutical brand names and rely upon surrogate decision makers (i.e., FDA, prescribing physicians) to make trade-off decisions between safety and efficacy. Research conducted thus far has primarily included students as study participants. Evaluating brand names, and drug names, from the perspective of a student differs considerably from that of a patient evaluating the brand names of product indicated to treat a condition for which the patient has been diagnosed.

Treatment naïve individuals may inherently be more likely to consider risk associated with a product as a result of less experience with pharmacologic treatments. Experienced patients may become conditioned through direct experience with pharmacologic therapy and the side effects associated with treatment. Although Schwarz (2004) demonstrated that the metacognitive experiences of general consumers are guided by processing fluency, the process may differ in the context of healthcare. General consumers are much less informed and experienced with drug therapy and may be more susceptible to the effects of processing fluency for pharmaceutical products. In fact, Dohle and Siegrist (2014) acknowledged that in a real-world setting, people actually afflicted by a condition may react differently to heuristic cues such as the complexity of a brand name.

Second, contrasting previous research, this study incorporated a between-subjects design in which participants were randomly assigned to either an easy-to-pronounce group of pharmaceutical brand names or a hard-to-pronounce group of pharmaceutical brand names. Extant literature (Song and Schwartz, 2009; Dohle and Siegrist, 2014; Tasso, Gavaruzzi, and Lotto, 2014; Cho, 2015; Dohle and Montoya, 2017) incorporated within-subjects designs in studies, exposing participants to both conditions of fluency. Methodological considerations, both disadvantages and advantages between the two experimental design approaches, have received considerable attention in the economic and psychology literature (Charness, Uri, and Kuhn, 2012). One particular risk associated with a within-subjects design is a “demand effect”, in which study participants either consciously or subconsciously attempt to interpret the intentions of the experiment and change their behavior accordingly (Charness, Uri, and Kuhn, 2012). As a result of considerations for the strengths and limitations of the two experimental design methods, between-subject designs have been considered to result in higher external validity in situations in which an individual is faced with a single decision, which is often the case in evaluations of whether a patient is willing to request a medication from his/her prescribing physician based on an advertisement for the medication as evaluated within the current study.

To demonstrate differences in these two methodological approaches, Hayes and Montoya (2016) recently used the work by Dohle and Siegrist (2014) which, based on fluency theory, assessed perceived hazardous and willingness to buy drugs based on drug name. In a similar single mediation model as hypothesized here within the current research, Dohle and Siegrist (2014) assumed the effects of drug name fluency (i.e., complexity) would be mediated on willingness to buy through participants perceived hazardousness. Hayes and Montoya (2016) applied a hypothetical between-subjects approach to the Dohle and Siegrist (2014) data and found

that complex sounding names were considered to be more hazardous than drugs with simpler names ( $t [42] = 2.618, p = 0.012, 95\% \text{ CI } [0.183, 1.417]$ ) which negatively affected willingness to buy through hazardousness (Hayes and Montoya, 2016). However, the mediation analysis conducted by Dohle and Siegrist (2014) using the within-subjects design found no statistically significant difference in willingness to buy based on drug name but instead, concluded a full or complete mediation effect, indicating that differences in hazardousness predicts willingness to buy (Hayes and Montoya, 2016). Disparate results from previous fluency theory research found within the current study may partially be the result of methodological advantages of the between-subjects design incorporated in this study.

### Limitations

There are limitations associated with this research that should be recognized. Participants evaluated hypothetical brand names of products indicated to treat RA. Patients self-identified as having been previously diagnosed with RA and therefore a confirmed diagnosis was not obtained for study participants. Although the survey captured participants' experience with various forms of RA treatment and their measure of disease severity, it is possible that participants did not have a confirmed clinical diagnosis of RA and therefore may not be suited to evaluate hypothetical products indicated to treat RA. Additionally, although the study incorporated a between-subjects designs, participants in each fluency group were exposed to a total of 10 brand names and could have experienced response burden or responder fatigue as a result. A sensitivity analysis was conducted to address this limitation by only analyzing the first brand name presented to each respondent. Finally, although this study attempts to investigate the fluency risk connection in a real-world setting with patients, the findings may not translate to other conditions outside of RA.

Patients with conditions that differ in symptoms, criticality, and even prevalence from that of RA may respond dissimilarly when evaluating brand names indicated to treat their disease.

### Implications

The current study has implications for both the growing body of fluency theory research and pharmaceutical industry itself. First, this study provides additional evidence as to the potential limitations in the previously established link between processing fluency and judgements such as perceived risk. Although the original work by Song and Schwartz (2009) has been replicated in subsequent studies, recent work by Dohle and Siegrist (2014), Bahnik and Vranka (2017), and the current study have demonstrated conflicting results to the relationships between processing fluency and judgements associated with disfluent brand names.

Future research should explore these possible boundary conditions and assess the robustness and generalizability of the fluency risk relationship. From an industry perspective, the results are supportive of recent naming trends and indicate that the complexity of pharmaceutical brand names do not negatively influence patients' willingness to act to advertising initiatives and request a medication from their healthcare provider. As the pharmaceutical market in the US continues to grow, with forty-six new products introduced in 2017 alone, pharmaceutical marketing practitioners should further investigate other judgements such as perceived efficacy and value that may be influenced by the complexity of the brand name.

Additionally, it is important to understand the potential impact of the fluency risk relationship on prescribing practitioners. Physicians and health care providers act as surrogate consumers for patients in the US health care market by choosing medications to prescribe for a patient. Determining what effect, if any, the fluency of pharmaceutical brand names on

prescribing practitioners is needed to further expand the real-world impact of processing fluency in the context of pharmaceuticals.

### Conclusion

In conclusion, the present study suggests that ease of pronunciation of a pharmaceutical brand name does not affect patients perceived risk associated with the product or their willingness to request the medication from their healthcare provider. This research contributes to the fluency theory literature and provides a unique perspective on the real- world implications, or lack thereof, of brand name selection for pharmaceutical products.

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## APPENDICES

## Appendix A: Pre-test Instructions

Thank you for your willingness to participate in this study. Your input is very valuable to the research team.

Throughout this process, you will see a series of 45 brand names of pharmaceutical products. We are interested in how easy, or difficult, each of the brand names are to pronounce. The following scale will be used so that you can rate each brand name based on ease of pronunciation. You will have a chance to rate each individual brand name before going to the next product.

*NOTE: Each numerical value will have a check box function to allow participants to select (or click) the appropriate number.*

Please rate the following pharmaceutical brand names how easy the names are to pronounce.

1                      2                      3                      4                      5                      6                      7

**Placed directly above each numerical value will be the following labels:**

1 = Very difficult to pronounce

2 = Moderately difficult to pronounce 3 =

Slightly difficult to pronounce

4 = Neither easy nor difficult to pronounce 5 =

Slightly easy to pronounce

6 = Moderately easy to pronounce 7 = Very

easy to pronounce

Appendix B: Example Study Measure Format

Imagine you see the following pharmaceutical product name and accompanying information during an advertisement for the product.

# Rotipix

Rotipix is a pharmaceutical product  
that is indicated for the treatment of  
Rheumatoid Arthritis



**Perceived Familiarity**

How would you rate the novelty of the product brand name listed above?

1                    2                    3                    4                    5                    6                    7

Placed directly above each numerical value will be the following labels: 1 = Very old  
2 = Moderately old 3 =

Slightly old

4 = Neither old nor new 5 =

Slightly new

6 = Moderately new 7 =

Very new

**Perceived Risk Measure**

How well do you expect the product listed above will perform?

1                    2                    3                    4                    5                    6                    7

Placed directly above each numerical value will be the following labels: 1 = Extremely

poor

2 = Moderately poor 3 =

Slightly poor

4 = Neither poor nor good 5 =

Slightly good

6 = Moderately good 7 =

Extremely good

### **Perceived Risk Measure**

How concerned would you be about using the product listed above?

1                      2                      3                      4                      5                      6                      7

Placed directly above each numerical value will be the following labels: 1 = Consider the

product very harmful

2 = Consider the product moderately harmful 3 =

Consider the product slightly harmful

4 = Consider the product neither safe nor harmful 5 = Consider

the product slightly safe

6 = Consider the product moderately safe 7 =

Consider the product very safe

### **Willingness to Request**

1                      2                      3                      4                      5                      6                      7

Placed directly above each numerical value will be the following labels: 1 = Very

unlikely

2 = Somewhat unlikely 3 =

Unlikely

4 = Neither unlikely nor likely 5 =

Likely

6 = Somewhat likely 7 =

Very likely

## Appendix C: Survey

### **Q1 Investigator Contact**

David Wamble  
The University of Mississippi School of Pharmacy dewamble@go.olemiss.edu

In this survey, you will be presented with a series of brand names for prescription pharmaceutical products indicated to treat rheumatoid arthritis. Once each product name is presented, you will be asked to respond to a few questions. Please select the most appropriate answer which best describes your impression of the pharmaceutical brand name.

The survey will require approximately 10-15 minutes to complete. Participation is strictly voluntary and you may refuse to participate at any time.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

### **Statement of Consent**

I have read the procedure described above. Clicking the "Proceed" button below signifies that I voluntarily agree to participate in the survey.

Proceed

Do not proceed

Q2 What is your age in years?

---

Q3 Have you ever been diagnosed with rheumatoid arthritis?

Yes

No

Q4 How long ago were you diagnosed with rheumatoid arthritis?

Less than 1 year ago

1 to 3 years ago

3 to 7 years ago

More than 7 years ago

Not sure

Q5 What is your gender?

Male

Female

Q6 Please specify your ethnicity

White

Hispanic or Latino

Black or African American

Native American or American Indian

Asian/Pacific Islander

Other

Q7 Are you a native English (US) speaker?

Yes

No

Q8 What is the highest degree or level of school you have completed?

High School or diploma equivalent (for example: GED)

Associate degree

Bachelor's degree

Master's degree

Professional degree

Doctorate degree

Q9 Do you work in a healthcare related field or for a healthcare organization?

Yes

No

Q10 Approximately how many prescription medications are you currently taking?

None

1 - 3 prescriptions

4 - 6 prescriptions

More than 6 prescriptions



Q11 Approximately how many prescription medications are you currently taking for rheumatoid arthritis?

- None
- 1
- 2
- 3 or more

Q12 Are the medications you are currently taking for rheumatoid arthritis injected/infused or taken by mouth?

- Injected/Infused
- Oral
- Both injected/infused and oral
- Not sure

Q13 How much pain have you had because of your rheumatoid arthritis IN THE PAST WEEK? On a scale of 0 to 100 (where zero represents “no pain” and 100 represents “severe pain”), please slide the bar to record the number below.

No pain	Severe pain
0	100





Q17 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q18 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q19 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q20 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q21

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Solotho

**Solotho is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q22 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q23 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old



Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q24 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q25 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q26

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Trivete

**Trivete is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q27 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q28 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q29 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q30 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q31

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Solatu

**Solatu is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q32 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar



Q33 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q34 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q35 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q36

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Vithoria

**Vithoria is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q37 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar  Very  
familiar

Q38 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new  Very new

Q39 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q40 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q41

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Runfina

**Runfina is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q42 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar



Q43 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q44 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q45 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q46

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Cutrino

**Cutrino is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q47 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar  Very  
familiar

Q48 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q49 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q50 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q51

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Altorex

**Altorex is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q52 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar  Very  
familiar



Q53 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q54 How concerned would you be about using the prescription pharmaceutical product listed above?

Consider the product very harmful

Consider the product moderately harmful

Consider the product slightly harmful

Consider the product neither safe nor harmful

Consider the product slightly safe

Consider the product moderately safe

Consider the product very safe

Q55 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q56

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Naxalon

**Naxalon is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q57 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

---

Q58 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q59 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q60 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q61

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Velcin

**Velcin is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q62 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q63 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old



Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q64 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q65 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q66

You are now going to see a series of pharmaceutical brand names. Please take a moment to pronounce each name, saying the name aloud or to yourself. You will then be asked to rate each pharmaceutical brand name based on how easy the name is to pronounce. Please make sure to rate each of the brand names before proceeding to the next.

Q67 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Evafir	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q68 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Solotho	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q69 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Trivete	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q70 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Solatu	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q71 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Vithoria	○	○	○	○	○	○	○

Q72 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Runfina	○	○	○	○	○	○	○

Q73 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Cutrino	○	○	○	○	○	○	○

Q74 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Altorex	○	○	○	○	○	○	○

Q75 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Naxalon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q76 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Velcin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q137 Thank you for your participation! Please provide your name and email below so payment can be processed for taking part in this study.

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Q77

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Niyxob

**Niyxob** is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis

Q78 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q79 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new



Q80 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q81 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q82

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Quthutix

**Quthutix is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q83 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar   
Very familiar

Q84 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q85 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q86 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q87

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Oxgnue

**Oxgnue is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q88 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar   
Very familiar

Q89 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new



Q90 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q91 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q92

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Enyvfo

**Enyvfo is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q93 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q94 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q95 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q96 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q97

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Vetlixfi

**Vetlixfi is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q98 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q99 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new



Q100 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q101 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q102

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Subridke

**Subridke is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q103 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q104 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q105 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q106 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely Q107

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Oxibinle

**Oxibinle is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q108 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q109 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new



Q110 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q111 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q112

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Oxtieze

**Oxtieze is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q113 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar   
Very familiar

Q114 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q115 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q116 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q117

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Asbixat

**Asbixat is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q118 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar   
Very familiar

Q119 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new



Q120 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q121 How willing would you be to request the prescription pharmaceutical product from your physician?

- Very unlikely
- Unlikely
- Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q122

Imagine you see the following prescription pharmaceutical product name and accompanying information during an advertisement for the product

Docilge

**Docilge is a prescription pharmaceutical product that is indicated for the treatment of Rheumatoid Arthritis**

Q123 How familiar to you is the prescription pharmaceutical product listed above?

Very unfamiliar

Moderately unfamiliar

Slightly unfamiliar

Neither familiar nor unfamiliar

Slightly familiar

Moderately familiar

Very familiar

Q124 How would you rate the novelty of the prescription pharmaceutical product listed above?

Very old

Moderately old

Slightly old

Neither old nor new

Slightly new

Moderately new

Very new

Q125 How concerned would you be about using the prescription pharmaceutical product listed above?

- Consider the product very harmful
- Consider the product moderately harmful
- Consider the product slightly harmful
- Consider the product neither safe nor harmful
- Consider the product slightly safe
- Consider the product moderately safe
- Consider the product very safe

Q126 How willing would you be to request the prescription pharmaceutical product from your physician?

Very unlikely

Unlikely

Niyxob

Somewhat unlikely

Neither unlikely nor likely

Somewhat likely

Likely

Very likely

Q127 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
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Q128 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neit her easy nor pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Quthutix	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q129 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neit her easy nor pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Oxgnue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q130 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neit her easy nor pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Enyvfo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q131 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neit her easy nor pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Vetlixfi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q132 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Subridke	○	○	○	○	○	○	○

Q133 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Oxibinle	○	○	○	○	○	○	○

Q134 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Oxtieze	○	○	○	○	○	○	○

Q135 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Asbixat	○	○	○	○	○	○	○



Q136 Please rate the following pharmaceutical brand name based on how easy the name is to pronounce.

	Very difficult to pronounce	Moderately difficult to pronounce	Slightly difficult to pronounce	Neither easy nor difficult to pronounce	Slightly easy to pronounce	Moderately easy to pronounce	Very easy to pronounce
Docilge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## CURRICULUM VITAE

DAVID WAMBLE, PHD

Director, Value Insight and Access Strategy

### **Education**

PhD, Pharmacy Administration, University of Mississippi, Oxford, MS

MS, Applied Pharmacoeconomics, University of Florida, Gainesville, FL

MBA, Marketing, University of Phoenix, Nashville, TN

BBA, Corporate Finance, Mississippi State University, Starkville, MS

### **Summary of Professional Experience**

David Wamble is a Director of the Value Insight and Access Strategy group at RTI HS. Mr. Wamble has more than 10 years of experience working in various roles within the pharmaceutical industry. He has worked extensively within the commercial sector of the industry, with experience in professional sales, sales training and development, and product management. Most recently, Mr. Wamble led the marketing efforts, with full P&L responsibilities, for the dermatology franchise of a mid-size global pharmaceutical company. In addition to this direct industry experience, he has more than 5 years of pharmaceutical pricing and market access consulting experience. Mr. Wamble has conducted multiple pricing and market access research initiatives, designing and implementing primary and secondary research methods to support strategic pricing and reimbursement recommendations for United States and global pharmaceutical and biotech firms.

### **Employment Chronology**

2014 to present      Senior Consultant  
Business Development      RTI Health Solutions  
RTI International  
Research Triangle Park, NC

2011 to 2014    Doctoral Student      School of Pharmacy  
University of Mississippi  
Oxford, MS

2011 to 2014    Research Intern      Medical Marketing Economics  
Oxford, MS

2010 – 2011 Product Manager Merz Pharmaceuticals  
Greensboro, NC

2009 – 2010 Aesthetic and Medical Dermatology Trainer Merz Pharmaceuticals  
Greensboro, NC

2007 – 2009 Associate Manager, Sales Training OrthoDermatologics  
Los Angeles, CA

2004 – 2007 Professional Sales Representative OrthoDermatologics  
Nashville, TN

### **Publications**

Wamble DE, West-Strum D. Communicating effectively in the workplace. In: Chisholm-Burns MA, Vaillancourt AM, Shepherd M, editors. Pharmacy Management, Leadership, Marketing, and Finance, 2nd ed. Jones & Bartlett Learning; 2012. p. 38-52.

### **Posters and Presentations**

Wamble DE, Patel A, Kolassa M. A test of the conceptual and structural validity of the van Westendorp price sensitivity meter: a US pharmaceutical market case study. Poster presented at the Pharmaceutical Management Science Association 2013 Annual Conference; May 2013. Bonita Springs, FL.

Wamble DE, Dikun JA, Jackson TH, Parrett JW, Ramachandran S, Shah R, et al. An examination of stress and its dimensions in pharmacy faculty. Poster presented at American Association of Colleges of Pharmacy Annual Meeting; April 2013. Chicago, IL.

Wamble DE, Null K, Banahan B. An application of CDPS for case management selection in a fee-for-service Medicaid sample. Presented at Academy of Managed Care Pharmacy 26th Annual Meeting; April 2014. Tampa, FL.  
Updated March 2016