Judgment Certainty: Perceptions of Its Origins and Why They Matter

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy
in the Graduate School of The Ohio State University

By
Andrew Lionel Luttrell
Graduate Program in Psychology

The Ohio State University
2016

Dissertation Committee:
Richard Petty, Advisor
Duane Wegener
Russell Fazio
Abstract

Judgment certainty has been an enduring and influential construct in many areas of psychology, including judgment, decision-making, memory, and the self. Perhaps the most developed literature on certainty, however, is in the domain of people’s attitudes. Attitude certainty is an important determinant of the strength of an attitude, but no prior research has examined whether the basis of that certainty matters. The present research considers whether the reasons that people think underlie their certainty affect the process through which they resist persuasion. Previous research showed that attitudes held with relative certainty change less in response to counterattitudinal persuasive communication, but this research goes a step further, proposing that perceived bases for certainty are impactful for the process through which people achieve resistance. The present studies hypothesized that perceiving oneself to have relatively strong vs. weak reasons for certainty would be associated with thoughtful ways of resisting persuasion. This research found that people with relatively strong reasons for being sure of an attitude showed greater thought in responding to persuasive communication, expending greater effort in processing the message and generating more thoughtful anti-message responses. These questions were examined in eleven studies. Studies 1 – 3 explore people’s perceived reasons for certainty, showing that people endorse a variety of reasons for being sure of an attitude and that these reasons vary in their perceived strength. Studies 4 – 7 consider the effects of specific reasons for certainty, which were shown to reflect relatively strong
and weak bases for confidence, on responses to a persuasive message. Study 8
demonstrates the generalizability of the key relationships in the context of the 2012 U.S.
presidential election, and Studies 9 – 11 examine the extent to which the previous effects
are due to participants’ own perceptions that their reasons for certainty are relatively
strong or weak. These findings have implications for attitudes and persuasion processes,
as well as the broader literature on certainty.
Acknowledgements

The research in this dissertation would not be possible without the guidance of Richard Petty. I owe my sincere gratitude to him for tirelessly reviewing manuscripts, meeting about research, and entertaining occasionally crazy ideas. His support has made me a better scholar, speaker, writer, teacher, and mentor.

I would also like to thank Duane Wegener, Russell Fazio, Pablo Briñol, and Baldwin Way for their instrumental roles in my development as a social psychologist. In addition, thank you to the members of the Attitudes and Persuasion Lab, the Group for Attitudes and Persuasion, and the Group for Attitudes and Persuasion—Spain for their critiques, encouragement, and inspiration. I have been lucky to go through graduate school surrounded by some of the most intelligent, generous, and fun people I have ever met.

Finally, thank you to Shirley and Larry Luttrell and to Shalini Goyal for their patience and support (and for conversations not having to do with attitude certainty).
Vita

June 2006 ................................Prospect High School

2010 ........................................B.A. Psychology, Eastern Illinois University

2010-2011 .................................Graduate Fellow, The Ohio State University

2012 .................................M.A. Psychology, The Ohio State University

2011-2015 .................................Graduate Research Associate, The Ohio State University

2012-2014 .................................Graduate Teaching Associate, The Ohio State University

2015-2016 .................................Colloquium Series Chair, The Ohio State University

Publications


Fields of Study

Major Field: Psychology
Table of Contents

Abstract .......................................................................................................................... ii

Acknowledgements ....................................................................................................... iv

Vita ................................................................................................................................. v

List of Tables ................................................................................................................ x

List of Figures ............................................................................................................... xi

Chapter 1: Introduction ............................................................................................... 1

The Consequences of Attitude Certainty ................................................................. 7

Origins of Certainty ..................................................................................................... 12

Objective Origins ....................................................................................................... 12

Subjective Origins ..................................................................................................... 15

Perceived Reasons for Certainty ............................................................................. 18

The Process of Resisting Persuasion ...................................................................... 20

Research Overview .................................................................................................. 23

Chapter 2: Exploring People’s Reasons for Being Certain .................................. 31

Study 1 ...................................................................................................................... 32
Appendix B: Figures ........................................................................................................... 167
Appendix C: Measurement Instrument (Study 2) ................................................................. 172
Appendix D: Measurement Instrument (Study 3) ................................................................. 174
Appendix E: Strong vs. Weak Reasons as Predictors .......................................................... 176
Appendix F: Unreported Studies .......................................................................................... 179
  Study F1: Free Response Reasons as a Predictor ............................................................... 179
  Study F2: Testing Mediation of the Manipulation ............................................................... 181
  Study F3: Argument Quality ............................................................................................. 183
  Summary .......................................................................................................................... 185
List of Tables

Table 1. Categories Used to Code Free Response Reasons for Certainty (Study 1) .................................................. 158

Table 2. Categories of Reasons for Certainty about Barack Obama, University Football, Diet Coke, and Recycling (Study 1) ........................................ 160

Table 3. Average Attitudes and Certainty (Study 2) .......................................................... 161

Table 4. Endorsement of Individual Reasons for Attitude Certainty (Study 2) ........ 162

Table 5. Average Perceived Strength of Individual Reasons for Certainty (Study 3) ........................................................................................................ 164

Table 6. Correlations Between Predictors (Study 7) .................................................... 165

Table 7. Correlations Between Certainty, Perceived Reason Strength, and Predicted Resistance Strategies (Study 9) ........................................ 166

Table 8. Summary of Analyses on Counterarguing ...................................................... 178
List of Figures

Figure 1. Attitudes toward recycling following a persuasive message interact with initial perceived reasons for certainty to predict intentions to recycle over the following week (Study 7)........................................167

Figure 2. Sequential mediation model entering perceived strength of confidence bases and self-reported counterarguing as mediators of the effect of perceived reasons for certainty on post-message attitude certainty (Study 10).............................................................................168

Figure 3. Moderation of the false feedback effects by initially reported (strong vs. weak) reasons for certainty (Study 11)......................................................169

Figure 4. Moderation of the correspondence between post-message attitudes and behavioral intentions by the manipulation of perceived strength of bases for certainty (Study 11)......................................................171
Chapter 1: Introduction

Certainty has long intrigued scientists of the mind. The roots of this interest lie in epistemology—a branch of philosophy that considers the nature of knowledge and belief. These philosophers wrote about the nature of certainty, questioning whether and how knowledge can be certain at all. In general, these philosophical traditions have treated certainty as a means of evaluating the truth of some belief, indexing the strength of a belief’s justification, and judging a belief’s potential to be disconfirmed (for a review, see Firth, 1967).

In the past century, psychologists have also developed an interest in certainty and have used two approaches. One approach considers people’s reactions to diffuse states of certainty or uncertainty.1 The dominant approach, however, focuses on people’s subjective certainty in their own judgments, beliefs, evaluations, etc. That is, as it is often used in psychology, “certainty” (typically used interchangeably with the term “confidence”), refers to a person’s subjective sense that his or her mental content is valid.

---

1 That is, there has been some interest in certainty/uncertainty as it pertains to the people’s feelings about the predictability of their situations or to the ability to know something. For example, research on emotions has proposed that a diffuse state of certainty or uncertainty can underlie discrete emotions (e.g., C. A. Smith & Ellsworth, 1985), and research on decision making has examined how people make choices when the outcomes of different options are uncertain (e.g., Tversky & Kahneman, 1992). Other social psychological theories focus on the unpleasantness of the state of uncertainty, which motivates various cognitive and behavioral processes aimed at relieving it. These theories include Uncertainty-Identity Theory (Hogg, 2007), compensatory conviction (McGregor, Zanna, Holmes, & Spencer, 2001), and the Meaning Maintenance Model (Heine, Proulx, & Vohs, 2006), among others. These uses of “certainty” and “uncertainty” are somewhat different from that which will be used here because they do not relate to identifiable primary cognitions.
Importantly, “mental content” can be defined quite broadly. A person can be certain of a belief, a momentary thought, an emotional state, a prediction of the future, a survey response, etc. In this way, certainty is a *metacognition*—a thought about a thought. Some have used the terminologies of “primary” and “secondary” cognitions to talk about the relationships between a broad array of mental contents (primary cognitions) and metacognitions like certainty (a secondary cognition; Briñol & DeMarree, 2012; Dulonsky & Metcalfe, 2009; Luttrell, Briñol, Petty, Cunningham, & Diaz, 2013; Petty, Briñol, Tormala, & Wegener, 2007).

Early works attempted to understand the relationships between metacognitive confidence and the accuracy of the primary cognitions (i.e., a judgment or a memory; Dallenbach, 1913; Hollingworth, 1913; Lund, 1926; Trow, 1923). Since then, the topic of certainty has been considered across many prominent areas of psychology, including judgment, decision-making, memory, the self, and attitudes. In each, metacognitive certainty has emerged as an important variable with critical consequences pertaining to these distinct primary cognitions.

First, the concept of certainty has been well established in research on perception and judgment. Generally, when a judgment is easier or clearer to make, it is made more accurately and more confidently (Johnson, 1945). Confidence, however, does not always signal accuracy and instead, people can be more confident than the accuracy of their judgments warrant (Einhorn & Hogarth, 1978; Harvey, 1997; Gigerenzer, Hoffrage, & Kleinbolting, 1991). Nevertheless, judgment confidence can be consequential. For instance, greater confidence has been associated with higher bets placed on options that
are judged favorably (Simmons & Nelson, 2006) and with reduced likelihoods of revising one’s estimate (Ülkümen, Thomas, & Morwitz, 2008).

Similar work has been conducted with respect to choice confidence. That is, after making a decision, how confident are people that they made the right choice? In general, people tend to be more certain of their decisions when the choice was relatively easy (Fleming & Dolan, 2012; Kepecs, Uchida, Zariwala, & Mainen, 2008), limited to only a few options (Wang & Shukla, 2013), and accompanied by relatively little and highly useful information (Keller & Staelin, 1987; Lee & Lee, 2004). Choice confidence can be especially informative because it predicts how satisfied people are with their choices and their likelihood of regret (e.g., Heitmann, Lehmann, & Herrmann, 2007; Wang & Shukla, 2013).

Certainty is also commonly assessed alongside people’s memory reports. As with the judgment literature, memory researchers have also focused on the correlations between confidence and accuracy (Busey, Tunnicliff, Loftus, & Loftus, 2000; Roediger & DeSoto, 2014). One might reasonably expect that a memory held with high confidence should also be relatively accurate (as is often the case with judgment confidence). Indeed, many studies have reached this conclusion (see Dunlosky & Metcalfe, 2009; Wixted & Mickes, 2010). Nevertheless, Roediger and DeSoto (2014) note that even in studies that find a confidence-accuracy relationship, it is not a perfect correlation: “one finds that when people are 100% confident in their response, they may be only 80-90% accurate on average” (p. 348). To make matters more complicated, however, some work has documented negative confidence-accuracy correlations. That is, when a memory task
involves “trick” questions, relying on lure items (e.g., Roediger & McDermott, 1995) or common misconceptions, less accurate responses are accompanied by greater confidence (Koriat, 2008, 2012; Roediger & DeSoto, 2014; Sampaio & Brewer, 2009).

The issue of confidence-accuracy relationships in memory comes into sharp focus when considering eyewitness testimony (Leippe & Eisenstadt, 2007). Although confidence and accuracy in eyewitness memory reports are imperfectly, and even negatively, related, the confidence expressed in an eyewitness testimony has a substantial influence on a jury’s belief in that testimony (Bradfield & Wells, 2000; Brewer & Burke, 2002; Fox & Walters, 1986; Lindsay, Wells, & O’Connor, 1989; Tetterton & Warren, 2005; Wells, Lindsay, & Ferguson, 1981; Whitley & Greenberg, 1986). Of course, relying on the confidence of an eyewitness can have horrific consequences if that confidence turns out to be unfounded. Thus, other research in this area has aimed to understand the conditions under which witnesses become highly confident in erroneous recollections (e.g., Garrioch & Brimacombe, 2001; Luus & Wells, 1994; Shaw, Zerr, & Woythaler, 2001; Wells & Bradfield, 1998; Wells, Lindsay, & Ferguson, 1981; Wixted, Mickes, Clark, Gronlund, & Roediger, 2015).

With respect to the self, researchers have considered the role of certainty as it relates to self-beliefs (for a review, see DeMarree, Petty, & Briñol, 2007). That is, people can vary in how confident they are in their defining traits and characteristics. Some research has considered individuals’ chronic confidence in their self-concept as a whole (Campbell, Trapnell, Heine, Katz, Lavallee, & Lehman, 1996). Other approaches, however, have considered how confident people are in individual personality attributes.
For example, the more confident people are that a particular personality trait (e.g., extraversion) applies to them, the more they engage in trait-consistent behaviors (Pelham & Swann, 1994; Shoots-Reinhard, Petty, DeMarree, & Rucker, 2014; Swann & Ely, 1984). Further, the more confident someone is in a self-belief, the more that belief is likely to persist over time (Pelham, 1991) and in the face of pressures to change (Morrison, Johnson, & Wheeler, 2012; Swann & Ely, 1984; Swann, Pelham, & Chidester, 1988).

Across these many domains, it is clear that certainty has emerged as an important variable, capable of predicting a range of outcomes. One key question, however, is: where does certainty come from? Why is it that some mental content is associated with metacognitive confidence but other content is associated with relative doubt? This is not a new question. Psychologists have examined the objective antecedents to certainty for as long as they have observed its consequences. As far back as 1926, Frederick Lund showed that memory confidence (but not accuracy) depended on a feeling of familiarity. Others, for example have argued that both confidence and the response itself (i.e., the judgment, choice, memory, etc.) are determined by precisely the same input: the quality of the evidence that informed the response in the first place. In fact, neural evidence supports this model, showing that neural activity underlying a decision itself also underlies confidence in that decision (Kepecs et al., 2008; Kiani & Shadlen, 2009). In other words, the neural processes that code for decision-relevant information are the same ones that code decision confidence.
Perhaps more interesting are the antecedents to certainty for inaccurate responses. For example, how can people become so sure of their identification of a criminal suspect that turns out to be incorrect? Additionally, in the case of more subjective judgments (e.g., how much someone likes or dislikes another person), how do people reach a sense of confidence? The available evidence suggests that people turn to other cues when forming a sense of certainty. For example, the quicker a person registers a decision, the more certain he or she is in that decision (Kiani, Corthell, & Shadlen, 2014). Although decision time also tends to be correlated with decision accuracy, Kiani et al. (2014) showed that quicker decisions are still held with greater confidence even when the decisions are inaccurate or when response times are manipulated independent of accuracy. That is, even when a cue is objectively misleading, it can still serve as the basis for confidence.

Although it is clear that much research has focused on the actual determinants of certainty across many domains, almost no work has considered people’s own beliefs about the bases of their certainty. That is, why do people think they are certain (regardless of the true origins of their confidence)? These lay beliefs about the origins of confidence may follow directly from the true origins, but perhaps more intriguingly, they may be perceptions that exist independent of their accuracy. The present research considers this novel question and examines people’s perceived reasons for being certain of inherently subjective evaluations. Further, this research tests whether these perceptions of distinct confidence bases are consequential. To address these questions, we turn to
what may be the most commonly studied form of certainty in social psychology: attitude certainty.

**The Consequences of Attitude Certainty**

Attitudes are stored evaluations of a particular target. This target can be a person, an object, an abstract idea, a social issue, a consumer product, etc. Regardless of the specifics of the target, the attitude represents a person’s overall positive or negative reaction to that target. For example, a person who thinks eggs are bad has a negative attitude toward eggs. Someone who likes Barack Obama has a positive attitude toward Barack Obama. However, two people who hold equally positive attitudes toward Obama can still differ in their degrees of attitude certainty—one person can be *sure* that he likes Obama whereas the other person can like him but not be as sure about it. As with certainty in one’s judgments, decisions, memories, and self-beliefs, attitude certainty is a metacognition that reflects the subjective validity of a primary cognition—in this case, an attitude (see also Gross, Holtz, & Miller, 1995; Rucker, Tormala, Petty, & Briñol, 2014; Tormala & Rucker, 2007).

Social psychologists have generally conceptualized attitude certainty as an indicator of an attitude’s strength. By definition, a “strong” attitude is one that is

---

2 Typically, certainty is discussed as an *overall* sense of conviction or validity about one’s attitude. However, some work has identified two unique aspects of attitude certainty: “clarity” and “correctness” (Petrocelli, Tormala, & Rucker, 2007). “Clarity” is how sure people are that they know what their attitudes actually are, and “correctness” is how much people think that their attitudes are the objectively right ones to have. When measured separately, these two aspects of certainty are highly correlated, and oftentimes they both independently predict outcomes like resistance to persuasion (Petrocelli et al., 2007) and stability over time (Luttrell, Petty, & Briñol, 2016a). Nevertheless, clarity and correctness can have distinct antecedents (Petrocelli et al., 2007; Prislin, Shaffer, & Crowder, 2012) and can have distinct consequences (Cheatham & Tormala, 2015; Rios, DeMarree, & Statzer, 2014). Because the line of research distinguishing these two aspects of attitude certainty is rather new, the present review generally covers past work that focused on overall reports of certainty.
influential and durable (see Krosnick & Petty, 1995). In other words, strong attitudes are those that guide relevant behavior, persist over time, and remain unchanged in the face of challenges. These qualities can be thought of as the key consequences of attitude strength. But how can one predict which attitudes will show these consequences? In an expansive body of work, research has uncovered many unique features of attitudes that reliably predict attitude strength outcomes. These indicators of strength include the extent to which an attitude is accessible (Fazio, 1995), ambivalent (Armitage & Conner, 2000), rated as important (Eaton & Visser, 2008), based on high knowledge (Wood, Rhodes, & Biek, 1995), resulted from considerable message-relevant thinking (Petty, Haugtvedt, & Smith, 1995), and of course, held with confidence (Gross, Holtz, & Miller, 1995). As reviewed below, however, many of these attitude strength indicators (e.g., accessibility, extent of thinking, and knowledge) have been linked to certainty, which can ultimately mediate their effects on attitude strength outcomes (e.g., Barden & Petty, 2008). Thus, among this set of established strength indicators, certainty emerges as an especially important one.

Typically, attitude certainty is assessed by asking people to first report their overall attitudes toward a target and then indicate how certain, confident, and/or sure they are of that evaluation (Wegener, Downing, Krosnick, & Petty, 1995). Responses to such questions can then be used to predict the aforementioned attitude strength consequences. Generally, the more confident a person is in an attitude, the more that attitude demonstrates the key strength consequences.
First, greater certainty tends to correspond with more attitude-consistent behavior. In one early study, Sample and Warland (1973) measured students’ attitudes toward student government and how certain they were in their responses to the attitudes questions. In addition, they measured the students’ intentions to vote in an upcoming student government election at their school and also obtained objective reports of which students actually voted in the election. Although more favorable attitudes were associated with greater intentions to vote and greater likelihood of actually voting, attitudes were especially reliable predictors of these behavior-related outcomes for students who expressed relatively high certainty in their attitudes, compared to students who expressed relatively low certainty. In the years since, the effect has emerged repeatedly; greater attitude certainty is associated with more attitude-consistent intentions and behavior (Antril, 1983; Barden & Petty, 2008; Berger, 1992; Berger & Mitchell, 1989; Budd & Spencer, 1984; Bizer, Tormala, Rucker, & Petty, 2006; Davidson, Yantis, Norwood, & Montano, 1985; Fazio & Zanna, 1978; Franc, 1999; Krishna & Smith, 1998; Laroche, Kim, & Zhou, 1995; Rucker & Petty, 2004; Tormala & Petty, 2002; Tuu & Olsen, 2012; Visser, Krosnick, & Simmons, 2003). Indeed, several meta-analyses underscore the reliability of this association (Glasman & Albarracín, 2006; Kraus, 1995).

Second, if certainty indicates attitude strength, then there should also be a positive relationship between certainty and the stability of the attitude over time. Indeed, some data support this positive correlation (Abelson, 1988; Bassili, 1996). Similarly, the more confident someone is in her or her behavioral intentions, the more stable those intentions are over time (Sheeran & Abraham, 2003). Other data, however, fail to support a
relationship between certainty and stability (Craig, Martinez, & Kane, 2005). To account for these empirical discrepancies, recent research has tested moderators of the certainty-stability relationship, finding that certainty is positively related to attitude stability for attitudes that are relatively unambiguous. In contrast, for relatively ambivalent attitudes, certainty can actually have a negative effect on longitudinal stability (Luttrell, Petty, & Briñol, 2016a, 2016b).

Finally, greater certainty in one’s attitude is associated with less attitude change in the face of persuasive communication (Babad, Ariav, Rosen, Salomon, 1987; Bassili, 1996; Kelley & Lamb, 1957; Litt & Tormala, 2010; Petrocelli et al., 2007; Pomerantz, Chaiken, & Tordesillas, 1995; Pullig, Netemeyer, & Biswas, 2006; Tormala & Petty, 2002; Visser & Mirabile, 2004; Wu & Shaffer, 1987). As with stability, there is also evidence that greater certainty is associated with greater resistance for relatively unambiguous attitudes; for more ambivalent attitudes, high certainty can actually result in reduced resistance (Clarkson, Tormala, & Rucker, 2008). High certainty can also result in reduced resistance when the persuasive message is well matched to the affective or cognitive basis of the person’s initial attitude (Clarkson, Tormala, & Rucker, 2011).

Even beyond these three defining features of strong attitudes, certainty has been shown to have several other consequences as well. For example, greater certainty is associated with a greater willingness to express one’s opinion (Lasora, 1991; Matthes, Morrison, & Schemer, 2010), greater intentions to persuade others (Akhtar, Paunesku, & Tormala, 2013; Visser et al., 2003) stronger propensity to attend to pro-attitudinal (vs. counter-attitudinal) information, especially when the information is familiar (Brannon,
Tagler, & Eagly, 2007; Knobloch-Westerwick & Meng, 2009; Sawicki, Wegener, Clark, Fabrigar, Smith, & Bengal, 2011), higher minimum willingness-to-pay prices (Maier, Wilken, & Dost, 2015), greater self-certainty (Clarkson, Tormala, DeSensi, & Wheeler, 2009), and stronger effects of attitude similarity on liking when people are focused on the other person (Sawicki, 2013). As was the case with stability and resistance, however, these effects of certainty can depend on other factors. For instance, when information is unfamiliar, greater certainty is associated with reduced likelihood of choosing to read attitude-consistent (vs. inconsistent) information (Sawicki et al., 2011), and when people are focused on their own attitudes, greater certainty is associated with a weaker effect of attitude similarity on liking (Sawicki, 2013).

In summary, it is clear that attitude certainty is one characteristic of people’s attitudes that provides a great deal of information. In light of how reliably certainty predicts these key consequences, some have highlighted the importance of including this simple measure in surveys of various sorts, noting that it would “greatly help researchers gauge and understand public opinion and social behavior” (Krosnick & Abelson, 1992, p. 179). Given the importance of this variable, however, it is natural to wonder: where does it come from? Although some of the research reviewed above has considered the origins of certainty across a broad range of areas such as memory and decision-making, the origins of attitude certainty have received considerable detailed attention. This literature has established a variety of ways by which people become certain of their attitudes. These origins can be categorized as relatively “objective” origins (those that pertain to
the actual ways in which people think about and form their attitudes) and relatively “subjective” origins (those that pertain to the perceived qualities of one’s attitude).

**Origins of Certainty**

**Objective Origins.**

Although attitude certainty often indicates an attitude’s strength, it can have many origins. There has been much work identifying various antecedents to certainty (for reviews see, Gross et al., 1995; Tormala & Rucker, 2007; Rucker et al., 2014). What follows is a brief overview of various origins of certainty, drawn primarily from studies that manipulate the variable of interest to establish a causal effect on attitude certainty.³ Although it is not an exhaustive review, it is intended to illustrate the point that social psychologists have thus far documented many actual origins of attitude certainty.

First, certainty can be influenced by the kind of information that went into forming the attitude itself. For instance, people tend to be more confident in attitudes that were formed through direct (vs. indirect) experience with the topic of evaluation (Fazio & Zanna, 1978; R. E. Smith & Swinyard, 1983, 1988; Wu & Shaffer, 1987), through reading information that came from a credible (vs. non-credible) source (Clarkson at al., 2008; cf. Nan, 2009), through reading information that presented an evaluatively consistent image of the topic (Maheswaran & Chaiken, 1991; S. M. Smith, Fabrigar,

---

³ In addition to these studies, other work has established various correlations between certainty and other relevant variables. For instance, certainty is often correlated with other attitude strength indicators like extremity, ambivalence, importance, moral conviction, etc. (e.g., Krosnick, Boninger, Chuang, Berent, & Carnot, 1993; Prislin, 1996; Skitka, Bauman, & Sargis, 2005). Attitude certainty also correlates with individual differences like need for cognition (e.g., Barden & Petty, 2008), need to evaluate (Britt, Millard, Sundareswaran, & Moore, 2009), need for cognitive closure (Kruglanski & Webster, 1991; Kruglanski, Webster, & Klem, 1993; Webster, 1993), certainty orientation (Sorrentino & Short, 1986), and one’s age (Visser & Krosnick, 1998). Despite the evidence for these associations, however, relying on correlational evidence makes it more difficult to establish whether or not these variables are actually causes of certainty.
MacDougall, & Wiesenthal, 2008), and through reading persuasive arguments that match the quality expected, given the message’s source (Tormala & DeSensi, 2009). Similarly, certainty can depend on how information is framed. People tend to be more confident in their attitudes when the information is framed as two-sided (vs. one-sided; Rucker, Petty, & Briñol, 2008), and when preferences are framed as opposition (vs. support; Bizer, Larsen, & Petty, 2011). Finally, in addition the nature of the information and how it is presented, confidence can also depend on the sheer amount of information considered—more information produces greater confidence (S. M. Smith et al., 2008; Tsai, Klayman, & Hastie, 2008).

Certainty can also depend on how people are exposed to and think about the information. Seeing the same information multiple times, for example, increases attitude certainty, compared to seeing the information only once (Berger & Mitchell, 1989; Haugtvedt, Schumann, Schneier, & Warren, 1994). Also, thinking more about relevant information and doing so as the information is received (vs. later, when it is time to report one’s opinion) results in more confidently held attitudes (Barden & Petty, 2008; Bizer, Tormala, Rucker, & Petty, 2006; Kopp, 2010; Shoots-Reinhard, Rucker, Petty, & Shakarchi, 2014; S. M. Smith et al., 2008). Relatedly, confidence can depend on how people think about persuasive information that opposes their current attitude. That is, the more a person successfully resists being persuaded by counterattitudinal information, the more confident he or she becomes in the attitude under attack (Tormala & Petty, 2002).

Importantly, though, this is only the case when the person believes that the message he or she resisted was composed of strong (vs. weak) arguments (Tormala & Petty, 2002,
2004a), that the source of the message was an expert (vs. non-expert; Tormala & Petty, 2004b), that their counterarguments were of high (vs. low) quality (Tormala, Clarkson, & Petty, 2006), and that they based their resistance on legitimate (vs. illegitimate grounds (Tormala, DeSensi, & Petty, 2007).

In addition to qualities of attitude-relevant information, certainty can also depend on how the person expresses his or her attitude. For instance, expressing one’s attitude several times, compared to doing so only once, results in greater attitude certainty (Holland, Verplanken, & van Knippenberg, 2003; Krishnan & Smith, 1998). Certainty has also been shown to increase following a group discussion in which individuals are able to express their attitudes (Stasser, Taylor, & Hanna, 1989).

Finally, the attitudes of other people can have a reliable impact on one’s certainty. In an early demonstration of this effect, Johnson (1940) assessed the degree of objective agreement within the study’s 68 participants for each of 20 attitudinal responses and found that for each item, group agreement correlated with individuals’ certainty in their response, which shows that people tend to be more confident in their attitudes when there seems to be social consensus. Since then, other studies have shown that when a person holds the same opinion as a majority of other people, he or she holds that opinion with greater certainty (Orive, 1988; Visser & Mirabile, 2004). Also, when someone is asked to estimate the attitudes held by members of her ingroup or outgroup, the act of forming this estimation can increase her own attitude certainty (Holtz & Miller, 1985; Holtz, 2003).
Subjective Origins.

Notably, attitude certainty is an inherently subjective attribute—it is a person’s own metacognitive assessment of his or her attitude. As a result, perceptions of certainty may depend more strongly on other subjective perceptions relevant to the primary cognition. The origins of attitude certainty documented above, then, may only influence subjective confidence inasmuch as people become aware of those qualities of the information, the way they processed the information, their social environments, etc. Recent research has provided evidence in support of this reasoning. For instance, although having more knowledge about an issue leads to greater attitude certainty, the effect is mediated by people’s perceptions that they know about the issue (S. M. Smith et al., 2008). Similarly, although developing more accessible attitudes results in greater certainty, this effect is mediated by people’s perception that their attitude comes to mind easily (Kopp, 2010). Finally, although generating more counterarguments in response to a persuasive message can increase a person’s attitude certainty, the effect is mediated by the person’s perception that he or she successfully resisted persuasion (Tormala & Petty, 2002).

The evidence cited above argues that certainty is affected by various objective origins only because people become aware of things like attitude-relevant knowledge and accessibility. However, the perception of those attitude-relevant variables need not correspond to reality, and as a result, those perceptions still affect a person’s confidence even if they are inaccurate. As an example, consider the effect of careful thinking on attitude certainty. In general, attitudes tend to be more consequential when they are the
result of careful thinking (see Petty, Hagtvedt, & Smith, 1995); however, objective attitude-relevant thinking leads to greater certainty to the extent that people are aware that they thought deeply about the issue (Barden & Petty, 2008; S. M. Smith et al., 2008). Going further, however, Barden and Petty (2008) also directly manipulated people’s perceptions that they had thought carefully about the available information, independent of how much they actually thought. The results showed that this direct manipulation of the perception itself affected people’s reports of attitude certainty. Other studies have used similar procedures, showing that attitude certainty can be affected by directly manipulating people’s perceptions that they had successfully resisted persuasion (Tormala & Petty, 2002), that attitudes are inherently stable by their nature (Petrocelli, Clarkson, Tormala, & Hendrix, 2010), that a majority of other people held the same attitude (Clarkson, Tormala, Rucker, & Dugan, 2013; Tormala, DeSensi, Clarkson, & Rucker, 2009), that their attitude has a moral basis (Luttrell, Petty, Briñol, & Wagner, 2016), and that their attitude-related thoughts came to mind easily (Haddock, Rothman, Reber, & Schwarz, 1999). These perceptions all affected certainty even though people were randomly assigned to conditions, so there was no objective basis to the perception.

It is clear that despite the effects that many objective attitude-relevant variables have on certainty, subjective perceptions of those variables are perhaps most important. Even further, however, the influence of these subjective perceptions can depend on other beliefs (Petty et al., 2007). That is, people infer certainty from their perceptions of these other attitude qualities, but that inference process depends on what the individual thinks that quality means. As an example, consider the case of accessibility as an origin of
certainty. More accessible attitudes (indicated by reporting the attitudes especially quickly) are held with greater certainty (Krosnick et al., 1993; Bassili, 1996), manipulations that affect objective accessibility also affect certainty (e.g., Berger & Mitchell, 1989; Holland et al., 2003), manipulations of accessibility affect certainty through corresponding effects of the perception that one’s attitude comes to mind easily (Kopp, 2010), and manipulating the perception of ease independent of objective accessibility affects attitude certainty (Haddock et al., 1999). Overall, these effects are likely due to the belief that we must be really sure of an attitude if it comes to mind very quickly. However, this is not the only possible belief a person can have about accessibility. Some people can instead believe that it is bad to come to a conclusion so quickly. Indeed, when people perceive that their attitude came to mind relatively quickly (vs. slowly), they then express greater confidence in their attitude, but only if they also believed that gut reactions were especially trustworthy. For people who believed that thoughtful judgments were more valid, confidence was greater when they perceived that their attitude came to mind relatively slowly (vs. quickly; Tormala, Clarkson, & Henderson, 2011; see also Briñol, Petty, & Tormala, 2006; Haddock et al., 1999; Tsai & McGill, 2011).

Other studies have similarly documented the importance of individuals’ beliefs (or “lay theories”) in the relationships between various attitude-relevant variables and attitude certainty. For example, perceiving oneself to have successfully resisted persuasion leads to increased certainty only if the person views resistance positively (e.g., it demonstrates intelligence and independent thinking) but not if he or she views it
negatively (e.g., it demonstrates lack of insight and closed-mindedness; Rydell, Hugenberg, & McConnel, 2006). As another example, when people form attitudes following a very effortful, depleting task (vs. a simpler task), they hold those attitudes with greater certainty because the depleting nature of the first task makes them feel as though they thought very carefully about the attitude-relevant information, even though the initial depletion did not affect objective amount of thought (Wan, Rucker, Tormala, & Clarkson, 2010). This effect, however, was shown only to emerge when people believed that feeling depleted meant that they had thought a lot about the information. When they instead believed that feeling depleted meant that they were less thorough in their processing of the information, depletion (vs. non-depletion) led to reduced certainty. Finally, perceived social consensus led to greater certainty for people who saw it as a means to find belonging in a group, whereas perceived social consensus undermined certainty for people who saw it as a threat to their uniqueness (Clarkson et al., 2013).

In sum, these studies illustrate that certainty is a function of both (a) the perceived qualities of an attitude and (b) the subjective meaning of those qualities.

**Perceived Reasons for Certainty.**

It is clear by now that there are a variety of potential origins of attitude certainty. People can be confident for many reasons, and subjective perceptions play a major role in the development of certainty. The present research aims to go a step further, proposing that not only does confidence have its origins in this variety of perceived attitudinal features, but people can also introspect and form perceptions of the reasons why they are certain of a particular attitude. That is, a person can answer questions like “Why are you
so sure?” It is possible, however, that the answer to this question is an inaccurate reflection of the person’s true bases of confidence. A person might fail to acknowledge that something is a reason for his confidence because he is unaware of its influence. Similarly, a person might perceive that his certainty springs from something that is not true (e.g., believing that his certainty came from giving the topic considerable though when he has not actually deeply considered the issue). Regardless of their accuracy, it is plausible that these perceived bases still have some impact on certainty-relevant outcomes, just as (sometimes inaccurate) perceptions of other attitude features have an impact on certainty itself.

The effects that these perceived confidence bases can have likely depend on people’s beliefs about them. That is, just as perceived ease can have different effects depending on whether people see it as a positive or a negative (Briñol et al., 2006; Tormala et al., 2011; Tsai & McGill, 2011), the perception that one’s confidence is based on the attitude’s accessibility may have different effects depending on whether that basis is seen as a relatively legitimate reason for being confident or not. Thus, the present research proposes that the reasons people perceive for their sense of certainty in an attitude vary in how strong they are believed to be as bases for confidence. For example, someone might be very certain that a system of universal healthcare is a good thing, and she may perceive that certainty as coming from the many hours she spent carefully thinking through this issue. Many people would likely see this as a strong reason to be confident in this attitude. On the other hand, someone else might also be very certain that a system of universal healthcare is a good thing, but this person may perceive that
certainty as coming from his preference to hold all of his opinions with complete conviction (i.e., “I am a confident person”). In this case, many people would likely see this as a relatively flimsy reason to be confident in this particular attitude.

At this point, we suggest that there are some reasons for certainty that are normatively viewed as relatively strong reasons and others that are normatively viewed as relatively weak reasons. This is not to say that people do not vary in their beliefs about the legitimacy of these various confidence bases. Rather, the point is that on average, there are some confidence bases that tend to be seen as strong or weak and thus carry with them relatively consistent consequences. Of course, if people do perceive different reasons for being certain and these reasons vary in their perceived strength, it is only natural to wonder, “does it matter?” To address this important question, the present research focuses on one of certainty’s key consequences: resistance to persuasion.

The Process of Resisting Persuasion

In general, the more confident people are in their attitudes, the less likely they are to change their opinion when presented with persuasive information (cf. Clarkson et al., 2008). By studying the conditions under which a message fails to have its intended persuasive effect, research on resistance to persuasion has shed light on persuasion processes in general. McGuire (1964) conducted some of the earliest work on resistance to persuasion, showing that people are better prepared to defend a belief in the face of strong persuasive arguments if they are first given the opportunity to defend the belief against a weaker attack. In the years since, research on persuasion resistance has
expanded to encompass numerous accounts of the causes and consequences of resistance (see Knowles & Linn, 2004b).

Resistance to persuasion, however, can be defined at different levels. Perhaps the most basic approach is to define resistance as an outcome whereby resistance is indicated by the extent to which attitudes are influenced by a persuasive message (Knowles & Linn, 2004a; Wegener, Petty, Smoak, & Fabrigar, 2004). By this approach, predictors of resistance are those that relate to relatively little influence of a message on one’s attitude.

Alternatively, resistance can be considered at the process level. That is, although two people may evince an identical amount of resistance at the outcome level (no discernible attitude change following a persuasive message), they may have resisted by different means. Just as attitude change can occur through different means (e.g., Petty & Cacioppo, 1986), so too can the lack of attitude change. For example, Eagly and Chaiken (1995) proposed a difference between active and passive resistance. The former is characterized by careful attention to counterattitudinal information in an effort to directly counterargue it, and the latter is characterized by selective exposure processes, whereby a person simply ignores the counterattitudinal information altogether. Similarly, Wegener et al. (2004) proposed that one can resist persuasion through either thoughtful or nonthoughtful means, paralleling the thoughtful and non-thoughtful routes to persuasion inherent in theories such as the elaboration likelihood model (Petty & Cacioppo, 1986). Research on the effects of regulatory depletion (i.e., a form of fatigue that follows effortful self-control) have also suggested a division between effortful and noneffortful resistance processes. This work finds that depletion inhibits resistance when resistance is
effortful but not when it is relatively easy (Burkley, 2008; Wheeler, Briñol, & Hermann, 2007).

Beyond categorizing resistance processes into thoughtful and nonthoughtful, some have suggested that there are a number of more specific, individual strategies that people can use to resist persuasion. These strategies can be combined to resist a persuasive message, and individuals can differ in their propensities to use and to anticipate using them (Briñol, Rucker, Tormala, & Petty, 2004; Fransen, Verlegh, Kirmani, & Smit, 2015; Jacks & Cameron, 2003). Jacks and Cameron (2003) identified seven such strategies that can be used in resisting persuasion and that have been examined in resistance studies throughout the literature.

By far the most thoughtful approach to resistance—because of its demands to process the message and scrutinize its contents—is that of counterarguing, which is characterized by directly addressing and refuting an argument advanced by the persuasive message. This strategy has long been of interest in persuasion research (Brock, 1967; Festinger & Maccoby, 1964; McGuire, 1964; Petty & Cacioppo, 1977; Miller & Baron, 1973; Xu & Wyer, 2012; Zuwerink & Devine, 1996). The relatively thoughtful nature of counterarguing is supported by evidence that it can be disrupted under conditions that limit effortful thought (e.g., Petty, Wells, & Brock, 1976), whereas other resistance strategies—like source derogation (see below)—occur more under conditions of low thought (e.g., Jeong & Hwang, 2012; Meirick, 2002; Wheeler et al., 2007; Wright, 1974). Attitude bolstering is another relatively thoughtful strategy, but because it involves coming up with arguments that support one’s initial attitude but that do not directly
address the arguments advanced in the message (Lydon, Zanna, & Ross, 1988; Sherman & Gorkin, 1980; Tannenbaum, Macauley, & Norris, 1966; Xu & Wyer, 2012), it is still somewhat less effortful than counterarguing, though still susceptible to disruption (Petty et al., 1976).

Other less thoughtful strategies, due to their avoidance of directly engaging with and considering the counterattitudinal information itself, include source derogation, by which the validity of the message is discounted by finding fault in its author(s) (Festinger, 1957; Tannenbaum et al., 1966; Wright, 1973, 1975); social validation, by which one reminds oneself of others who agree with the initial attitude (Festinger, 1954, 1957); assertions of confidence, by which one merely asserts that nothing could ever change one’s mind (Jacks & Cameron, 2003); negative affect, by which one responds to the message by getting upset (Jacks & Devine, 2000; Zuwerink & Devine, 1996); and selective exposure, by which one actively avoids processing any counterattitudinal components of the message (Albarracín & Mitchell, 2004; Brock & Balloun, 1967; Freedman & Sears, 1964; Pomerantz et al., 1995; Sears & Freedman, 1967).

**Research Overview**

In light of these various ways of resisting persuasion, the present research proposes that people’s perceived reasons for certainty are associated with how they resist persuasion. First, it is possible that the stronger a person’s perceived reasons for certainty, holding degree of certainty constant, the more likely that person is to resist persuasion via thoughtful (vs. nonthoughtful) means. To make these predictions more concrete, imagine two people who are both very sure that they support Hillary Clinton as the Democratic
presidential nominee. Person A has (or believes she has) relatively strong reasons to be sure of this opinion whereas Person B has (or believes he has) relatively weak reasons to be sure of this opinion. If someone else were to then present these individuals with arguments claiming that Clinton is instead a poor choice, we expect that each person’s high overall certainty would generally prompt them to resist attitude change; however, they would differ in how they resisted. Person A would respond to these arguments by thoughtfully considering and refuting them (counterarguing) whereas Person B would respond less thoughtfully, perhaps by tuning out the message or derogating its source. Because Person A believes there are strong reasons to be certain, she may also believe that she is capable of effectively counterarguing the message and therefore is motivated to do so (Albarracín & Mitchell, 2004). Although Person B is equally certain and motivated to resist, because he believes that his reasons to be confident are weak and counterarguing would be difficult, a less effortful resistance strategy is chosen.

Some prior work has hinted at this pattern by comparing the outcomes predicted by distinct attitude strength indicators. For instance, on the basis of factor analyses, Pomerantz, Chaiken, and Tordesillas (1995) categorized attitude strength indicators as “embeddedness” (i.e., linking one’s attitude to one’s self) and “commitment” (i.e., remaining firmly committed to one’s attitude). Although higher levels of embeddedness and commitment similarly predicted greater resistance to persuasion, commitment specifically predicted biased resistance processes (e.g., selective elaboration), and embeddedness predicted unbiased resistance processes (e.g., information seeking). Although this work dealt with different attitude strength antecedents, it seems just as
plausible that the perceived bases for the same strength antecedent could have these differential effects as well. Just as different categories of attitude strength dimensions can produce the same outcome through different means (Visser et al., 2006), so too might different perceived bases of certainty reach certainty-related outcomes through different processes. In fact, it may be that embeddedness corresponds to thinking that one has strong reasons to be certain. The items making up embeddedness pertained to the attitude’s connection to a persons’ self, values, and knowledge. Commitment, by contrast, may correspond to sheer certitude without the perception of any strong underlying bases (even perceiving weak bases). The items making up commitment were extremity, likelihood of change, and belief that the person’s opinion was “right.” If this is the case, it provides further support that perceiving strong and weak bases for certainty can determine the means by which a person resists persuasive communications.

Even if strong and weak perceived confidence bases have the predicted effects on how people respond to counterattitudinal persuasive messages, it is unclear how influential they will be for resistance as an outcome. At a minimum, it is plausible that perceiving weaker reasons for one’s certainty will be associated with less thoughtful responses to the message even if the person resists persuasion to the same extent as someone who perceives having stronger reasons for certainty. This is consistent with the patterns found by Pomerantz et al. (1995) and with resistance being conceptualized separately as a process and an outcome, as reviewed above. However, if a person perceives himself to have weak (vs. strong) reasons for certainty, the effect may be impactful enough that he not only fails to counterargue the message but also changes his
attitude to be more in line with the message’s position. That is, if he actually confronts the weakness of the reasons he thinks underlie his confidence, he may become more accepting of the persuasive information and/or more doubtful of his initial opinion.

Finally, it is worth considering the possibility that people’s perceived reasons for certainty will have a different effect altogether. That is, people who think that they have relatively strong reasons for certainty may experience a kind of “secure certainty” that makes them unmotivated to expend much effort on counterattitudinal information. Because they know that their confidence rests on relatively strong bases, they might avoid effortful counterarguing and instead maintain their opinion by responding with less thoughtful strategies. On the other hand, people who think that they have relatively weak reasons for certainty may experience “insecure certainty” and feel the need to bolster their confidence by thoughtfully counterarguing the persuasive message. Thus, the primary goal of the present research is to test whether stronger perceived reasons for certainty are associated with more thoughtful or with less thoughtful responses to counterattitudinal persuasive information.

Beyond testing the direction of the relationship between perceived reasons for certainty and thoughtful resistance to persuasion, the present research has two additional goals. First, a goal was to examine whether the effects of perceiving specific confidence bases was actually due to people’s own perceptions that their reasons for certainty are relatively strong or weak. Although specific perceived bases for confidence might be associated with the resistance process because of various quirks of the individual bases, we expect that the effects are instead driven by people’s own beliefs that their reasons for
certainty are relatively strong or weak bases for confidence. This hypothesis is conceptually similar to the prior work on attitude certainty showing that some variables only boost certainty when they are believed to be legitimate signs of confidence (e.g., Tormala et al., 2001, 2006; Rydell et al., 2006). To test this key mechanism, we directly measure how strong people think their reasons for certainty are. If this perception of reason strength is indeed an important factor in the resistance process, then perceiving a stronger basis for confidence should be associated with the process of resistance, independent of any specific basis for confidence and holding the level of confidence constant.

Second, we wanted to test whether any differences in the resistance process observed were ultimately consequential. One possibility, noted above, is that the process of resistance would relate to the degree of resistance; more thoughtful resistance could lead to less attitude change. Another possibility is that more thoughtful resistance to a persuasive message would result in attitudes that are indistinguishable from those that result from non-thoughtful resistance. Third, it is possible that the thoughtfulness of resistance stemming from differential bases of attitude certainty would relate to the confidence with which post-message attitudes are held, even if the degree of resistance is the same. This is because more thoughtful resistance processes would encourage greater elaboration on their attitudes and the perception that they can successfully resist persuasion through quality counterarguing, both of which have been shown to strengthen attitudes (Petty, Haugtvedt, & Smith, 1995; Tormala & Petty, 2004).
Notably, our focus in this research is on people’s reasons for certainty, and as such, we consider various attitudes marked by relatively high certainty. Our approach is thus to consider the effects of confidence bases, holding confidence itself constant at a relatively high level. We chose to focus on certainty (vs. doubt) for several reasons. First, by default, people tend to be relatively certain of their attitudes. That is, by holding an opinion, a person is likely to be at least somewhat confident in it (cf. Gilbert, Krull, & Malone, 1990). Second, confidently held attitudes are especially worthy of study because, as reviewed earlier, they are the ones upon which people are most likely to act (see Rucker et al., 2014). Finally, given our other focus on various strategies for resisting persuasion, it makes sense to pay particular attention to attitudes that people are most likely to defend (i.e., confidently held attitudes) to provide the greatest opportunity to observe various ways of resisting persuasion. We return to this point in the general discussion (Chapter 6), however, and consider the potential effects of people’s reasons for doubt.

Our set of research questions were tested in eleven studies. Studies 1 – 3 were designed to explore people’s perceived bases for confidence. In these studies, people provided the reasons why they thought they were sure of various opinions (Study 1), rated how much each of a set of reasons characterized their own attitude certainty (Study 2), and evaluated the strength of a set of possible confidence bases (Study 3). The perceived reasons for certainty identified in these initial studies (and their corresponding perceptions of strength) were used as the basis for the measures and manipulations in the subsequent studies.
Studies 4 – 6 examined the primary question of how strength of the perceived reasons for certainty would be related to the thoughtfulness of resistance to counterattitudinal information. In Studies 4 and 5, participants were given strong and weak possible reasons for certainty, taken from the prior studies, and reported how much each of them corresponded to their own reasons for being sure of a particular attitude. In Study 6, we manipulated which set of reasons on which people thought their confidence was based. Each study then examined how people engaged with a counterattitudinal persuasive message to see how thoughtful their responses were. Study 7 aimed to replicate the previous effects but also test the hypothesis that the effects on resistance processes were ultimately consequential, assessing people’s certainty in their attitudes following the message in addition to their intentions to engage in attitude-relevant behaviors.

Study 8 (Chapter 4) aimed to conceptually replicate the key finding in the context of a particularly relevant topic—attitudes toward the 2012 U.S. presidential candidates. This study incorporated additional ways to assess people’s reasons for certainty as well as how thoughtfully they would resist persuasion.

Finally, Studies 9 – 11(Chapter 5) were intended to test the hypothesis that the effects observed in the earlier studies are due (at least in part) to the direct perception that one’s reasons for certainty are strong vs. weak, independent of any specific bases. By measuring (Studies 9 and 10) and manipulating (Study 11) perceptions of reason strength, these data extend the results of the preceding studies by highlighting the importance of
believing that one’s confidence is based upon a foundation that is relatively strong or weak.
Chapter 2: Exploring People’s Reasons for Being Certain

The first step in this research was to explore the reasons that people think underlie their attitude certainty. Although a variety of variables have been identified as actual determinants of certainty, no work has yet considered the variables that people think contributed to their sense of certainty. Presumably, though, people think about the origins of their confidence. When a person expresses great confidence in an assertion, one response is to ask, “What makes you so sure?” The person can then respond in a variety of ways, but the potential responses (and the degree of variety itself) remains unexamined in attitude strength research.

On the one hand, it is possible that people vary widely in the bases that they perceive underlie their attitude certainty. They may cite reasons ranging from the thoughtful to the emotional, and these reasons may encompass those that people would call legitimate and those that people would say are weak bases for confidence. On the other hand, it is possible that people generally cite only a few reasons for certainty that appear to be legitimate bases. For example, perhaps nearly everyone’s answer to the question “What makes you so sure?” is: “I’m sure because I’ve given this a lot of thought!”

The studies in this chapter aimed to better understand the perceived bases of attitude confidence using several approaches. Study 1 simply asked people to provide the
reasons for certainty with respect to a few specific attitude objects. Study 2 followed up by providing people with a list of potential reasons for certainty and asking them how much each one was a reason for their own certainty. Finally, Study 3 aimed to understand whether people perceive the variety of confidence bases as varying in their strength as reasons for certainty. In addition, these studies explicitly considered a broad range of attitude objects to generalize the results beyond any single issue.

**Study 1**

For the first exploration of people’s perceived reasons for attitude certainty, we simply asked a relatively small group of people to write a brief explanation of why they held an attitude with a particular degree of confidence. The aim was to get a sense of whether people listed few or many different reasons for being certain as well as the types of reasons people provide and whether there were any common themes across the responses.

**Method**

**Participants.** Participants in this study consisted of 58 undergraduate students at Ohio State University ($M_{age} = 19.03, SD = 2.56, 41.4\%$ male) who participated in partial fulfillment of a course requirement. Sessions were conducted in a computer lab in groups of one to ten participants at a time. Dividers between computers prevented participants from seeing each other’s computer screens.4

**Procedure.** At the beginning of the study, all participants were told that they would be participating in a study that looks at the characteristics and structure of social,

---

4 Analyses of these data have also been presented in Belding, Wagner, Luttrell, and Petty (2010).
political, and consumer attitudes.” Participants completed a brief survey in which they indicated their attitudes and corresponding certainty regarding the following topics: Barack Obama, the football team at their university, Diet Coke, and recycling. After each rating of certainty, participants were asked to “please explain why you assigned the certainty rating that you just did regarding your attitude toward [attitude object].” These instructions clarified that participants were not to “include reasons why you like/dislike [him/it] but rather reasons why you are convinced that number represents your true feelings of certainty.”

**Response Coding.** A number of categories were identified based on prior research on attitude certainty and on patterns identified in participants’ responses. The full coding scheme is presented in Table 1. This table presents all coding categories, a description of how a response was to be coded as that category, and an example of each category drawn from participants’ actual responses. All coding was done by two raters who resolved any discrepancies via discussion.

**Results**

In three cases (once for “recycling” and twice for “Diet Coke,” participants did not provide a written reason for their attitude certainty. Table 2 presents the percentages of valid responses within each topic that were coded as each of the identified categories.

Across topics, the most common types of reasons that people provided pertained to their knowledge about the topic ($M = 32.70\%$ of provided reasons) and to their direct

---

5 Certainty was reported on 7-point scales anchored at “not at all certain” and “completely certain.” In general, certainty was relatively high for attitudes toward Diet Coke ($M = 6.09, SD = 1.19$), the university football team ($M = 6.02, SD = 1.26$), and recycling ($M = 6.14, SD = 1.19$), although certainty was more moderate for attitudes toward Barack Obama ($M = 4.81, SD = 1.64$).
experience with the topic ($M = 22.04\%$ of provided reasons). By contrast, the least common types of reasons that people provided were bodily responses and power—neither of which was mentioned by any participant.

One can also observe that different types of reasons appeared more often for different topics. For example, direct experience was a relatively common reason for confidence about Diet Coke attitudes (50% of all responses were coded as “experience”) but a relatively uncommon reason for confidence about Barack Obama attitudes (5.17% of responses were coded as “experience”). As another example, “interest” was a more common reason for certainty for attitudes about students’ university football team (15.52%) than for attitudes about Diet Coke, Obama, and recycling ($M = 2.92\%$).

**Discussion**

These preliminary data demonstrated that people freely report a range of bases underlying their attitude certainty, although some types are more common than others. Study 1 also established that people are capable of providing such confidence bases across a range of topics. Nevertheless, these data offer a first glimpse at the phenomenon of perceived reasons for certainty. It is possible that the introspective exercise that characterized Study 1 obscured some reasons for certainty that people might endorse once prompted to consider them. Study 2 thus aimed to further explore people’s perceived bases for attitude certainty by providing people with possible reasons for certainty and asking how much they informed their own sense of certainty.

---

6 Notably, these data were collected in 2009—shortly after Obama’s 2008 election, and it is much easier to have personal experience with a consumer product than a presidential candidate.
Study 2

Although Study 1 showed that people report a variety of reasons for their attitude certainty, Study 2 aimed to extend those findings by assessing perceived confidence bases with a different measure. Specifically, Study 2 implemented a series of questionnaire items to measure people’s perceived reasons for attitude certainty across a range of topics.

The goal of this study was simply to explore the variability of people’s endorsement of various potential certainty bases. It is possible that when presented as survey items, a few particular bases would be highly endorsed and others would receive no endorsement. Alternatively, it is possible that when an assortment of potential reasons for certainty are presented, they all receive some endorsement at least some of the time.

Method

Participants. One-hundred thirty-eight Ohio State University undergraduates ($M_{age} = 19.03$, 41.4% male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted in a computer lab in groups of one to ten participants at a time. Dividers between computers prevented participants from seeing each other’s computer screens.  

Procedure. Each participant responded to questions about three different topics. These topics were organized into blocks, and participants were randomly assigned to block. As a result, one group of participants responded to questions about their university’s football team, Windows Vista, and applying for college. Another group

---

7 Analyses of these data have also been presented in Belding, Wagner, Luttrell, and Petty (2010).
responded to questions about drawing, health care reform, and hockey fans. The third group responded to questions about Hillary Clinton, gay marriage, and the iPhone. These topics were always presented in these orders, and the questions themselves were the same for each topic.

For each topic, participants first reported their attitudes and then reported their certainty. Next, they responded to a series of potential reasons for attitude certainty, adapted from the coding scheme of Study 1. Once they were done responding to questions about one topic, they would move on to the next topic.

**Measured Variables.**

*Attitudes.* Participants rated their attitudes toward each topic using 7-point scales anchored at “dislike a great deal” and “like a great deal.”

*Attitude Certainty.* After indicating their attitudes all participants reported their certainty by responding to the question: “how certain are you in your attitude about [x]?” Responses were provided on 7-point scales anchored at “not at all certain” and “completely certain.”

*Perceived Reasons for Certainty.* To assess participants’ perceived reasons for certainty, we provided a set of potential confidence bases, adapted from the coding scheme used in Study 1. See Appendix C for a full list of items. For each basis, participants indicated how much it affected their attitude certainty on 7-point scales anchored at “not at all” and “a great deal.”

**Results**
Overall, degree of attitude certainty was relatively high across topics (see Table 3). Table 4 presents the means and standard deviations for each certainty basis for each topic. Observing this table reveals that each basis was endorsed to some extent and that people show variability in their endorsement of these reasons for certainty. The most endorsed reason for certainty across all of the topics, on average, was interest in the topic, and the least endorsed was one’s bodily responses to the topic. The most endorsed reason varied by topic, however. For example, for Windows Vista and the iPhone, the most endorsed reason for being certain was knowledge about the product. For drawing, it was experience, and for gay marriage, it was personality.

Discussion

The goal of Study 2 was to further explore the variability of people’s perceived reasons for attitude certainty, as assessed using scale response survey items. The results reflect variability in responses and suggest that people readily endorse a variety of reasons for their attitude certainty, across a diverse array of topics. However, it remains unclear whether people view these individual reasons for certainty differently, even if they are willing to endorse them as bases for their own confidence. Study 3 aimed to address this question by assessing whether these various reasons for certainty, which people openly report and readily endorse, vary in how strong people think they are as bases of confidence.

Study 3

Recall that the key hypotheses for this program of research pertain to the differential effects of having relatively “strong” vs. “weak” reasons for certainty. To this
point, Studies 1 and 2 have only documented that people perceive a variety of reasons for their attitude certainty. It is possible that these reasons are not consistently seen as “strong” or “weak.” For example, some people might see “knowledge” as a very strong reason to be confident whereas other see it as a very weak reason to be confident. In contrast, there may be agreement on the strength of these confidence bases. That is, perhaps people generally agree that “knowledge” is a strong reason to be confident, and they also generally agree that “emotion” is a weak reason to be confident. Study 3 thus aimed to test whether a collection of confidence bases reliably differ in whether people view them as relatively strong or weak reasons for certainty.

Method

Participants. One-hundred fifty-five participants were recruited using Amazon.com’s Mechanical Turk program ($M_{age} = 35.46$, $SD = 11.81$, 53.5% male). They completed this survey online in exchange for monetary compensation.

Procedure. Participants read a series of statements reflecting a reason a person might give for having confidence in an opinion (e.g., “I am certain because I have thought a lot about this issue”). These items were adapted from the confidence bases coded in Study 1 and measured in Study 2. Several new potential confidence bases (e.g., the time of day and that day’s weather) were added in order to represent plausible bases that were also likely to reflect especially weak reasons to be certain. See Appendix D for a full list of items used in this study. Participants reported how strong or weak each statement seemed as a reason to be certain using 7-point scales anchored at “very weak reason for certainty” and “very strong reason for certainty.”
Results

See Table 5 for each confidence basis’ mean perceived strength.

Discussion

The data from Study 3 provide evidence that a collection of individual reasons for certainty are perceived as differentially strong bases of confidence. These ratings will serve as the basis for the measurements and manipulations in the studies that follow. That is, these ratings identify several individual confidence bases as relatively “strong reasons for certainty” (e.g., knowledge and thinking) and other individual confidence bases as relatively “weak reasons for certainty” (e.g., the time of day and one’s personality).

Notably, however, when the following studies refer to such confidence bases as being “strong” or “weak,” we mean that they are perceived to be strong or weak reasons for certainty, as indicated by these data. At this point, we make no strong claims about what makes a basis for confidence relatively weak or strong—only that this variation exists and that it is likely to predict how people go about resisting persuasive influence. Henceforth, when we refer to people “endorsing strong over weak reasons for their attitude certainty,” we mean that they rate confidence bases like those seen as being stronger reasons for certainty in Study 3 as more consistent with their own perceived bases of confidence than confidence bases that were seen as weaker reasons for certainty. Likewise, when we use the term “strong reason for certainty,” we are referring to strength as it relates to these ratings and not necessarily to any particular feature of a given reason itself.
Chapter 3: Reasons for Certainty and Resistance to Persuasion

Studies 1 – 3 illustrated the variety of reasons that people think underlie their attitude certainty, across a range of topics. Having demonstrated that some of these reasons tend to be seen as relatively strong bases for confidence and others tend to be seen as relatively weak bases, the next step is to examine whether these reasons have implications for persuasion resistance processes. That is, what are the effects of perceiving strong vs. weak reasons for one’s attitude certainty?

Recall that the major predictions of this program of research are that having stronger reasons for being sure of an attitude will be related to responding more or less effortfully to counterattitudinal persuasive messages. People who perceive strong bases for their confidence, compared to those who perceive weak bases, should thus engage more or less thoughtfully with these persuasive messages and resist their influence through relatively effortful strategies—namely, counterarguing. Studies 4 – 7 examine the same resistance processes by measuring people’s endorsement of strong and weak reasons for certainty (Studies 4, 5, and 7) and by manipulating the bases that people think underlie their confidence (Study 6).

Study 4

In the first study, we used a simple paradigm to initially examine whether stronger perceived reasons for certainty would predict more or less thoughtful engagement with a
counterattitudinal persuasive communication. In particular, we considered a topic about which participants were likely to have confidently held positive attitudes: recycling. To assess the strength of their certainty bases, we provided a collection of potential reasons for certainty drawn from the strong and weak bases identified in Study 3. Responses to those items could then be used to predict responses to an anti-recycling persuasive message.

As a first step toward examining thoughtful responses to persuasion, we simply asked participants to report how much they had counterargued a persuasive message as they read it. Similar self-report measures have been used in the past as a proxy for how much people generated counterarguments in response to a persuasive message (e.g., Jeong & Hwang, 2012; Nabi, Moyer-Guse, & Byrne, 2007; Silvia, 2006; Tormala & Petty, 2002). As an additional measure of thoughtful engagement with a counterattitudinal message, we also recorded the amount of time that participants spent reading the arguments (for similar uses of this reading time variable, see Edwards & Smith, 1996; Lau, Smith, & Fiske, 1991; Ronis et al., 1977; Pratkanis & Greenwald, 1993).

In sum, this study examined whether, controlling for degree of certainty, increasing endorsement of strong over weak reasons for certainty would relate to (a) the time people spend reading a counterattitudinal persuasive essay and (b) how much they perceive themselves to have counterargued. However, because degree of certainty typically correlates positively with resistance to persuasion overall (e.g., Bassili, 1996)

---

8 It is also worth noting that people’s recycling attitudes were unlikely to be very ambivalent, which could have undermined certainty’s effect on resistance (Clarkson et al., 2008).
we did not necessarily expect perceived reasons for that certainty to predict extent of attitude change when degree of certainty was controlled.

**Method**

**Participants.** Ninety-nine Ohio State University undergraduates ($M_{age} = 19.46$, 59.6% male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted in a computer lab in groups of one to ten participants at a time. Dividers between computers prevented participants from seeing each other’s computer screens.⁹

Sample size was based primarily on feasible data collection opportunities and on estimates of having enough participants to estimate the relationship between perceived reasons for certainty and the outcomes of interest. With no indication of the target effect sizes, we decided that $N = 100$ was a reasonable sample size for this study. Power analyses found that recruiting 100 people would result in .80 power to detect an effect of $f^2 = .08$ (at $\alpha = .05$), which is a small – medium effect.¹⁰

**Procedure.** Upon agreeing to enroll in the study, participants indicated their attitudes toward recycling and the degree of certainty with which they held their attitudes. The next set of instructions explained that the researchers were interested in the reasons people have for holding an attitude with a particular degree of certainty. Participants then responded to a series of items drawn from the previous studies, indicating the extent to which a particular variable (e.g., amount of time spent thinking about recycling issues,

---

⁹ Analyses of these data have also been presented in Luttrell, Briñol, & Petty (2014, 2016).
¹⁰ All power analyses in this dissertation were conducted using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009).
time of day, etc.) affected their reported certainty. These items were intended to represent relatively strong or relatively weak reasons to be certain.

Following the items assessing reasons for certainty, participants read a short essay purportedly written by a national group for “environmental information research” arguing against the value of recycling. The essay arguments were of moderate strength to provide a message that was persuasive but not so persuasive as to eliminate participants’ ability to counterargue. Reading time for the essay was recorded. After reading the essay, participants again indicated their attitudes toward recycling and responded to questions related to how they believed they had dealt with the persuasive message.

**Predictor Variables.**

**Pre-message Attitudes toward Recycling.** Initial attitudes toward recycling were assessed on three 9-point semantic differentials anchored at negative-positive, bad-good, and dislike-like. These items showed good internal reliability ($\alpha = .94$) and were thus averaged to form an index of attitudes toward recycling with higher scores indicating more positive attitudes. As expected, participants, on average, came into the study with very positive attitudes toward recycling ($M = 8.21$, $SD = 1.01$). Because we were presenting participants with messages arguing against recycling, we dropped one participant whose score on the attitude index was below the midpoint on the scale (i.e., for whom the message would be somewhat pro-attitudinal). Excluding this participant, however, does not alter the statistical significance of the reported results. Nevertheless, we maintained this exclusion criterion across all studies.
Pre-message Attitude Certainty. Attitude certainty was assessed using three 6-point scales: “How confident are you in your attitude toward recycling?” (completely unconfident—completely confident), “How sure are you that your attitude toward recycling is correct?” (completely unsure—completely sure), and “How certain are you of your attitude toward recycling?” (completely uncertain—completely certain). The three items assessing certainty in recycling attitudes were found to be reliable (α = .91), so they were averaged together to form a single index of attitude certainty (M = 4.80, SD = .87).

Reasons for Certainty. The study provided instructions explaining that the researchers were interested in knowing the reasons behind the amount of certainty people express and asked participants to indicate the extent to which a series of variables influenced their reported degree of attitude certainty regarding recycling. Items were framed as descriptions of reasons themselves (e.g., “How much I’ve thought about recycling” or “What the weather is like today”). Responses were indicated on a 7-point Likert-type scale anchored at “Did not at all influence how sure I am” and “Strongly influenced how sure I am.”

Consistent with the results of Study 3, “strong” reasons included the amount of time spent learning about recycling, the amount of the person’s prior knowledge about recycling, and how much the person had thought about recycling. By traditional criteria, the reliability of these three items is good (α = .69), and because these items tap a range of variables that were intended to represent strong reasons for certainty, they were averaged to form a single measure of tendency to endorse strong reasons for certainty. Weak reasons for certainty included the time of day during which the study was
completed, the time of year at the time of participation, and the day’s weather. These three items demonstrated good reliability ($\alpha = .82$) and were thus averaged to form a single measure of tendency to endorse weak reasons for certainty.$^{11}$

To create a single measure of whether participants thought their certainty was based more on strong reasons or weak reasons, a variable was computed by subtracting average endorsement of weak reasons from the average endorsement of strong reasons. Thus, higher scores on this measure indicate the tendency to endorse strong over weak reasons for certainty. Negative values on this measure indicate the tendency to endorse weak over strong reasons.$^{12}$ This approach of taking a difference score mirrors an analytic strategy frequently used in the literature on affective vs. cognitive attitude bases (e.g., See, Fabrigar, & Petty, 2013; See, Petty, & Fabrigar, 2008).

**Dependent Variables.**

*Post-message Attitudes toward Recycling.* Attitudes after reading the message were measured using the same scale as the pre-message attitude reports. Responses again demonstrated good internal reliability ($\alpha = .97$), so they were averaged to form an index of attitudes toward recycling after reading the persuasive message ($M = 7.28, SD = 1.52$). A within-subjects t-test reveals that the persuasive message was influential on average; pre- and post-message attitudes are significantly different, $t(99) = 7.72, p < .001$.

---

$^{11}$ Results of a within-subject t-test showed that overall, participants were more likely to endorse strong reasons for certainty ($M = 4.25, SD = 1.29$) than weak reasons ($M = 2.15, SD = 1.35$), $t(99) = 11.58, p < .001$. A simple correlation analysis failed to show evidence of a correlation between endorsing strong reasons and endorsing weak reasons for certainty, $r(98) = .06, p = .53$.

$^{12}$ See Appendix E for analyses that treat “strong” and “weak” reasons separately in a regression model instead of combined into a composite. This appendix summarizes these analyses for all studies in this dissertation that examined self-reported reasons for certainty and message counterarguing.
**Reading Time.** The computer recorded how much time, in milliseconds, that a participant spent on the screen containing the essay arguing against recycling before advancing to the next stage of the experiment. Participants were not constrained in how long they could spend reading the essay and were free to advance to the next part of the experiment whenever they were ready. For ease of interpretation, reading time units were converted to seconds.

**Perceived Thoughtful Resistance.** To measure the extent to which participants thought they had engaged in thoughtful resistance to persuasion, participants responded to questions written to capture the experience of thoughtful resistance via counterarguing. Specifically, participants were asked “How successful do you think you were in finding flaws in the arguments in the message you read?” and “How successful do you think you were in critically evaluating the quality of evidence in the message you read?” Responses were given on 7-point scales anchored at “very unsuccessful” and “very successful.” Because responses to these two questions showed good internal reliability, $\alpha = .65$, they were averaged to form a single measure of thoughtful resistance processing.

**Results**

First, the data were submitted to a simple correlation test to assess how much degree of initial attitude certainty related to endorsed reasons for certainty. The composite measure of perceived certainty bases was not correlated with degree of certainty, $r(97) = .10$, $p = .32$. Nevertheless, degree of initial attitude certainty was entered as a covariate in all subsequent analyses to examine effects of perceived certainty bases independent of certainty extremity. Unless otherwise stated, initial attitude certainty
was not significant in any of the following regression models ($p > .10$). Overall, participants were rather certain of their favorable recycling attitudes ($M = 4.81$, $SD = .87$).

**Attitudes.**

To test whether the strength of participants’ self-rated bases for attitude certainty predicted resistance, controlling for actual degree of certainty, data were submitted to a multiple regression analysis, entering the perceived reasons for certainty composite, initial certainty, and initial attitudes simultaneously to predict post-message attitudes. Results support the overall relationship between certainty and resistance: greater certainty was associated with more positive post-message attitudes, controlling for pre-message attitudes, $B = .38$, $t(95) = 2.43$, $p = .02$, 95% CI: [.07, .69]. Initial attitudes were also associated with the post-message attitudes, $B = .66$, $t(95) = 4.47$, $p < .001$, 95% CI: [.37, .95], but above and beyond these other predictors, the strength of a person’s perceived reasons for certainty did not predict post-message attitudes, $B = .05$, $t(95) = .69$, $p = .49$, 95% CI: [-.09, .18].

**Reading Time.**

To assess the relationship between perceived reasons for certainty and the amount of time spent reading the counterattitudinal essay, data were submitted to a multiple regression analysis. This time, the perceived reasons for certainty composite and initial certainty were entered together as simultaneous predictors of the reading time measure. There was a marginal main effect of certainty whereby greater certainty was associated with spending more time reading the message, $B = 8.40$, $t(96) = 1.80$, $p = .07$, 95% CI: [-.82, 17.61], but strength of perceived reasons for certainty also uniquely and significantly
predicted reading time such that increasingly strong perceived bases for certainty was associated with greater time spent reading the counterattitudinal essay, $B = 6.97, t(96) = 3.07, p = .003, 95\% \text{ CI: [2.46, 11.47]}$.

**Perceived Thoughtful Resistance.**

The composite perceived reasons measure and initial certainty were once again submitted to a set of multiple regression analyses predicting self-reported counterarguing. Although there was a significant unique effect of initial attitude certainty such that greater initial attitude certainty was associated with greater perceptions of thoughtful resistance, $B = .32, t(96) = 2.64, p = .01, 95\% \text{ CI: [.08, .56]}$, the measure of stronger perceived reasons for attitude certainty was also uniquely associated with greater perceptions of thoughtful resistance, $B = .19, t(96) = 3.19, p = .002, 95\% \text{ CI: [.07, .31]}$.

**Discussion**

Results of Study 4 replicate past research, showing that greater certainty is associated with greater resistance to persuasion. More importantly, however, results extended these findings, providing evidence for the notion that perceiving relatively strong (vs. weak) reasons for attitude certainty corresponds to more thoughtful engagement with a counterattitudinal message and use of thoughtful approaches to ultimately resist attitude change. Notably, however, despite reporting different amounts of counterarguing, participants did not actually change their attitudes any more or less as a function of how strong their perceived reasons for certainty were.

One key limitation to this study was its reliance on a subjective measure of counterarguing. Although other research has shown that subjective measures of
counterarguing correspond to objectively measured counterarguing in thought listing procedures (Jacks & Cameron, 2003), it is unclear whether perceiving strong reasons for certainty actually produce more thoughtful resistant responses or whether they simply produce a perception of thoughtful resistance. Therefore, Study 5 includes a more objective measure of thoughtful resistance responses.

**Study 5**

In Study 5, we aimed to replicate and extend the previous findings by implementing two key changes. First, this study included a thought listing procedure to allow for an objective indicator of thoughtful resistance processes. This study also aimed to generalize the effects to another topic. Whereas the topic in Study 4 (recycling) was one that nearly all participants began with positive attitudes toward, the topic employed in Study 5 (senior comprehensive exams) is one that we expected participants to initially have confident negative attitudes toward. By using this new topic (and its correspondingly new persuasive message), we were able to extend Study 4’s results to understanding resistant reactions to arguments in favor of something. These topics also differ in that they relate to separate larger issues (environmentalism vs. education) and may seem differently personally relevant (i.e., recycling’s implications are far in the future whereas the senior exam issue seems more immediate).

Based on the result of Study 4, the hypotheses in Study 5 were that, controlling for degree of initial certainty, stronger perceived reasons for that certainty would positively predict (a) spending more time reading a counterattitudinal persuasive message and (b) generating thoughtful resistant responses to the arguments.
Method

Participants. Eighty-three Ohio State University undergraduates (\(M_{\text{age}} = 19.53, SD = 4.16, 68.7\% \text{ male}\)) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted in a computer lab in groups of one to ten participants at a time. Dividers between computers prevented participants from seeing each other’s computer screens.\(^\text{13}\)

The target effect from Study 4—the effect of perceived reasons for certainty on self-reported counterarguing—emerged with an effect size of \(f^2 = .10\). Thus, assuming that this approximates the true effect size, power analyses found that a sample size of \(N = 83\) would have .80 power (\(\alpha = .05\)) to detect this effect.

Procedure. Upon agreeing to enroll in the study, participants read a brief paragraph describing a proposed policy at their university that would require seniors to take a series of exams prior to graduating in order to establish competencies in skills relevant to their majors. Participants were then asked to indicate their attitudes toward the proposed policy and the amount of certainty with which they held their attitudes. Next, participants reported their perceived reasons for certainty using the same measurements used in Study 4.

Participants then read a short essay purportedly written by a university committee, arguing in favor of a proposed senior exam policy (Petty & Cacioppo, 1986). The essay contained a mix of strong and weak arguments to provide a message that was persuasive but not so persuasive as to eliminate participants’ ability to counterargue. Reading time

\(^{13}\) Analyses of these data have also been presented in Luttrell (2012) and Luttrell, Briñol, & Petty (2013, 2016).
for the essay was recorded. Participants then listed the thoughts they had while reading
the essay, which were later coded for valence and resistance strategy by independent
raters. Finally, participants again reported their attitudes toward the exam policy as well
as how much they thought they counterargued the persuasive message.

**Predictor Variables.**

*Pre-message Attitudes Toward Senior Exams.* Participants’ initial attitudes
toward the senior exam policy were assessed with a single continuous measure that
asked: “To what extent do you agree with the proposal requiring college seniors to take a
comprehensive exam in their major before graduating?” Responses were indicated on a 7-
point Likert-type scale anchored at *do not agree at all* and *agree completely.* As
expected, participants, on average, reported relatively negative attitudes toward the senior
comprehensive exam policy ($M = 2.53, SD = 1.47$). There were, however, 9 participants
who indicated a relatively positive attitude toward the policy, indicated by ratings above
the midpoint of the scale. As in Study 4, these participants were excluded from the target
analyses because the persuasive message would have been pro-attitudinal for them.

*Pre-message Attitude Certainty.* After the initial continuous attitude measure,
participants responded to the same three items used to assess attitude certainty in Study 4.
Responses to these items were found to be reliable ($\alpha = .79$) and were thus averaged to
form a single initial attitude certainty index. As anticipated, and consistent with Study 4,
average certainty was rather high ($M = 5.09, SD = 1.19$).

*Reasons for Certainty.* Perceived reasons for certainty were measured using the
same items used in Study 4. The reliability of the three items assessing strong reasons ($\alpha$
the three items assessing weak reasons ($\alpha = .88$) were good. Responses were again averaged into separate indices of strong and weak reasons for certainty, which were then combined into a composite index of relative strong and weak reasons by subtracting average endorsement of weak reasons from average endorsement of strong reasons.\textsuperscript{14}

**Dependent Variables.**

**Post-message Attitudes toward Senior Exams.** Attitudes after reading the message were measured on the same continuous scale as the initial attitude ratings ($M = 2.99, SD = 1.69$). A within-subjects t-test reveals that the persuasive message was influential on average; pre- and post-message attitudes are significantly different, $t(73) = -3.14, p = .002$.

**Reading Time.** How much time a participant spent reading the essay was recorded as it was in Study 4.

**Thought Listing.** Participants were told to use a series of “thought listing boxes” to write any thoughts they had while reading the essay arguing for senior exams. They were instructed to write down all of their thoughts, “whether favorable to, opposed to, neutral toward, or irrelevant to the essay” (see Cacioppo, Harkins, & Petty, 1981, for more detail about thought listing procedures). Up to ten thoughts could be entered before advancing in the study, but participants were allowed to advance even if they could only generate fewer than ten thoughts.

\textsuperscript{14}Results of a within-subject t-test showed that overall, participants were more likely to endorse strong reasons for certainty ($M = 3.89, SD = 1.15$) than weak reasons ($M = 2.78, SD = 1.50$), $t(82) = 6.20, p < .001$. A simple correlation analysis demonstrated a moderate, but significant, positive correlation between endorsing strong reasons and endorsing weak reasons for certainty, $r(81) = .25, p = .02$. 
The thoughts that were listed in response to the persuasive message were coded by two independent coders for both valence and resistance strategy. To obtain the coders’ data, the content of thought listings were provided to the coders in an Excel file with only a unique ID number associated with each response. MediaLab had recorded the thoughts into an Excel file along with the other data. A new Excel file was then created with just the thoughts, their associated ID numbers, and two blank columns that were created alongside each thought, into which each coder entered the judged valence of each response and then, if applicable, the type of resistance strategy suggested by the thought.

*Thought Valence.* To code the valence of the thoughts, the external coders were instructed to indicate whether each thought was favorable toward, unfavorable toward, neutral toward, or irrelevant to the exam policy. Two sets of four variables were thus created to represent the total number of message-favorable, message-unfavorable, neutral, and irrelevant thoughts generated by each participant as judged by both coders. These judgments were then transferred to the complete SPSS data file for analysis. The two thought raters were in agreement at the subject level, indicating highly correlated numbers of thoughts coded as negative, \( r(81) = .86, p < .001 \), positive, \( r(81) = .89, p < .001 \), neutral, \( r(81) = .52, p < .001 \), and irrelevant, \( r(81) = .24, p = .03 \). To create single measures of each valence of interest and to resolve any discrepancies between coders, three valence variables were computed by averaging the numbers of negative, positive, and neutral thoughts, respectively, provided by each coder.

*Resistance Strategy.* Thoughts were also coded into six resistance strategies according to the coding scheme outlined by Jacks and Cameron (2003, Study 4):
counterarguing, attitude bolstering, source derogation, assertions of confidence, negative affect, and social validation. As in Jacks and Cameron (2003, Study 4), instances of selective exposure were not anticipated given that all participants were made to read the message. Thus, selective exposure was not provided as a response category. The most thoughtful strategy by which to resist persuasion, and thus, the resistance strategy of most interest in this study, was counterarguing. Thought coders were in agreement at the subject level, indicating highly correlated numbers of thoughts coded as instances of counterarguing, $r(81) = .59, p < .001$. Thought coders were also in agreement in judgments of the other resistance strategies: attitude bolstering, $r(81) = .71, p < .001$, assertions of confidence, $r(81) = .79, p < .001$, and negative affect, $r(81) = .42, p < .001$. Because agreement was high on these strategies, the data from the two judges were averaged for each resistance strategy to form single variables representing the number of thoughts produced in response to the message that were characterized as each type of resistance strategy.

Correlations could not be computed for instances of social validation nor source derogation, however, because one judge did not code any thoughts as instances of social validation or source derogation, and the other judge only coded three thoughts as instances of social validation and three thoughts as instances of source derogation. Given the low frequency of these responses, we dropped these variables from further analysis.

*Perceived Thoughtful Resistance.* Participants’ reports of how much they counterargued the message was assessed as it was in Study 4 ($\alpha = .71$).

**Results**
First, the data were submitted to a simple correlation test to assess how much degree of initial attitude certainty related to endorsed reasons for certainty. The composite measure of perceived certainty bases was positively, but nonsignificantly, correlated with degree of certainty, \( r(72) = .14, p = .23 \).

**Attitudes.**

To test whether the strength of participants’ self-rated bases for attitude certainty predicted resistance, controlling for actual degree of certainty, data were submitted to a multiple regression analysis, entering the perceived reasons for certainty composite, initial certainty, and initial attitudes simultaneously to predict post-message attitudes. Results support the overall relationship between certainty and resistance: greater certainty was associated with more positive post-message attitudes, controlling for pre-message attitudes, \( B = -.29, t(70) = -1.98, p = .052, 95\% \text{ CI: [-.58, .002]} \). Initial attitudes were also associated with the post-message attitudes, \( B = .37, t(70) = 1.98, p = .052, 95\% \text{ CI: [-.002, .73]} \), but above and beyond these other predictors, the strength of a person’s perceived reasons for certainty did not predict post-message attitudes, \( B = .003, t(70) = .03, p = .98, 95\% \text{ CI: [-.20, .21]} \).

**Reading Time.**

A separate regression analysis was conducted to examine the effect of perceived certainty bases on the amount of time participants spent reading the counterattitudinal message, again controlling for initial certainty. Results indicate that relative endorsement of strong reasons over weak reasons significantly predicted spending more time reading
the essay, $B = 11.29$, $t(71) = 3.59$, $p = .001$, 95% CI: [5.02, 17.57], but initial attitude certainty did not, $B = 3.48$, $t(71) = .78$, $p = .44$.

**Responses to the Message.**

**Thought Valence.** Another set of regression analyses considered the effect of perceived certainty bases on the thoughts participants generated in response to the persuasive message. Initially, relative endorsement of strong vs. weak reasons for certainty was used to predict the total number of negative thoughts in response to the message (i.e., thoughts reflecting resistance to persuasion). The results indicate that as participants endorsed relatively greater strong reasons over weak reasons for certainty, they generated more negative thoughts in response to the counterattitudinal message, but this relationship was not significant, $B = .12$, $t(71) = .99$, $p = .32$, 95% CI: [-.12, .36]. Initial certainty also did not significantly predict number of message-unfavorable thoughts, $B = .19$, $t(71) = 1.12$, $p = .27$, 95% CI: [-.15, .53].

Participants’ endorsement of strong vs. weak reasons for certainty was also not uniquely associated with the number of positive thoughts in response to the message, $B = .02$, $t(71) = .28$, $p = .78$, 95% CI: [-.13, .18]. There was, however, an effect of initial attitude certainty such that the more certain people were in their initial attitudes overall, the fewer positive thoughts they generated in response to the counterattitudinal message, $B = -.32$, $t(71) = -2.91$, $p = .01$, 95% CI: [-.54, -.10].

Finally, there was an unexpected effect whereby stronger perceived reasons for certainty were associated with a greater number of neutral thoughts in response to the message, $B = .14$, $t(71) = 2.20$, $p = .03$, 95% CI: [.01, .26]. Initial certainty was not
associated with the number of neutral thoughts, $B = .04$, $t(71) = .50$, $p = .62$, 95% CI: [-.13, .22].

**Resistance Strategy.** Finally, to test the hypothesis that stronger perceived bases of certainty would be associated with generating particularly thoughtful negative responses to persuasion, relative endorsement of strong vs. weak reasons for certainty was entered in a regression analysis to predict number of resistant responses of a particular category. As predicted, endorsing relatively strong over weak reasons for certainty was associated with more responses distinctly characterized by counterarguing, $B = .16$, $t(71) = 3.83$, $p < .001$, 95% CI: [.08, .24]. Strength of perceived reasons for certainty, however, tended to negatively predict instances of asserting confidence, $B = -.10$, $t(71) = -1.72$, $p = .09$, 95% CI: [-.21, .02] and expressing negative affect, $B = .03$, $t(71) = -1.74$, $p = .09$, 95% CI: [-.07, .01]. There was no relationship, however, between strength of perceived reasons for certainty and instances of attitude bolstering, $B = .08$, $t(71) = 1.14$, $p = .26$, 95% CI: [-.06, .23].

Degree of initial certainty, however, did not predict any particular resistance strategy, $ps > .14$.

**Perceived Thoughtful Resistance.**

Another multiple regression analysis was conducted to test the relationship between perceived reasons for certainty and self-reported counterarguing. As before, there was a significant positive relationship between relative endorsement of strong reasons over weak reasons and self-reported counterarguing, $B = .27$, $t(71) = 3.58$, $p = .001$, 95% CI: [.12, .41]. In addition, there was a unique effect of initial degree of
certainty such that greater certainty was associated with greater self-reported counterarguing, $B = .23$, $t(71) = 2.18$, $p = .03$, 95% CI: [.02, .44].

**Discussion**

In Study 5, perceived bases for attitude certainty were measured and related to behavior in the persuasion resistance process. Replicating the results of Study 4, stronger perceived reasons for certainty was associated with spending more time reading a counterattitudinal persuasive message and reporting greater counterarguing during the message. In addition, however, analysis of participants’ written responses to the message revealed that stronger perceived reasons for certainty corresponded to generating more message-unfavorable thoughts characterized by counterarguing, a particularly thoughtful resistance strategy.

Notably, as in the prior study, perceived reasons for certainty did not predict the actual post-message attitudes, only the means by which they resisted. These findings converge on the notion that people who perceive themselves as having reasons for their attitude certainty that are relatively strong engage in a more thoughtful persuasion resistance process than those who perceive themselves as having reasons for their certainty that are relatively weak.

A limitation of Studies 4 and 5, however, is their correlational nature. It is unclear whether perceived reasons for certainty actually lead to more thoughtful resistance. It is also unclear whether the effects are due to perceived reasons for certainty per se, or whether the measure of perceived confidence bases instead captures another construct that is the key predictor. For example, it could be that individuals who are high in need
for cognition (Cacioppo & Petty, 1982) endorse more thoughtful reasons for their certainty and also engage in more thoughtful resistance (Kupor, Tormala, Norton, & Rucker, 2014). Or, it could also be that individuals who have a style of thinking characterized more by a faith in intuition (Epstein, Pacini, Denes-Raj, & Heier, 1996) endorse less thoughtful reasons for certainty and engage in less thoughtful resistance. To address these limitations, Study 6 takes an experimental approach by manipulating the reasons people think underlie their attitude certainty and then examining their subsequent resistance behavior.

**Study 6**

The goal of Study 6 was to conceptually replicate the effects found in the previous studies and to more clearly test the role of perceived reasons for attitude certainty in persuasion resistance processes. However, whereas Studies 4 and 5 relied on measurements of participants’ perceived reasons for certainty, the present study manipulates those perceptions directly using a false feedback paradigm. Thus, perceived reasons for certainty were manipulated while degree of certainty was held constant.

Hypotheses for this study mirrored those for the previous studies. Specifically, we expected that people who were led to perceive strong bases for their certainty would spend more time reading a counterattitudinal persuasive message and produce more message-unfavorable thoughts in response to the essay, using a more thoughtful means of resisting the message (i.e., direct counterarguments).

**Method**
Participants. One-hundred two Ohio State University undergraduates ($M_{age} = 18.83, 33.3\%$ male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted in a computer lab in groups of one to ten participants at a time. Dividers between computers prevented participants from seeing each other’s computer screens. Sample size was determined such that each condition would have roughly $n = 30$. Because this was the first manipulated study, it was unclear what effect size to predict. Thus, the sample size selected allows power to be .80 to detect an effect of $f = .31$ (a “medium” effect).\(^{15}\)

Procedure. This study followed a procedure similar to that for Study 5 and used the same topic and persuasive arguments. Participants began by reading a short description of the senior exam proposal and indicated their attitudes. They also responded to a measure of attitude certainty embedded in several distractor items.

Perceived reasons for certainty were then manipulated via a false feedback procedure. Upon responding to the attitude-relevant items, participants saw a screen containing the results of a “confidence analysis.” All participants were told that the computer had conducted an analysis and concluded that their level of confidence was high. Importantly, those in the strong reasons condition were given relatively strong reasons for their confidence and those in the weak reasons condition were given relatively weak reasons for their confidence, closely matching the items used to measure reasons for certainty in the previous studies. Participants in a control condition were given the same level of computed confidence in their feedback but without the presence

\(^{15}\) Analyses of these data have also been presented in Luttrell (2012) and Luttrell, Briñol, & Petty (2013).
of any reasons for the result. Participants then reported their belief in the computer’s result. The remainder of the study commenced as it did in Study 5.

**Screening Variable: Topic Familiarity.**

Because the topic of senior exams is a fabricated issue and one commonly used in attitudes research, an item was included at the end of the experiment to assess whether participants had previously engaged in a study using this topic (and consequently had learned that it was fabricated via debriefing). Specifically, participants were asked: “Have you participated in any other studies that also dealt with the senior comprehensive exam policy issue?” Response options included: yes, no, and not sure. Participants who had already participated in a study using this persuasion topic ($N = 4$) were removed prior to analysis.\(^{16}\)

**Predictor Variables.**

**Pre-message Attitudes toward Senior Exams.** Initial attitudes toward the senior exam policy were assessed with the same single continuous measure used in Study 5. As before, participants, on average, came into the study with negative attitudes toward the senior exam policy ($M = 3.17$, $SD = 1.54$). There were, however, 9 participants who indicated a relatively positive attitude toward the policy, indicated by ratings above the midpoint of the scale. These participants were excluded from subsequent analysis, following exclusion criteria established in Study 4.

**Pre-message Attitude Certainty.** Because the manipulation was intended to hold certainty equal between groups, a measure of certainty was included before the

---

\(^{16}\) Although this screening item was included in Study 5, no participants in that study reported having previously participated in an experiment using senior comprehensive exams as a persuasion topic.
manipulation to check for failure of random assignment. Immediately following their responses to the attitude measure, participants were asked “How certain are you of your feelings about senior comprehensive exams?” and responses were indicated on a 7-point scale anchored at very uncertain and very certain.

False Feedback. The experimental induction held perceived degree of certainty at a high level and manipulated reasons for that certainty using a false feedback procedure. During the introduction to the study, participants were told that “this experiment makes use of a new computer program being used to analyze and interpret students’ attitudes toward university issues, and you will have the opportunity to see its results,” but they were given no other indication of the method that this program would use.

After completing the attitude measure, certainty measures, and other filler items to distance self-reported certainty from the false feedback, participants were taken to a new screen that asked them to “please wait while the computer conducts a ‘confidence analysis.’” A progress bar on the screen reinforced the illusion that the computer was running such an analysis. After 11 seconds, the screen automatically advanced to a page containing participants’ “scores” on the confidence analysis as well as the manipulation of perceived reasons for certainty.

In order to control for degree of attitude certainty, all participants were told they had the same score on the confidence analysis. Specifically, all participants were given the following result: “Our program has calculated that your confidence in the opinion you just indicated is: 8 (on a scale from 1—10). That is, you are moderately to very confident that senior exams should not be a graduation requirement.” To reinforce this number,
participants were asked to write their confidence score on a blank scratch paper pad available at their computer stations because they would be asked to recall this number later. Prior research has shown that individuals accept this type of false feedback (Luttrell et al., 2016c; Tormala et al., 2007).

In two of the three conditions to which participants could be randomly assigned, the false feedback also included reasons for the computed certainty. These reasons were based on the strong and weak certainty bases identified in Studies 1 – 3 and were chosen so that they would reflect variables that were plausible bases for computer-based feedback. Participants in the strong reasons condition were told that their score was based on the amount of time they spent considering the senior exam policy, how quickly they indicated their opinions, and their prior knowledge about the topic. Participants in the weak reasons condition were told that their score was arrived at because people who sit at that particular computer are usually more confident, because people are more confident at the time of day the experiment was taking place, and because most people are confident in their opinions. Participants in the control condition were not given any reasons for their confidence score; their results screen included only the information described above.

**Dependent Variables.**

**Belief in False Feedback.** Immediately following the false feedback manipulation, participants responded to an item intended to check whether they

---

17 To make this more believable, before participants indicated their initial attitudes, they responded to several leading questions assessing their knowledge regarding OSU education policies meant to boost their perception of how much they knew about the topic (e.g., “Compared to another student in a different university, how familiar are you with the basic requirements for graduating at Ohio State?”)
adequately believed their feedback and to allow for a test of whether this belief varied by condition. Participants responded to the question “How sure are you that the computer feedback about your attitude confidence is correct?” on a 7-point scale anchored at “very doubtful it is correct” “and very certain it is correct.” This question, however, did not specify whether it pertained to the accuracy of the confidence score or the provided confidence bases.

Post-message Attitudes. Attitudes after reading the message were measured using the same scale as the pre-message attitude reports ($M = 3.59, SD = 1.75$).

Reading Time. How much time that a participant spent reading the essay was recorded as it was in Studies 4 and 5.

Thought Listing. Thoughts in response to the message were recorded as they were in Study 5. Participants’ thoughts were compiled in a document that was printed and provided to two new judges, blind to all data other than the content of the thoughts. Following the same procedure as Study 5, they coded each thought for valence and then coded each thought that they coded as negative for its resistance strategy.

Thought Valence. Thought valence was coded using the same instructions as Study 5. The two thought raters were in agreement at the subject level, indicating highly correlated numbers of thoughts coded as negative, $r(100) = .95, p < .001$, positive, $r(100) = .89, p < .001$, neutral, $r(100) = .62, p < .001$, and irrelevant, $r(100) = .99, p < .001$. To create single measures of each valence of interest and to resolve any discrepancies between coders, three valence variables were computed by averaging the numbers of negative, positive, and neutral thoughts, respectively, provided by each judge.
Resistance Strategy. Thoughts were also coded into six resistance strategies as they were in Study 5. Once again, thought coders were in agreement at the subject level, indicating highly correlated numbers of thoughts coded as instances of counterarguing, \( r(100) = .81, p < .001 \). Thought coders were also in agreement, though less so, at the subject level in judgments of the other resistance strategies: attitude bolstering, \( r(100) = .46, p < .001 \), source derogation, \( r(100) = .49, p < .001 \), assertions of confidence, \( r(100) = .59, p < .001 \), and negative affect, \( r(100) = .26, p < .001 \). Because agreement was high, the data from the two judges were averaged for each resistance strategy to form single variables representing the number of thoughts each participant produced in response to the message that were characterized as each type of resistance strategy. A correlation could not be computed for instances of social validation because one judge did not code any thoughts as instances of social validation, and the other judge coded only two thoughts as instances of social validation. This resistance strategy was thus dropped from the following analyses.

Confidence Check. At the end of the experiment, participants were asked to report the confidence score given to them in their “confidence analysis.” All participants had been given a confidence score of eight and had been told to write this score down to make it easier to recall later. Therefore, it would be unclear whether a participant attended to the feedback information if he or she responded to this confidence check with any figure other than eight.\(^{18}\)

Results

\(^{18}\) In this study, there was no additional manipulation check to ensure that participants attended to the reasons provided for their confidence score.
**Screening Items.** Three variables were used to determine whether the study’s experimental materials and subsequent analyses were appropriate for any particular individual: initial attitudes, topic familiarity, and the confidence check. First, as already reported, nine participants reported senior exam attitudes above the midpoint (i.e., positive), rendering the content of the false feedback information unsuitable and the arguments in the essay pro-attitudinal.\(^\text{19}\)

Second, four participants reported previous experience in a study using senior comprehensive exams as an attitude object, which means they would have learned that this policy is not actually being considered at the university and that the arguments in the essay were created for research purposes only.\(^\text{20}\)

Finally, four participants responded to the confidence check with figures other than eight. Notably, three of these participants’ responses would correspond to having low confidence, with two participants entering the number four and one entering the number two.\(^\text{21}\)

Because the participants reported above have characteristics that obscure how they would have engaged with the manipulation and persuasive message, these data were

\(^{19}\) Indeed, the nine participants who indicated that they agreed with the senior exam policy on the initial attitude measure later tended to express less belief in the false feedback \((M = 3.89, SD = 1.76)\) than those who indicated that they disagreed with the senior exam policy \((M = 4.73, SD = 1.48)\), \(t(100) = -1.61, p = .11\).

\(^{20}\) Some nonsignificant effects become significant when these participants are removed, suggesting the noise introduced by their previous participation with this attitude object obscured effects of interest.

\(^{21}\) Although including participants who failed the manipulation check produces p-values that are slightly higher than when these participants are excluded, their removal had no implications for classifying effects as significant or nonsignificant.
not included in the subsequent analyses. Removal of these data points leaves $N = 87$ participants.

**Predictor Variables.**

Confirming that random assignment was successful, one-way ANOVAs did not find that pre-message attitudes, $F(2, 84) = .42, p = .66$, or pre-message attitude certainty, $F(2, 84) = .46, p = .63$, differed by experimental condition. Thus, random assignment appears to have been successful.

**Dependent Variables.**

**Belief in False Feedback.** To ensure that the content of the false feedback, which differed by condition, did not inadvertently cause differential belief in that feedback, a one-way ANOVA was conducted. Results show no evidence that belief in the false feedback differed across groups, $F(2, 84) = .50, p = .61$. Critically, planned comparisons further indicate that those who received strong reasons for their confidence score did not seem to express significantly different belief in the feedback ($M = 4.96, SD = 1.23$) than those who received weak reasons for their confidence score ($M = 4.59, SD = 1.60$), $t(84) = -1.00, p = .32$.

**Attitudes.**

An ANCOVA was conducted to examine whether post-message attitudes varied by condition, entering pre-message attitudes a covariate. These results show that post-message attitudes did not differ across types of feedback, controlling for pre-message attitudes, $F(2, 83) = .76, p = .47$, although as expected, there was a main effect of pre-message attitudes on post-message attitudes, $F(1, 83) = 14.29, p < .001$. Thus, consistent
with the previous studies, no evidence was obtained to suggest that the reasons underlying attitude certainty affect the extent of attitude change following a counterattitudinal persuasive message. We did not examine the overall effect of certainty on post-message attitudes, however, because degree of certainty was held constant with the false feedback manipulation.

**Reading Time.** To assess the effect of feedback on amount of time spent reading the counterattitudinal essay, data were submitted to a one-way ANOVA. Results demonstrated that reading time differed across conditions, \( F(2, 84) = 4.60, p = .01 \). Tukey’s post-hoc comparisons of the three groups indicated that participants who received strong reasons for their confidence (\( M = 111.17, SD = 44.71 \)) spent significantly more time reading the counterattitudinal essay than participants who received weak reasons for their confidence (\( M = 77.62, SD = 40.77 \)), \( p = .01 \). Neither those who received strong reasons nor weak reasons for confidence differed significantly in reading time from those in the control condition (\( M = 101.42, SD = 47.77 \)), \( ps > .10 \).

**Thought Valence.** A one-way ANOVA testing the effect of feedback on number of message-unfavorable thoughts in response to the message revealed a nonsignificant overall difference in total number of negative thoughts generated in response to the message across conditions, \( F(2, 84) = 2.29, p = .11 \). However, planned comparisons showed a marginally significant effect such that participants who received strong reasons for their attitude certainty generated more message-unfavorable thoughts (\( M = 2.43, SD = 2.34 \)) than those who received weak reasons for their attitude certainty (\( M = 1.55, SD = 1.48 \)), \( t(84) = -1.89, p = .06 \). The strong reasons condition also differed marginally from
the control condition ($M = 1.54, SD = 1.49$), $t(84) = -1.83, p = .07$, but the weak reasons and control conditions did not differ, $t(84) = .02, p = .98$.

Results of a second ANOVA indicated that perceived reasons for certainty did not affect number of message-favorable thoughts in response to the essay, $F(2, 84) = .47, p = .63$. Planned comparisons also failed to find a difference in the number of generated message-favorable thoughts between those who received strong reasons for their certainty ($M = 1.39, SD = 2.07$) and those who received weak reasons for their certainty ($M = 1.27, SD = 1.08$), $t(84) = .32, p = .75$ and neither differed from the control condition ($M = 1.65, SD = 1.29$), $ps > .34$.

Finally, results of a third ANOVA indicated that perceived reasons for certainty had no effect on number of neutral thoughts in response to the message, $F(2, 84) = .11, p = .89$. Planned comparisons further failed to find a difference in number of generated neutral thoughts between those who received strong reasons for their certainty ($M = .34, SD = .58$) and those who received weak reasons for their certainty ($M = .41, SD = .50$), $t(84) = .42, p = .68$, and neither differed from the control condition ($M = .41, SD = .76$), $ps > .60$.

**Resistance Strategy.** To test whether perceptions of certainty bases affected extent of counterarguing as rated by the judges, a one-way ANOVA was conducted. Results showed only a marginal difference in number of counterarguments across conditions, $F(2, 84) = 2.54, p = .09$, but planned comparisons revealed that those who received strong reasons for their certainty generated a greater number of counterarguments ($M = 1.18, SD = 1.44$) than those who received weak reasons for their
certainty ($M = .52, SD = .79$), $t(84) = -2.24, p = .03$, though neither differed from the control condition ($M = .76, SD = 1.16$), $ps > .17$. No simple contrasts between strong and weak reasons conditions nor omnibus F-tests demonstrated effects of perceived reasons for attitude certainty on attitude bolstering, source derogation, assertions of confidence, negative affect, or social validation, $ps > .18$.

**Discussion**

In Study 6, participants’ perceived bases for their attitude certainty were manipulated via false feedback. Compared to those who were led to believe they had weak reasons for their attitude certainty, those who were led to believe they had strong reasons for their attitude certainty (a) spent a longer time reading a counterattitudinal persuasive message, (b) generated a greater number of message-unfavorable thoughts in response to the counterattitudinal message, and (c) generated a greater number of counterarguments—a highly thoughtful persuasion resistance strategy. Results from the control condition generally fell in between the strong and weak reasons conditions, suggesting that the effects are due partly to strong perceived confidence bases enhancing counterarguing and weak perceived confidence bases reducing it. Post-message attitudes (controlling for pre-message attitudes) did not differ by condition, suggesting that reasons for certainty once again failed to affect persuasion resistance itself, controlling for degree of certainty. These findings conceptually replicate the effects found in the previous correlational studies. Once again, these results suggest that when people perceive themselves as having relatively strong reasons underlying their sense of attitude certainty,
they engage in a more thoughtful persuasion resistance process than when they perceive having weak reasons underlying that sense of attitude certainty.

The experimental nature of this study also addresses a key shortcoming associated with self-reported reasons for certainty used in Studies 4 and 5. Because perceived reasons for certainty were manipulated in Study 6, it was possible to infer that the results are due directly to the perceived reasons for certainty themselves and not to some third variable that may enact dual influence on perceptions of attitude certainty bases and engagement with a persuasive message.

**Study 7**

Overall, the results from Studies 4 – 6 converge, demonstrating that perceptions of having a sense of confidence grounded in relatively strong bases (vs. weak bases) produces greater engagement with counterattitudinal persuasive messages, evidenced both by the amount of time people spend reading the persuasive messages and by the thoughtfulness of their responses to them. Despite their effects on thoughtful message responding, however, perceived certainty bases were not related to differential attitudes in any of the three studies. Thus, it remains to be seen what outcomes, if any, different perceived reasons for certainty might have other than on the process of resistance.

To this end, Study 7 considered the possibility that the effortful message engagement associated with stronger perceived certainty bases confers greater strength to the resulting attitude even if on the surface, the attitudes themselves do not seem to change. This would be consistent with a large body of work connecting greater message elaboration to stronger post-message attitudes (for a review, see Petty, Haugtvedt, &
Smith, 1995). That is, because it seems that people spend more time thinking about a counterattitudinal message’s arguments when they initially believe they have stronger reasons for certainty, we expect that their resulting attitudes are especially impactful. Similarly, this hypothesis is consistent with other research that has shown a boost in attitude certainty following successful resistance to a counterattitudinal message through legitimate means (for a review, see Petty, Tormala, & Rucker, 2004). Therefore, Study 7 included additional post-message measures to assess how confident participants were in their attitudes following the message and the degree to which they intended to engage in relevant behaviors.

Another point that this study aimed to clarify was how specific the effects were to reasons for certainty as opposed to perceived reasons for an attitude more generally. Although the previous studies measured and manipulated the reasons people thought they had for holding an attitude with a particular degree of certainty, these methods may have instead indirectly measured or manipulated the reasons people think they had for holding an attitude of a particular valence, regardless of confidence. For example, when a person thinks about her reasons to be confident that she is pro-recycling, she may really be thinking about the reasons why she is pro-recycling at all. Because prior research has considered the role of perceived reasons for attitudes (Wilson, Dunn, Kraft, & Lisle, 1989) and values (Maio & Olson, 1998), we wanted to test whether the very same reasons for holding a particular attitude produce the same results we found in the previous studies or whether there really is something unique about the bases people think underlie a sense of certainty.
This study thus measured perceived reasons for certainty in the same way as Studies 4 and 5 but also measured perceived reasons for participants’ attitudes themselves. To hold reasons constant, the latter measure was virtually identical to the former, but we made clear to participants that they were rating one set of reasons as confidence bases and the other set as attitude bases. Although we expected to replicate our effects for perceived reasons for certainty, we explored whether this measure was redundant with reported attitude bases and whether reported attitude bases predict the same outcomes.

Because Study 7 aimed to replicate and extend the results from the previous studies, we again hypothesized that stronger perceived reasons for certainty would be associated with spending more time reading a counterattitudinal persuasive message and with engaging in thoughtful resistance strategies. Given the lack of attitude effects in the previous studies, we did not expect perceived certainty bases to predict post-message attitudes (i.e., resistance as an outcome) in this study; however, we hypothesized that stronger perceived reasons for initial attitude certainty would be associated with greater certainty in post-message attitudes. That is, although people may resist persuasion to the same extent, because those with stronger perceived reasons for their initial certainty resist persuasion more thoughtfully, their attitudes after resisting a message should be held more confidently than those with weaker perceived reasons for their initial certainty. Similarly, we predicted that stronger perceived reasons for initial attitude certainty would be associated with post-message attitudes that are especially predictive of attitude-relevant behavioral intentions.
Method

Participants. Eighty-nine Ohio State University undergraduates (\(M_{age} = 18.93, SD = 1.57; 40.4\%\) male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted in a computer lab in groups of one to ten people at a time. Dividers between computers prevented participants from seeing each other’s computer screens.22

Regarding the sample size, one key effect present in both Studies 4 and 5—the effect of perceived reasons for certainty on self-reported counterarguing—was \(f^2 = .10\) in Study 4 and \(f^2 = .16\) in Study 5. Thus, using the more conservative effect size estimate of \(f^2 = .10\), power analyses again indicate that a sample of \(N = 81\) would have .80 power (\(\alpha = .05\)) to detect this effect. Thus, we aimed to recruit about this number of participants.

Procedure. The procedure was nearly identical to that of Study 4 but with two key changes. First, upon agreeing to enroll in the study, participants indicated their attitudes toward recycling and reported their perceived bases for those attitudes using a scale nearly identical to the one used in previous studies to assess perceived bases for certainty. To induce a delay between this measure and the certainty measures, participants next completed demographics items and a personality scale to fill the time. The participants were then reminded that they had earlier indicated their attitudes toward recycling and were asked to report how certain they were of those attitudes, after which they completed the same reasons for certainty scale used in the prior studies.

22 Analyses of these data have also been presented in Luttrell, Briñol, & Petty (2016).
The study then proceeded just as it did in Study 4, but after participants reported their post-message attitudes toward recycling, they completed additional measures to assess their certainty in those attitudes and their intentions to engage in recycling-relevant behaviors.

**Predictor Variables.**

**Pre-message Attitudes Toward Recycling.** Initial attitudes toward recycling were assessed using the same questions as Study 4, which also considered recycling as a topic. These items again showed good internal reliability ($\alpha = .81$) and were thus averaged to form an index of attitudes toward recycling with higher scores indicating more positive attitudes ($M = 8.52$, $SD = .69$). In this study, no participants reported attitudes below the midpoint of the scale; therefore, all participants were retained in the subsequent analyses.

**Perceived Attitude Bases.** We adapted the procedure used to measure people’s perceived reasons for certainty in order to assess whether these same reasons were endorsed for holding a positive attitude toward recycling. The instructions and questions were written assuming that participants would hold positive attitudes toward recycling. Indeed, no participant in this study reported attitudes below the midpoint of the scale.

After reporting their attitudes, participants read the following instructions:

You just indicated your overall attitude toward recycling. According to your responses, your opinion is that recycling is positive. Our attitudes and opinions can come from many different places. On the next several screens are some of the things people base their attitudes on. Please rate the extent to which each of these is a basis for your attitude regarding recycling.
They were then presented with several potential reasons for their attitude that mirror exactly the reasons for certainty that are measured in this study and the previous studies. Strong reasons included: “My knowledge about recycling,” “How much I’ve thought about recycling,” and “The amount of time I’ve spent learning about recycling.” Weak reasons included: “The time of day it is now,” “The time of year it is now,” and “What the weather is like today.” For each of these statements, participants provided their response on a 7-point scale anchored at “not at all why I think recycling is good” and “strongly influenced why I think recycling is good.” Internal reliability was acceptable for both strong ($\alpha = .66$) and weak ($\alpha = .85$) perceived bases for recycling attitudes. Each set of items was thus averaged to form composite scores of strong reasons and weak reasons, and an overall composite score was computed by subtracting average endorsement of weak reasons from average endorsement of strong reasons. Thus, higher scores on this measure indicate the tendency to endorse strong over weak reasons for positive attitudes toward recycling.\textsuperscript{23}

**Pre-message Attitude Certainty.** Attitude certainty was assessed using three items used in Study 4, and they were again found to be reliable ($\alpha = .91$), so they were averaged together to form a single index of attitude certainty ($M = 5.01$, $SD = .94$).

**Reasons for Certainty.** Perceived reasons for certainty were assessed using the same items used in the previous studies and to assess reasons for attitudes in this study. As before, and to make sure that participants responded correctly (and not simply

\begin{footnotesize}
\textsuperscript{23} As with perceived reasons for certainty in Studies 1 and 2, participants tended to endorse the strong reasons for holding a pro-recycling attitude ($M = 4.70$, $SD = 1.28$) to a greater extent than the weak reasons ($M = 2.36$, $SD = 1.59$), $t(88) = 11.57$, $p < .001$. \end{footnotesize}
repeating their responses for attitude bases), the 7-point response scales were anchored with the certainty-specific labels: “did not at all influence how sure I am” and “strongly influenced how sure I am.” The reliability of the four items used to measure “strong” reasons for certainty was acceptable (α = .83) as was the reliability of the three items used to measure “weak” reasons for certainty (α = .86). A composite index perceived certainty bases was created following the same procedure as Studies 4 and 5.24

**Dependent Variables.**

**Post-message Attitudes toward Recycling.** Attitudes after reading the message were measured using the same scale as the pre-message attitude reports. Responses again demonstrated good internal reliability (α = .96), so they were averaged to form an index of attitudes toward recycling after reading the persuasive message (M = 7.83, SD = 1.32). As before, a within-subjects t-test shows that the persuasive message was influential on average; pre- and post-message attitudes are significantly different, t(88) = 5.38, p < .001.

**Reading Time.** The computer recorded how much time, in milliseconds, that a participant spent on the screen containing the essay arguing against recycling before advancing to the next stage of the experiment. Participants were not constrained in how long they could spend reading the essay and were free to advance to the next part of the experiment whenever they were ready. For ease of interpretation, reading time units were converted to seconds.

**Post-message Attitude Certainty.** The same three items assessing pre-message attitude certainty were used to assess certainty in participants’ post-message recycling

---

24 As before, participants tended to endorse the strong reasons for certainty to a greater extent (M = 4.70, SD = 1.38) than the weak reasons for certainty (M = 1.88, SD = 1.28), t(88) = 14.58, p < .001.
attitudes. The items again demonstrated good internal reliability ($\alpha = .87$), so they were averaged together to form a single index of post-message attitude certainty, which was again relatively high ($M = 4.75, SD = .86$).

**Behavioral Intentions.** Recycling intentions were measured with three questions with 5-point response scales. These items assessed intentions to recycle in general, to recycle paper products specifically, and to throw recyclable products in the trash (reverse scored) in the next week. These items demonstrated good internal reliability ($\alpha = .72$) and were thus averaged to form an index of intentions to engage in pro-recycling behavior in the next week ($M = 3.63, SD = .78$).

**Perceived Thoughtful Resistance.** To measure the extent to which participants thought they had engaged in thoughtful resistance to persuasion, we administered the same two questions used in Studies 4 and 5 to measure perceived counterarguing ($\alpha = .68$).

**Results**

See Table 6 for correlations between predictor variables.

**Reasons for Certainty as Predictor.**

To begin these analyses, we wished to see whether the previous effects replicated in this study and whether the effects that we have already shown result in stronger post-message attitudes. Thus, the first set of multiple regression analyses considers how well participants’ self-reported reasons for attitude certainty predict the outcome variables above and beyond their initial degree of certainty.
**Attitudes.** First, data were submitted to a multiple regression analysis predicting attitudes following the message. Initial certainty, initial attitudes, and perceived reasons for certainty were entered as simultaneous predictors of post-message attitudes toward recycling. As expected, pre-message attitudes uniquely predicted post-message attitudes, $B = .45, t(85) = 2.16, p = .03, 95\% \text{ CI:} \ [0.04, .87]$, and initial attitude certainty also uniquely predicted post-message attitudes, $B = .40, t(85) = 2.51, p = .01, 95\% \text{ CI:} \ [.08, .71]$ with greater certainty associated with greater resistance to the message. Perceived bases of certainty, however, did not predict post-message attitudes above and beyond pre-message attitudes and initial certainty, $B = .08, t(85) = 1.11, p = .27, 95\% \text{ CI:} \ [-.06, .23]$, consistent with the prior studies.

**Reading Time.** The next step was to test for the effects of reasons for certainty on indicators of thoughtful resistance. First, data were submitted to a multiple regression model predicting how long participants spent reading the counterattitudinal message. Initial certainty and the composite reasons for certainty measure were entered as simultaneous predictors of reading time. In this model, attitude certainty does not predict reading time, $B = 1.02, t(86) = .18, p = .86, 95\% \text{ CI:} \ [-10.07, 12.11]$. As in the previous studies, stronger reasons for certainty tended to be associated with spending more time reading a persuasive message, but this effect was not significant in this study, $B = 3.36, t(86) = 1.17, p = .25, 95\% \text{ CI:} \ [-2.34, 9.07]$

**Perceived Thoughtful Resistance.** Next, the reason strength measure and initial certainty were submitted to a set of multiple regression analyses predicting perceived thoughtful resistance. In this model, initial certainty was marginally associated with
participants’ reported amount of counterarguing the message, $B = .21, t(86) = 1.73, p = .09$, 95% CI: [-.03, .45]. Stronger reasons for that certainty, however, were associated with greater reports of counterarguing the message, $B = .14, t(86) = 2.30, p = .02$, 95% CI: [.02, .27].

**Post-message Certainty.** Although the results just reported replicate those of the previous studies, it remained to be seen whether the effect certainty bases have on thoughtful resistance are impactful for post-message attitude strength even in the absence of attitude change effects. We first tested whether perceived reasons for certainty predict post-message certainty. To do so, initial certainty and the composite measure of perceived reasons for certainty were entered as simultaneous predictors in a multiple regression model predicting post-message certainty. Participants’ certainty in their attitudes prior to the message was positively associated with their certainty in their attitudes following the message, $B = .46, t(86) = 5.42, p < .001$, 95% CI: [.29, .63]. Above and beyond this effect, however, stronger reasons for initial attitude certainty was associated with greater certainty following the message, $B = .09, t(86) = 2.16, p = .03$, 95% CI: [.01, .18].

**Attitude-Behavior Correspondence.** As a second means of testing the strength of post-message attitudes, we next considered the correspondence between participants’ post-message recycling attitudes and relevant behavioral intentions. If the thoughtful resistance processes taken by those with stronger reasons for their certainty produce stronger (more confident) post-message attitudes, there should be greater attitude-intention correspondence for participants who reported stronger bases for their initial
certainty. To test this prediction, data were submitted to a hierarchical multiple regression analysis predicting behavioral intentions. Initial certainty, reasons for certainty, and post-message attitudes were entered in the first step of the model, and the interaction term for reasons for certainty and post-message attitudes was entered in the second step. Results are interpreted from the first step of the model in which they appear.

First, there was a main effect of post-message attitudes on behavioral intentions; increasingly positive attitudes were associated with increasing intentions to recycle, $B = .24, t(85) = 4.23, p < .001, 95\%\ CI: [.13, .35]$. There was also a main effect of initial certainty such that greater initial attitude certainty was associated with greater intentions to engage in pro-recycling behaviors, $B = .17, t(85) = 2.03, p = .05, 95\%\ CI: [.03, .33]$. There was also a main effect of perceived reasons for certainty in which increasingly strong perceived reasons for certainty was associated with increasing intentions to recycle, $B = .09, t(85) = 2.25, p = .03, 95\%\ CI: [.01, .17]$. Most importantly, post-message attitudes interacted with perceived reasons for certainty to predict behavioral intentions, $B = .08, t(84) = 2.53, p = .01, 95\%\ CI: [.02, .15]$ (Figure 1). This result indicates that at a relatively low score on the certainty bases composite (i.e., “weaker” reasons for certainty; -1 SD), attitudes following the message do correspond to behavioral intentions, $B = .17, t(84) = 2.79, p = .01, 95\%\ CI: [.05, .29]$, but at a relatively high score on the certainty bases composite (i.e., “stronger” reasons for certainty; +1 SD), attitudes following the message even more strongly correspond to behavioral intentions, $B = .47, t(84) = 4.44, p < .001, 95\%\ CI: [.26, .68].

**Reasons for Attitude as Predictor.**
Next, the data were re-analyzed to see whether these effects were specific to the strength of people’s reasons for *certainty* or whether these effects are instead accounted for by people’s perceived reasons for holding a particular attitude. Thus, the preceding regression analyses were re-run including the measure of perceived attitude bases as a covariate.

Results revealed that the measure of reasons for certainty continued to demonstrate the reported effects, even controlling for the corresponding measure of perceived reasons for the attitude. That is, the relationship between perceived certainty bases and degree of attitude change remained nonsignificant, $B = .04, p = .67$, but there were still significant relationships between perceived certainty bases and self-reported counterarguing, $B = .18, p = .04$, and post-message certainty, $B = .12, p = .04$. In addition, the post-message attitude × initial reasons for certainty interaction predicting behavioral intentions remained significant, $B = .08, p = .01$. In none of these analyses did the perceived attitude bases measure have significant effects.²⁵

Notably, however, participants’ perceived attitude bases predicted the amount of time they spent reading the counterattitudinal message, $B = 10.09, p = .01$, suggesting that at least some of the effect of perceived certainty bases on reading time that were uncovered in prior studies may have operated via perceptions of the attitude’s bases.

**Discussion.**

---

²⁵ Although perceived attitude bases had no effect on degree of attitude change following the message when controlling for perceived certainty bases, there was an effect when perceived certainty bases were not included in the model. That is, above and beyond the effects of initial attitudes and certainty, stronger perceived reasons for one’s recycling attitude corresponded to more positive (i.e., less changed) attitudes following the message, $B = .16, t(85) = 2.32, p = .02, 95\% CI: [.02, .30]$. 
The results of Study 7 replicate the results of the prior studies: greater endorsement of strong over weak reasons for certainty was associated with greater counterarguing in response to a counterattitudinal persuasive message. In addition, however, these data showed for the first time that this thoughtful resistance effect resulted in more confidently held final attitudes that were more predictive of relevant behavioral intentions. These effects also held when controlling for a similar set of measurements intended to assess participants’ perceived reasons for holding a positive attitude toward the topic (i.e., rather than their reasons for being confident in that attitude). This is especially impressive, perhaps, given the high correlation between the two measures ($r = .70$).

By way of an interim summary, the preceding studies provided consistent evidence that people’s endorsement of relatively strong versus weak reasons for certainty is associated with the way in which they engage with a counterattitudinal persuasive message. Overall, endorsing stronger reasons for certainty is associated with more thoughtful responses to the message, indexed by participants’ own reports of how much they critically evaluated the message’s arguments (Studies 4, 5, and 6) and by the kinds of thoughts that they provided in response to the message, coded by third party raters (Studies 5 and 6). Additionally, endorsing weaker reasons for certainty was associated with less thoughtful responses such as discounting or avoiding the message overall, indexed by their relatively brief engagement with the message. Curiously, although this reading time effect emerged in Studies 4 – 6, it was not significant in Study 7 even though the effect was directionally consistent. More informative, perhaps, was that the
measure of perceived attitude bases in Study 7 was significantly associated with reading
time, even when controlling for perceived confidence bases. Thus, the reading time
effect, though relatively consistent across studies, is nevertheless open to further study to
better understand the nuances of its relationship with perceived reasons for certainty.

There are several limitations to these studies, however, which the following
studies will aim to address. First, the previous studies relied on only two attitude objects:
recycling and senior comprehensive exams. Although these topics were selected to
provide issues of distinct relevance, familiarity, and valence, they nonetheless are just
two of many possible cases of confidently held attitudes. Therefore, Study 8 (Chapter 4)
aims to conceptually replicate the previous findings in yet another context—attitudes
toward presidential candidates in the 2012 U.S. election. Study 9 will also consider a new
attitude object—same-sex marriage—in order to further generalize the implications of
this research to consequential social issues.

Of greater importance, however, is the remaining theoretical question: do these
various reasons for certainty have their effect because they are seen as relatively strong or
weak or because there is something about the reasons themselves (e.g., high knowledge)
that produce the effects? Up until this point, perceived confidence bases have been
assessed by measuring people’s endorsement of distinct reasons for certainty that were
pre-tested to vary in how strong they are seen as bases for confidence. While informative,
it is not yet clear that it is the perceived strength of these reasons that drives the effects.
Perhaps the discrete bases that were selected differ in some other consequential way, and
perhaps people do no perceive these reasons as differently strong or weak when they are
the ones endorsing them. Studies 9 – 11 (Chapter 5) address this question by more
directly examining how strong people think their reasons for certainty are, independent of
any individual reasons.
Chapter 4: Generalization to a Presidential Election

Study 8

To test the generalizability of the findings from the studies reported in Chapter 3, a new study was run using a very relevant attitude object: attitudes toward candidates in the 2012 U.S. presidential election. In this study, perceived reasons for certainty were assessed simply by asking people to indicate their attitudes and attitude certainty with regard to both Barack Obama and Mitt Romney and then, in a free-response fashion, describe their reasons for their indicated levels of attitude certainty. These open-ended responses were then coded by independent raters on a scale from very weak reason for certainty to very strong reason for certainty. In order to measure persuasion resistance, all participants were presented with a prompt at the end of the study asking how they would respond to someone criticizing their preferred candidates. Participants responded to the prompt, and the number of words they used to do so was recorded as an indication of the effort invested in resisting the counterattitudinal claim.

If the proposed effects of perceived confidence bases hold in this highly relevant environment, then people who provide stronger reasons for their certainty, based on third party ratings, should use more words to defend their preferred candidate in the face of a counterattitudinal claim. This study also included a measure of need for cognition (NFC), which reflects individuals’ enjoyment of effortful thinking (Cacioppo, Petty, & Kao,
1984). It was possible that individuals relatively high in NFC have stronger reasons for certainty and respond more thoughtfully to counterattitudinal claims. By measuring and controlling for this variable, we were able to examine the viability of this third variable account of the key effect.

Method

Participants. Two-hundred twenty-nine Ohio State University undergraduates ($M_{age} = 18.78$, $SD = 1.83$, 33.2% male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study.\textsuperscript{26} Sessions were conducted in computer labs in groups of one to ten participants at a time. Notably, data for this study were collected 4 – 8 weeks prior to the 2012 presidential election. Three participants did not complete the key resistance task at the end of the survey, so their responses were excluded from the following analyses. The final sample is thus $N = 226$.

This overall sample size is quite a bit larger than the previous studies because this study was embedded in a larger survey that was the first wave of a larger longitudinal study. Thus, more participants were needed for the first wave to guard against attrition rates. The benefit, however, is the increased power to detect effects of perceived reasons for certainty. Although the variables are different in this study, assuming that the key effect is consistent with the previous effects on self-reported counterarguing (used as a basis to compute power in Studies 4, 5, and 7), this 226-person sample has $> .99$ power to detect an effect of $f^2 = .10$.

\textsuperscript{26} Data from this study were also analyzed and presented in Luttrell et al. (2016a).
**Procedure.** Upon agreeing to enroll in the study, participants rated their attitudes and attitude certainty regarding Barack Obama and Mitt Romney, the two primary candidates in the 2012 presidential election. The order (i.e., whether Obama or Romney was rated first) was counterbalanced. Following each set of attitude and certainty questions was a free response question in which participants were to explain why they were certain or uncertain of their attitude toward each candidate. Responses to this question were later coded by two independent raters who rated the strength of responses as reasons for certainty. Participants were then asked to indicate whether they intended to vote in the upcoming election and for which candidate they would vote. Subjective knowledge about each candidate was also assessed.

Finally, all participants were presented with a prompt stating that some have claimed a particular candidate would thus be unfit for the presidency, and they were asked how they would respond to the claim. Importantly, the candidate under attack was programmed to be whichever candidate the participant preferred, indicated either by voting intentions or initial attitude ratings as explained shortly. Participants responded to the prompt in a free response format and were able to use as many or as few words as they wished. The number of words they used was recorded as an indication of how effortfully they responded to the counterattitudinal attack.

Participants responded to the NFC scale at the end of the experiment before being debriefed and dismissed.

**Predictor Variables.**
**Candidate Attitudes.** Participants’ attitudes toward the presidential candidates were assessed with five semantic differential items, ranging from 1 to 9, with the following anchors: bad–good, negative–positive, unfavorable–favorable, dislikeable–likeable, and unpleasant–pleasant. The scales were such that higher numbers represented more positive attitudes toward the candidate. The five items assessing attitudes toward Obama were found to be reliable ($\alpha = .98$), and the five items assessing attitudes toward Romney were also found to be reliable ($\alpha = .98$), so each set of five items were averaged together to form single indices of attitude toward Obama ($M = 5.86, SD = 2.45$) and attitude toward Romney ($M = 4.21, SD = 2.16$).

**Candidate Attitude Certainty.** Immediately upon responding to a candidate’s attitude items, participants indicated their certainty in that attitude. Certainty was rated on three 7-point semantic differential items. Certainty items for Obama attitudes would read: “How confident are you in your attitude toward Barack Obama?” (completely unconfident—completely confident), “How sure are you that your attitude toward Barack Obama is correct?” (completely unsure—completely sure), and “How certain are you of your attitude toward Barack Obama?” (completely uncertain—completely certain). These same items were used for assessing certainty in Romney attitudes where “Barack Obama” was replaced with “Mitt Romney.” The three items assessing certainty in Obama attitudes were found to be reliable ($\alpha = .88$), and the three items assessing certainty in Romney attitudes were also found to be reliable ($\alpha = .86$), so each set of three items were averaged together to form single indices of attitude certainty regarding Obama ($M = 5.33, SD = 1.32$) and attitude certainty regarding Romney ($M = 4.96, SD = 1.44$).
**Reasons for Certainty.** Upon indicating attitude certainty for each candidate, participants described why they were either certain or uncertain of their attitude toward each candidate. To customize instructions depending on how much confidence each participant expressed, responses to the certainty questions were averaged by the computer as the study progressed. Participants were instructed, for example, to “describe what has made you somewhat doubtful about how you feel about Barack Obama,” where the phrase “somewhat doubtful” could read *very doubtful, somewhat doubtful, somewhat confident*, or *very confident*, depending on the average of their responses to the three certainty questions. The same item immediately followed the Obama-related certainty questions and the Romney-related certainty questions. Certainty in attitudes for the preferred candidate was categorized as “very doubtful” for 2.2% of participants, “somewhat doubtful” for 14.0% of participants, “somewhat certain” for 41.0% of participants, and “very certain” for 42.8% of participants.

**Strength of Reasons for Certainty.** To measure the extent to which participants’ reasons for their level of certainty reflected strong vs. weak reasons, participants’ responses were coded by two independent raters. The raters received an Excel spreadsheet with only the participants’ responses and their indicated attitude certainty for both Obama and Romney visible. For each response, coders rated how strong it was as a reason for the indicated level of certainty on a 5-point scale anchored at “very weak reason” and “very strong reason” such that higher ratings indicated reasons perceived to be stronger. Raters provided their own judgments of strength—they were not explicitly given individual reasons that had been pretested as reflecting relatively strong or weak
reasons for certainty. Nevertheless, coders agreed on their ratings of reason strength; their ratings for reasons for certainty in Obama attitudes were significantly correlated, $r(224) = .56, p < .01$, and their ratings for reasons for certainty in Romney attitudes were also significantly correlated, $r(224) = .56, p < .01$. Because of this rate agreement, the two coders’ ratings were averaged to form both a measure of Obama certainty reason strength ($M = 2.84, SD = 1.04$) and Romney certainty reason strength ($M = 2.69, SD = .95$).

**Length of Reasons for Certainty.** In addition to having the reasons for attitude certainty coded for strength, the number of words used to explain what led to participants’ reported degree of certainty was also recorded for both Obama and Romney responses.

**Identifying Participants’ Preferred Candidate.** A multi-step approach was taken to identify participants’ preferred presidential candidate. This was used to display a prompt that challenged the candidacy of whichever person the participant leaned toward supporting.

All participants were asked whether they intended to vote in the 2012 presidential election, and they answered on a 6-point scale anchored at *definitely will not vote* and *definitely will vote*. Those who indicated that they intended to vote (response of 4 or greater, $n = 186$) were then asked: “When you vote in the upcoming election, which candidate will you vote for?” By contrast, those who indicated that they did not intend to vote (response of 3 or lower on the initial voting intention item, $n = 40$) were asked: “If you were to vote in the upcoming election, which candidate would you vote for?” For both versions of this question, participants were allowed to choose from three response
options: Barack Obama, Mitt Romney, and Other. Those who indicated that they intended (or would intend to) vote for Obama were identified as preferring Obama, and those who indicated that they intended (or would intend to) vote for Romney were identified as preferring Romney.

For participants who chose the “Other” response option, the computer referenced the previous attitude responses, and if a participant had previously indicated a more positive attitude toward Obama than toward Romney, he or she was identified as preferring Obama. If a participant had previously indicated a more positive attitude toward Romney than toward Obama, he or she was identified as preferring Romney.

If, however, a participant had both chosen the “Other” option in the voting intention question and reported equal attitudes toward Obama and Romney (n = 5), the computer defaulted to identifying the participant as preferring Romney. The choice of Romney as the default was decided at random.27

Need for Cognition. All participants responded to the NFC scale (Cacioppo, Petty, & Kao, 1984), an 18-item scale with items such as “I find satisfaction in deliberating hard and for long hours” and “I only think as hard as I have to” (reverse coded). Responses to these 18 items demonstrated good reliability (α = .88) and were thus averaged to form a single NFC score for each participant.

Dependent Variable: Resistance Effort.

Resistance to a counterattitudinal attack was induced with a brief prompt to defend one’s attitude. Participants were presented with a prompt that read: “Some have

27 The significance of the reported effects does not change when these five people without a clear candidate preference are removed from the analyses.
made the claim that [x] does not have the best possible plan for improving the economy if elected and is thus unlikely to be the best leader. How would you respond to this claim?”

A free-response box was available below the prompt into which participants were free to write as much or as little as they desired to respond to the counterattitudinal proposition. The number of words participants used in their responses was counted in Excel and used as an indication of effort as has been done in past research (e.g., Gal & Rucker, 2010).

The “[x]” in the prompt was replaced by each participant’s preferred candidate, identified using the procedures outlined above.

**Results**

Before running statistical analyses, new variables were created for each participant so that there would be variables to represent each participant’s attitude, certainty, strength of reasons for certainty and subjective knowledge specific to the presidential candidate about whom the participant was asked to defend (i.e., their preferred candidate). For example, if a participant preferred Mitt Romney, his or her score on the new certainty variable would be the person’s certainty in his or her attitude toward Romney. By contrast, if a participant preferred Barack Obama, his or her score on the new certainty variable would be person’s certainty in his or her attitude toward Obama. Overall, people reported relatively high certainty for the candidate identified as their preferred candidate ($M = 5.43, SD = 1.20$). People were less certain of their attitudes toward the candidate that was not identified as the preferred one ($M = 4.86, SD = 1.50$), $t(225) = 5.35, p < .001$. 

93
To assess whether the strength of a person’s reasons for their degree of certainty in their attitude toward their preferred candidate could predict the number of words used in response to a counterattitudinal attack, a linear regression analysis was conducted, entering certainty and reason strength as predictors. Results demonstrated a marginally significant main effect of certainty, such that higher degrees of candidate attitude certainty was related to using more words in response to a counterattitudinal attack, $B = 2.10$, $t(223) = 1.76$, $p = .08$, 95% CI: [-.25, 4.45]. Importantly, however, there is a unique effect of reason strength such that participants who provided reasons for their certainty later rated to be relatively strong used significantly more words in response to a counterattitudinal attack than those who gave reasons that were rated as relatively weak, $B = 9.13$, $t(223) = 6.41$, $p < .001$, 95% CI: [6.33, 11.94].

It is possible, however, that other factors are affecting both the strength of participants’ reported reasons for certainty and the effort put into defending their political attitudes. For instance, people high in NFC may both produce reasons for certainty that seem stronger because they appear more thoughtful and generate lengthier responses to counterattitudinal attacks. Additionally, a general tendency to write more lengthy responses may be at play in that reasons for certainty written with more words are judged to be strong reasons and that these same people will write longer responses to a counterattitudinal attack.

---

28 When considering only participants whose certainty in their attitudes toward their preferred candidate was categorized as “somewhat certain” or “very certain” ($N = 189$), the effect of reason strength on number of words remains significant, $B = 9.24$, $t(186) = 5.58$, $p < .001$, 95% CI: [5.97, 12.50]. However, likely because of the reduced variance, the unique effect of degree of certainty is eliminated, $B = .31$, $t(186) = .17$, $p = .87$, 95% CI: [-3.38, 4.00].

29 Indeed, number of words used in writing the reasons for attitude certainty was correlated with coders’ ratings of reason strength for both Obama ($r = .63$, $p < .001$) and Romney ($r = .71$, $p < .001$) responses.
To account for these possibilities, a separate regression analysis was conducted, including NFC and the number of words used in participants’ reason for certainty as additional predictors. Results demonstrate that the added predictors both show significant effects in this model. Participants higher in NFC demonstrated greater resistance effort, $B = 5.26, t(221) = 2.40, p = .02, 95\% \text{ CI:} [.93, 9.58]$, and those who used many (vs. few) words to describe their reasons for certainty tended to use more words to defend that attitude, $B = .26, t(221) = 3.23, p = .001, 95\% \text{ CI:} [.10, .42]$. Importantly, however, controlling for these other variables, the strength of participants’ reasons for their attitude certainty still significantly predicts resistance effort, $B = 4.54, t(221) = 2.39, p = .02$. Degree of certainty, however, is no longer even a marginally significant predictor, $B = 1.68, t(221) = 1.42, p = .16, 95\% \text{ CI:} [-.65, 4.00]$.

**Discussion**

In this study, perceived bases for attitude certainty in a political domain were assessed and shown to predict the effort exerted in a persuasion resistance task. People provided both their attitudes and their certainty in their preferred presidential candidates. Those who provided reasons for their attitude certainty that were later coded as being stronger (vs. weaker) reasons went on to use more words in defending against a brief counterattitudinal message, and this held even after controlling for other factors such as NFC and individual tendency to write long or short justifications. Thus, the strength of a person’s reasons for being certain of candidate attitudes predicts how effortfully he or she will defend those attitudes.

---

$^{30}$The significance of all effects were not affected when using the log transformation of the number of words as the key dependent measure.
These data show how the results of the previous studies extend to a consequential attitude topic. Although the measure of the strength of perceived reasons for certainty and thoughtful resistance to persuasion were less refined than the measures used in prior studies, the results still stand as a compelling conceptual replication of the key underlying effect.
Chapter 5: Perceptions of Reason Strength

The previous five studies have all shown that thoughtful engagement with the persuasion resistance process is associated with perceiving oneself to have relatively strong or weak reasons for attitude confidence. The more people report having confidence bases that are normatively considered strong (vs. weak), the more they show signs of thoughtfully defending their attitudes against persuasion by picking apart and finding fault in the messages’ arguments. This thoughtful resistance was also shown to be consequential in that the resulting attitudes were held more confidently and were more predictive of behavioral intentions.

Although promising, the studies presented thus far do not address whether people themselves see these reasons for certainty as differentially strong or weak and whether this perception is a key component of the previously reported relationships. It may be that the reasons that are normatively rated as stronger than other reasons differ on a dimension beyond just this perception of strength, and that dimension is what is critical. The studies in this section thus look more directly at people’s perceptions that their own reasons for certainty are relatively strong or weak. Study 9 presents a new measure that directly assesses participants’ perceptions that their reasons for certainty are strong and tests whether this perception corresponds to how participants say they would react to a hypothetical persuasive message. Study 10 integrates this new measure into the research
paradigms used in Chapter 3. That is, it examines whether the perceptions of reason strength mediate the previously documented effects of endorsing individual reasons pre-tested to reflect normatively strong vs. weak confidence bases. Finally, Study 11 manipulates perceptions of reason strength directly to test the causal impact of perceiving one’s reasons for certainty as being relatively strong or weak on reactions to a persuasive message.

**Study 9**

As a first test of the role that perceived strength of one’s reasons for certainty plays in the persuasion resistance process, a new measurement instrument was developed. Rather than assessing the extent to which people think that they are confident because of specific, individual reasons, this study asked participants to report how strong, good, acceptable, and satisfactory their reasons for their own attitude certainty are. In this way, we can examine whether such perceptions are indeed important for the means by which people resist persuasion. If, however, the previously documented effects are driven by some other feature that distinguishes the “strong” from the “weak” confidence bases, then this more direct measure of perceived strength of reasons should not predict such outcomes.

This study was designed to validate the new measure and test its impact in a simplified survey design. Rather than give participants a persuasive message to which they could actually respond, we instead opted for an approach more similar to that of Study 8, in which participants were presented with a hypothetical challenge to their current attitude. To assess the way in which participants would resist persuasion, we
administered the questionnaire developed by Jacks and Cameron (2003), which consists of several strategies for resisting persuasion and instructs people to indicate how likely they would be to use each one in a hypothetical persuasion setting. This approach also allows us to capture resistance strategies that may be more difficult to detect through the thought listing and self-report measures used in prior studies (e.g., choosing to focus attention away from attitude-threatening information). We also chose a new attitude object—same-sex marriage—as an opportunity to further generalize these findings to a new and consequential topic.31

Simply, the hypothesis for this study was that the stronger people perceived their own reasons for attitude certainty, the more they would expect to engage in thoughtful resistance strategies (e.g., counterarguing) and the less they would expect to engage in non-thoughtful resistance strategies (e.g., selective exposure).

Method

Participants. Two-hundred thirty-five Ohio State University undergraduates ($M_{\text{age}} = 19.06, SD = 2.44; 49.4\%$ male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted as an online study that participants could complete from their own computers. As with Study 8, the sample size is quite a bit larger than previous studies because these data were collected as part of a larger study that required the large sample size. However, because this was the first time we were testing the relationships between perceived strength of one’s reasons for certainty and the strategies people say they would

---

31 This study was conducted in November of 2013, before the 2015 United States Supreme Court ruled that same-sex marriage was legal nationwide.
use to resist persuasion, this larger sample size provides the power needed to uncover
effects that may end up being rather small. Power analyses show that \( N = 235 \) has enough
power to find effects as small as \( f^2 = .03 \) at .80 power (\( \alpha = .05 \)).

**Procedure.** This study was collected as part of a larger online survey aimed at
pilot testing materials for future research. These measures were collected at the end of
that longer survey. Because survey fatigue was a concern, we included a measure of how
seriously the participant took the study. When asked, 16 participants reported that they
had taken the study “not at all seriously” and were thus excluded from subsequent
analyses, leaving a final sample size of \( N = 219 \).\(^{32}\)

Participants first reported their attitudes toward same-sex marriage and also
indicated how sure they were of their attitude. In addition, they reported how much they
thought the reasons underlying their particular degree of certainty were strong vs. weak
reasons for certainty. Finally, they read a brief prompt about how their attitudes toward
same-sex marriage might be challenged by other people or the media, and they were
asked to indicate how they thought they would react to such an event by rating the
likelihood of engaging in a number of behaviors that reflect established ways in which
people resist persuasion.

**Predictor Variables.**

**Attitudes.** Participants first indicated their attitudes toward same-sex marriage on
four 9-point semantic differential scales (*extremely bad*—*extremely good*; *strongly

---

\(^{32}\) Overall, the significance of the reported effects does not change when using the whole sample. However, the partial correlation between perceived reason strength and expected counterarguing (controlling for certainty) is marginal in the full sample, \( r(232) = .12, p = .06 \). Also, the raw correlation between certainty and expected negative affect is marginal the full sample, \( r(233) = -.12, p = .06 \).
dislike—strongly like; totally negative—totally positive; extremely harmful—extremely beneficial). Responses were averaged to form an index of people’s attitudes toward same-sex marriage, which tended to be relatively favorable overall ($M = 6.32$, $SD = 2.41$).

**Attitude Certainty.** After indicating their attitudes, participants were presented with the following question: “How sure are you about your overall attitude toward same-sex marriage?” They could respond on a 7-point scale anchored at “completely unsure” and “completely sure.” Overall, participants were reasonably sure of their attitudes ($M = 5.73$, $SD = 1.44$).

**Perceived Strength of Certainty Bases.** Four items were developed to assess participants’ perceptions that their certainty was based on relatively strong or weak reasons. They responded on 5-point scales to questions asking how strong, good, acceptable, and satisfactory they thought their reasons for their particular degree of certainty were. For instance, participants responded to the question: “To what extent would you say that your own reasons to be sure or unsure of your attitude toward same-sex marriage are strong reasons for certainty?” with a 5-point scale anchored at “not strong at all” and “extremely strong.” Responses showed good internal reliability ($\alpha = .92$) and were thus averaged to form an index of perceived strength whereby higher values correspond to perceiving greater strength of one’s reasons for confidence.

**Dependent Variables: Predicted Resistance Strategy**

All participants indicated the likelihood that they would engage in a number of responses to a hypothetical persuasive attack. These items were taken from Jacks and Cameron (2003) and measure the extent to which people think they will engage in the
following specific strategies to resist persuasion: counterarguing, attitude bolstering, assertions of confidence, source derogation, selective exposure, social validation, and negative affect. When they also used more objective measures to assess how people actually responded to a persuasive message, their data suggested that people tend to be relatively accurate in their expectations that they will engage in these resistance strategies (Jacks & Cameron, 2003, Study 7).

More specifically, the scale opens with a brief introduction:

*In our information-rich society, we are constantly being confronted with arguments, information, images, and advertisements designed to influence our attitudes and opinions in some way. In the following questions we are interested in how people resist being influenced to change their attitudes toward some issue, despite challenges to their way of thinking. For each of the following statements, please rate how likely you think you would be to respond in this way if your opinions regarding SAME-SEX MARRIAGE were challenged in some way.*

They survey then provided the prompt: “If someone tried to convince me that I was wrong about same-sex marriage…” Participants then indicate the likelihood that they would respond in each of 14 different ways, presented in a random order, using 9-point scales anchored at “not at all likely” and “extremely likely.” The scale includes two items for each resistance strategy. For example, *counterarguing* is assessed by measuring participants’ perceived likelihood that they would respond to a counterattitudinal challenge “by arguing or debating with the person who is challenging my opinion” and “by thinking about or verbalizing why the person’s arguments are faulty.”
Internal reliabilities were good for six of the seven resistance strategies: counterarguing ($\alpha = .76$), attitude bolstering ($\alpha = .83$), assertions of confidence ($\alpha = .53$), source derogation ($\alpha = .83$), selective exposure ($\alpha = .56$), and negative affect ($\alpha = .74$). The items were thus averaged to create single indices of each resistance strategy. Internal reliability was relatively weak for the two items assessing social validation ($\alpha = .20$); however, because these items have been used to assess this strategy in the past, we still averaged them to form an index of social validation. We note, though, that Jacks and Cameron (2003) also found the two items indexing social validation to be less internally consistent than the items used to index the other strategies.

**Results**

First, the data were submitted to a simple correlation analysis, and the results revealed a strong relationship between certainty and perceived reason strength, $r(217) = .72$, $p < .001$. In other words, the more certain people were of their attitudes, the more they thought their certainty was relatively well-founded.

Next, we tested the relationships between certainty, perceived strength of certainty bases, and subjective likelihood of engaging in specific resistance strategies. First, raw correlation analyses were run to establish relationships between certainty and resistance strategies and between perceived reason strength and resistance strategies. Then a set of partial correlation analyses were run to examine the relationships between perceived reason strength and resistance strategies, controlling for degree of certainty (akin to the analysis approach in the previous studies). Results of these analyses are presented in Table 7. Notably, when controlling for degree of certainty, perceiving a
stronger basis for attitude certainty was associated with greater subjective likelihood of counterarguing, $r(216) = .15, p = .03$, and attitude bolstering, $r(216) = .19, p = .01$, both of which are relatively thoughtful ways of responding to counterattitudinal persuasive communication. Similarly, perceiving a stronger basis for attitude certainty was associated with a reduced subjective likelihood of derogating the source, $r(216) = -.14, p = .03$, and simply ignoring counterattitudinal information (selective exposure), $r(216) = -.14, p = .03$.

It was possible that some of these relationships may have depended on people’s attitudes toward the issue itself. Unlike Studies 4 – 7, which considered topics about which people tended to have similar attitudes, there is more variation in attitudes toward same-sex marriage. Thus, the relationship between perceived strength of one’s certainty bases and anticipated strategy for responding to counterattitudinal information may depend on whether the person is in favor of or against same-sex marriage.

Data were thus submitted to series of multiple regression models testing the interaction between attitudes and perceived strength of one’s certainty bases (controlling for degree of certainty) on all seven potential ways of resisting persuasion. Results revealed that attitudes do not moderate the effect of perceived strength of certainty bases on anticipated counterarguing ($p = .95$), attitude bolstering ($p = .94$), asserting confidence ($p = .43$), source derogation ($p = .19$), negative affect ($p = .23$) or selective exposure ($p = .08$).$$33$

---

33 The marginal interaction on selective exposure, $B = -.10, t(230) = -1.74, p = .08$, 95% CI: [-.22, .01] revealed that among people who perceive that their reasons for certainty are relatively strong (1 SD above the mean), there is a negative relationship between attitudes and anticipated selective exposure such that more negative attitudes toward same-sex marriage are associated with greater expectations of responding to
Interestingly, an unexpected interaction emerged for social validation, $B = - .12$, $t(230) = - 2.17$, $p = .03$, 95% CI: [-.22, -.01]. Among people who perceive that their reasons for certainty are relatively strong (1 SD above the mean), there is a negative relationship between attitudes and anticipated social validation such that more negative attitudes toward same-sex marriage are associated with greater expectations of using social validation (“praying for strength” and thinking about the fact that other people share their convictions), $B = -4.83$, $t(230) = -3.44$, $p < .001$, 95% CI: [-.32, -.09]. There is no such effect among people who perceive that their reasons for certainty are relatively weak (1 SD below the mean), $B = .02$, $t(230) = .26$, $p = .80$, 95% CI: [-.16, .20].

Discussion

The results of Study 9 offer preliminary evidence that the perception that one’s basis for confidence is relatively strong, without accounting for any specific confidence bases, predicts a person’s way of engaging with counterattitudinal persuasive communication. While promising, this study only considered people’s expectations that they would respond to a persuasive communication in these ways. Although Jacks and Cameron (2003) argue that these expectations are relatively accurate, they are not perfectly calibrated to a person’s response when faced with an actual persuasive message. Therefore, following up on Study 9’s suggestive results, the next study considers people’s responses to an actual message and also situates these findings in the context of the results of the earlier studies.

persuasion attempts by tuning out things they disagree with $B = -.14$, $t(230) = -2.23$, $p = .03$, 95% CI: [-.27, -.02]. There is no such effect among people who perceive that their reasons for certainty are relatively weak (1 SD below the mean), $B = .05$, $t(230) = .58$, $p = .58$, 95% CI: [-.14, .25].
Study 10

We tested the role of perceived strength of one’s confidence bases by mimicking Study 4 almost exactly. The key difference is that participants reported how strong, good, acceptable, and satisfactory they thought their bases for certainty were after completing the standard set of confidence bases items. In addition, participants reported how confident they were in their post-message attitudes in an attempt to replicate the finding from Study 7 that the thoughtful resistance processes serve to strengthen post-message attitudes even if the attitudes themselves remain unchanged.

Method

Participants. One-hundred thirty-five Ohio State University undergraduates ($M_{age} = 19.27, SD = 1.24; 44.4\%$ male) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Sessions were conducted as an online study that participants could complete from their own computers. $N=11$ participants reported taking the study on their mobile phones. Due to issues with presenting the persuasive message on mobile phone interface (i.e., ability to actually read the message text), these participants were excluded from analyses.$^{34}$

Sample size was determined to be able to replicate the effects of previous studies of similar design (Studies 4, 5, and 7) and to extend those results with the new measure of perceived strength of confidence bases (whose effect sizes were unknown). Thus, the

---

$^{34}$Notably, however, utilizing the full sample does not change the significance of the reported results. The only difference is that the unique effect of perceived reasons for certainty (controlling only for initial degree of certainty) on post-message certainty is marginal in the full sample, $B = .09, t(132) = 1.87, p = .06$. 

106
average sample size of those previous studies ($N = 90$) was increased within the bounds of reasonable data collection opportunities.

**Procedure.** The procedure was very similar to that of Study 4 but with two key changes. First, after completing the standard set of items to assess perceived reasons for certainty, participants reported how strong they thought their reasons were. Second, participants completed a measurement of certainty regarding their attitudes following the message, as in Study 7.

**Predictor Variables.**

*Pre-message Attitudes Toward Recycling.* Initial attitudes toward recycling were assessed using the same questions as other studies using this topic, and they again showed good internal reliability ($\alpha = .90$) and were thus averaged to form an index of attitudes toward recycling with higher scores indicating more positive attitudes ($M = 7.97, SD = 1.34$). In this study, $N = 5$ participants reported attitudes below the midpoint of the scale and were excluded, following the criterion used in all other studies. The final sample size was thus $N = 119$.

*Pre-message Attitude Certainty.* Attitude certainty was assessed with the three items used in Study 4, and they were again found to be reliable ($\alpha = .90$), so they were averaged together to form a single index of attitude certainty ($M = 5.05, SD = .88$). The same three items assessing pre-message attitude certainty were used to assess certainty in participants’ post-message recycling attitudes. The items again demonstrated good internal reliability ($\alpha = .93$), so they were averaged together to form a single index of post-message attitude certainty ($M = 4.60, SD = .93$).
**Perceived Certainty Bases.** This variable was assessed as it was in prior studies. Internal reliability was acceptable for both strong ($\alpha = .64$) and weak ($\alpha = .87$) perceived bases for recycling attitudes. Each set of items was thus averaged to form composite scores of strong reasons and weak reasons, and an overall composite score was computed by subtracting average endorsement of weak reasons from average endorsement of strong reasons. Thus, higher scores on this measure indicate the tendency to endorse strong over weak reasons for positive attitudes toward recycling.\footnote{As before, participants tended to endorse the strong reasons for certainty to a greater extent ($M = 3.96$, $SD = 1.08$) than the weak reasons for certainty ($M = 1.88$, $SD = 1.20$), $t(134) = 14.26$, $p < .001$.}

**Perceived Strength of Certainty Bases.** Following the endorsement of specific reasons for certainty, participants indicated how strong they thought their reasons for certainty were using the same four items included in Study 9. Responses again showed good internal reliability ($\alpha = .88$) and were thus averaged to form an index of perceived strength of reasons whereby higher values correspond to perceiving greater strength of one’s reasons for confidence.

**Dependent Variables.**

**Post-message Attitudes Toward Recycling.** Attitudes after reading the anti-recycling message were measured using the same scale as the pre-message attitude reports. Responses again demonstrated good internal reliability ($\alpha = .95$), so they were averaged to form an index of attitudes toward recycling after reading the persuasive message ($M = 7.05$, $SD = 1.51$). The persuasive message was again influential on average; attitudes were different before and after exposure to the anti-recycling arguments, $t(118) = 10.11$, $p < .001.$

\footnote{As before, participants tended to endorse the strong reasons for certainty to a greater extent ($M = 3.96$, $SD = 1.08$) than the weak reasons for certainty ($M = 1.88$, $SD = 1.20$), $t(134) = 14.26$, $p < .001.$}
**Perceived Thoughtful Resistance.** To measure the extent to which participants thought they had engaged in thoughtful resistance to persuasion, we administered the same two questions used in Studies 4, 5, and 7 to measure perceived counterarguing ($\alpha = .68$).

**Results**

The data were first submitted to correlation analysis to test whether or not people actually perceived greater strength in their reasons for certainty consistent with the way we have been treating this variable in the prior studies. The results show a positive correlation with our index of endorsing relatively strong confidence bases over weak ones and the subjective perception of strength in one’s reasons for certainty, $r(117) = .48$, $p < .001$. This relationship holds even controlling for degree of initial certainty, $r(116) = .35$, $p < .001$. Indeed, just the index of endorsing “strong” reasons positively correlates with overall perceived reason strength, controlling for degree of certainty, $r(116) = .32$, $p < .001$, and just the index of endorsing “weak” reasons negatively correlates with overall perceived reason strength, controlling for degree of certainty, $r(116) = -.20$, $p = .03$.

Given this relationship between endorsing particular reasons for certainty and subjective perceptions of how strong one’s bases for confidence are, we next tested whether these perceptions mediate the effects of the former measure on the outcomes of interest in the prior studies. All indirect effects were tested using the PROCESS macro for SPSS (Hayes, 2013), using a bootstrapping method with 10,000 iterations.

**Attitudes.** Data were first submitted to a multiple regression model, entering initial certainty, initial attitudes, and perceived reasons for certainty as simultaneous
predictors of post-message attitudes. As expected, initial attitudes predicted post-message attitudes, \( B = .72, t(115) = 5.18, p < .001, 95\% \text{ CI: [.44, .99]} \). Consistent with the typical effect of certainty on resistance, greater initial certainty was associated with more positive post-message attitudes, but the effect was not significant in this study, \( B = .23, t(115) = 1.24, p = .22, 95\% \text{ CI: [-.14, .60]} \). Finally, as before, endorsing relatively strong over weak reasons for certainty did not predict post-message attitudes when controlling for initial attitudes and degree of certainty, \( B = .11, t(115) = 1.67, p = .10, 95\% \text{ CI: [-.02, .25]} \).

Next, perceived strength of certainty bases was added to the model. Interestingly, this measure of perceived strength marginally predicted attitudes such that greater perceived strength was associated with more positive post-message attitudes, \( B = .29, t(114) = 1.79, p = .08, 95\% \text{ CI: [-.03, .60]} \), indicative of resistance. Indeed, despite the lack of a direct effect on attitudes, endorsing relatively strong over weak reasons for certainty predicted attitude change indirectly via perceived strength of reasons, \( B = .05, SE = .03, 95\% \text{ CI: [.002, .130]} \).

**Perceived Thoughtful Resistance.** Curiously, unlike the prior studies, endorsing relatively strong over weak reasons for certainty was not significantly related to self-reported counterarguing, \( B = -.02, t(116) = -.34, p = .74, 95\% \text{ CI: [-.16, .12]} \).\(^{36}\) Initial degree of certainty, however, was uniquely associated with this measure, \( B = .34, t(116) = 2.27, p = .03, 95\% \text{ CI: [.04, .64]} \). Interestingly, however, when entering the

\(^{36}\) Additional analyses presented in Appendix E suggest that this because endorsing weak reasons for certainty was *positively* associated with self-reported counterarguing. It is unclear why this occurred in the present study. Endorsing strong reasons was also positively (thought nonsignificantly) associated with self-reported counterarguing, consistent with the other studies.
aforementioned perceived reasons index, degree of certainty, and perceptions of reasons’
strength in a model predicting self-reported counterarguing, the measure of perceived
strength significantly predicted this measure such that self-reported counterarguing
increased as perceived strength increased, $B = .55$, $t(116) = 3.39$, $p = .001$, 95% CI: [.23,
.88]. Indeed, despite the lack of a direct effect on self-reported counterarguing, endorsing
relatively strong over weak reasons for certainty predicted perceived thoughtful
resistance indirectly via perceived strength of reasons, $B = .08$, $SE = .03$, 95% CI: [.03,
.17].

**Post-message Certainty.** To test whether the thoughtful resistance process
predicted by perceptions of strong confidence bases result in stronger post-message
attitudes, we conducted a sequential mediation analysis to examine the indirect effect of
endorsing strong over weak reasons for certainty on post-message attitude certainty via
its effects of perceiving strong confidence bases and thus engaging in more thoughtful
resistance strategies. To do so, we utilized Model 6 in the PROCESS SPSS macro
(Hayes, 2013), entering initial degree of certainty as a covariate. First, we entered the
standard index of perceived reasons for certainty and initial degree of certainty as
simultaneous predictors of post-message certainty. Results show that initial certainty
uniquely predicts post-message certainty, $B = .44$, $t(116) = 4.38$, $p < .001$, 95% CI: [.24,
.64]. Over and above this relationship, however, endorsing relatively strong over weak
reasons for certainty is positively related to post-message certainty, $B = .12$, $t(116) =
2.45$, $p = .02$, 95% CI: [.02, .21].
Next, we entered the standard index of perceived reasons for certainty, perceived strength of confidence bases, self-reported counterarguing, and initial degree of certainty as simultaneous predictors of post-message certainty. Most notably, self-reported counterarguing uniquely predicted post-message certainty such that greater reports of counterarguing corresponded to greater certainty in attitudes following the message, \( B = .34, t(114) = 6.17, p < .001, 95\% \text{ CI: [.23, .45]} \). Additionally, perceived reasons for certainty, \( B = .13, t(114) = 2.83, p = .006, 95\% \text{ CI: [.04, .22]} \), and initial degree of certainty, \( B = .28, t(114) = 2.78, p = .006, 95\% \text{ CI: [.08, .48]} \), emerged as significant positive predictors of post-message certainty. Perceived strength of confidence bases, however, did not independently predict post-message certainty, \( B = .06, t(114) = .63, p = .53 \).

Most importantly, the indirect effect of endorsing strong over weak perceived reasons for certainty on post-message attitude certainty via its effect on perceived strength of confidence bases and that variable’s corresponding effect on self-reported counterarguing was found to be significant, \( B = .03, SE = .01, 95\% \text{ CI: [.01, .07]} \) (Figure 2).

**Discussion**

These results extend the findings of the previous studies, showing that the previously used measure of people’s endorsement of relatively strong and weak bases for confidence is correlated with people’s own perceptions of the strength of their reasons for certainty. Moreover, this direct assessment of how strong people think their reasons for certainty are mediates the effects of endorsing the individual confidence bases. Therefore, this evidence shows that the previously documented effects of perceived reasons for
certainty on thoughtful resistance and post-message confidence are plausibly due to people’s perceptions that their reasons for certainty are relatively strong or weak.

This study also presented an interesting unexpected finding. Prior studies showed no relationships between reasons for certainty and degree of attitude change. It seemed as though in the earlier studies that it was certainty itself that was generally predictive of degree of resistance and that the perceived reasons for certainty were instead more directly tied to the way in which the person achieved resistance. However, when we measured people’s own perceptions that their reasons for certainty were strong or weak, this more direct measure of perceived strength of one’s confidence bases actually did predict post-message attitudes. Greater perceptions that one’s reasons for certainty were strong corresponded to greater resistance (i.e., attitudes that remained highly positive following the message). Another way of putting it is that greater perceptions that one’s reason for certainty were weak corresponded to more message-consistent attitudes. This suggests that when people actually acknowledge that their confidence originates from weak bases, they are less resistant to counterattitudinal arguments.

One limitation of Studies 9 and 10, however, is that they rely on measurements of people’s perceptions of basis strength. The final study thus aims to provide a more stringent test of the causal influence of how strong people perceive their reasons for certainty are. By manipulating perceived strength directly, independent of any specific potential confidence bases, the final study examines where the mere perception that one’s attitude certainty is founded upon relatively strong bases leads to more thoughtful responses to a persuasive message. The following study also allows for a test of the
replicability of the persuasion findings from Study 10 in an experimental rather than a correlational design. That is, if perceiving one’s confidence bases as weak really does reduce resistance to persuasion, then inducing that perception directly should lead to more message-consistent attitudes.

**Study 11**

To establish the causal influence of the mere perception that one’s reasons for attitude certainty are relatively strong or weak, Study 11 followed a similar procedure as Study 10 except that it included a false feedback manipulation intended to induce different perceptions of participants’ confidence bases. Unlike Study 6, which used a similar false feedback approach to lead people to perceive that their certainty was founded upon a set of specific bases, the manipulation in the present study was instead designed to lead people to perceive that their certainty was founded upon “strong” or “weak” bases without ever mentioning any specific bases. We hypothesized that participants who were led to perceive their confidence bases as strong (vs. weak), regardless of any specific reasons that they might perceive for their certainty, would have more thoughtful responses to a counterattitudinal persuasive message. Also, potentially replicating the attitude change finding in Study 10, it was possible that inducing people to perceive that their reasons for certainty were, in fact, weak (vs. strong) would lead to less overall resistance to persuasion (i.e., more message-consistent attitudes).

**Method**

**Participants.** One-hundred forty-eight Ohio State University undergraduates ($M_{age} = 18.59$, 33.8% male) enrolled in introductory psychology who received credit
toward fulfilling a course requirement participated in the study. On the same measure used in Study 9, two participants indicated that they did not at all take the study seriously and were thus excluded from the analyses, leaving a total sample size of \( N = 146\).\(^{37}\) Sessions were conducted in a computer lab in groups of one to ten people at a time. Dividers between computers prevented participants from seeing each other’s computer screens.

Study 11’s design is a simple two-condition experiment. To ensure adequate power without knowing the manipulation’s strength \textit{a priori}, we chose a sample that would accommodate roughly \( n = 75 \) per condition. Power analyses show that this sample size provides .80 power (at \( \alpha = .05 \)) to detect medium-size effects of the manipulation (\( f = .23 \)).

\textbf{Procedure.} At the beginning of the study, the participants reported their attitudes toward recycling and indicated their certainty in their attitudes. Then, to add context to the impending false feedback manipulation, participants responded to a scale similar to the ones used in prior studies to measure perceived bases of certainty so that participants would find it plausible that the experimenters had some basis to provide feedback on their reasons for certainty. Following this, participants were exposed to a false feedback induction to manipulate how strong the reasons they endorsed for certainty were claimed to be. All participants then read an essay arguing against recycling, listed their thoughts...

\(^{37}\) Overall, the significance of effects reported for this study does not change when using the full sample. One exception to this is that the reported marginal interaction between perceived reasons for certainty and the manipulation on the manipulation check is significant in the full sample, \( B = .29, t(143) = 2.09, p = .04, 95\% \text{ CI:} [.005, .162] \). Also, the reported marginal effect of the manipulation on post-message attitudes (controlling for pre-message attitudes and pre-message certainty) is significant in the full sample, \( F(1, 144) = 3.94, p = .05 \).
in response to the message, indicated their recycling attitudes again, and reported how likely they were to recycle in the future. At the conclusion of the experiment, participants were fully debriefed and dismissed.

**Predictor Variables.**

**Pre-message Attitude.** Initial attitudes toward recycling were assessed on the same four 9-point semantic differentials used in prior studies with recycling as the target of evaluation ($\alpha = .90$). The items were averaged to form an index of attitudes toward recycling with higher scores indicating more positive attitudes ($M = 8.32$, $SD = 1.10$). No participants indicated attitudes lower than the midpoint of the scale.

**Pre-message Attitude Certainty.** Attitude certainty was assessed using the same three items used in previous studies with recycling as the target of evaluation ($\alpha = .68$). These items were again averaged together to form a single index of attitude certainty ($M = 5.17$, $SD = .77$).

**Perceived Reasons for Certainty.** This variable was measured as it was in Studies 4, 5, 7, and 10. The three items comprising strong reasons ($\alpha = .63$) and the three items comprising weak reasons ($\alpha = .87$) again showed good reliability.\(^{38}\)

**False Feedback.** After the participants completed the filler scale assessing their perceived bases for certainty, they saw a screen that said “Please wait while the computer runs a ‘confidence analysis.’” The computer then loaded one of two feedback screens, depending on the condition to which participants had been randomly assigned. In this feedback, all participants were told that “all of the reasons for certainty we provided are

\(^{38}\) As before, people tended to endorse the strong reasons ($M = 4.44$, $SD = 1.33$) more than the weak reasons ($M = 1.90$, $SD = 1.32$), on average, $t(147) = 18.23$, $p < .001$. 

116
legitimate bases for certainty and reflect reliable means through which people come to be confident in their opinions.” In the strong reasons condition, however, the feedback continued, “the reasons that you most consistently endorsed are ones that other people think are particularly compelling.” The feedback goes on to say that individual reasons were pre-tested in another sample and that the reasons the participant endorsed receive an average score of “9.5 out of 10,” which means that people generally perceive them as “relatively good, strong bases for opinion confidence.” By contrast, in the weak reasons condition, participants learn that the reasons they most consistently endorsed were ones that people think are relatively “unconvincing,” receiving an average score of “4.5 out of 10” (i.e., “relatively unfavorable, weak bases for opinion confidence”) in pre-testing.

**Manipulation Check.** At the end of the study, participants were asked to think back to the reasons for certainty that they had endorsed on the scale items earlier in the study. Specifically, as in Study 10, participants rated the extent to which they thought their bases of certainty were strong, good, acceptable, and satisfactory. Overall, these items showed high internal reliability (α = .88) and were thus averaged to form an index of perceived strength of participants’ reasons to be certain of their attitudes toward recycling.

**Dependent Variables.**

**Thought Listing.** Thoughts in response to the message were recorded as they were previously. To simplify the procedure, participants coded their own thoughts for whether they were in favor of recycling, neutral to recycling, against recycling, or
irrelevant to recycling. New variables were thus created representing the number of each type of thought that participants listed.

**Post-message Attitudes.** Attitudes after reading the message were measured using the same scale as the pre-message attitude reports. Responses again demonstrated good internal reliability ($\alpha = .95$), so they were averaged to form an index of attitudes toward recycling after reading the persuasive message ($M = 7.23, SD = 1.56$).

**Behavioral Intentions.** Recycling intentions were measured with three questions with 5-point response scales. These items assessed intentions to recycle in general, to recycle paper products specifically, and to throw recyclable products in the trash (reverse scored) in the next week. These items demonstrated good internal reliability ($\alpha = .70$) and were thus averaged to form an index of intentions to engage in pro-recycling behavior in the next week ($M = 3.52, SD = .80$).

**Results**

Data were first submitted to a between-subjects t-test to examine whether the experimental groups differed in the strength of their perceived reasons for certainty they indicated before receiving the false feedback. Participants who had been assigned to the “strong reasons” condition ($M = 2.40, SD = 1.53$) did not differ in their initial endorsement of various confidence bases from participants who had been assigned to the “weak reasons” group ($M = 2.70, SD = 1.84$), $t(144) = 1.06, p = .29$. Thus, it appears that random assignment was successful.

**Manipulation Check.** Data were submitted to a t-test analysis testing the effect of the feedback manipulation on the perceptions of holding strong reasons for attitude
certainty. Results reveal a marginally significant effect of feedback on perceived basis strength such that participants in the weak reasons condition later reported having confidence bases that they thought were weaker ($M = 3.30, SD = .91$) than participants in the strong reasons condition ($M = 3.54, SD = .69$), $t(144) = -1.78, p = .08$.

Data were also submitted to a hierarchical multiple regression model predicting perceptions of holding strong reasons for attitude certainty. Initial degree of certainty, measured perceived reasons for certainty, and the manipulation were entered in Step 1, and the interaction between measured reasons and the manipulation was entered in Step 2. Results are interpreted from the first step of the model in which they appear. As documented in the above t-test, there was a positive main effect of the manipulation, $B = .14, t(142) = 2.06, p = .04, 95\%$ CI: [.01, .27]. There was also a main effect of initial certainty such that greater certainty was associated with greater perceptions that the bases of that certainty were strong, $B = .28, t(142) = 3.20, p = .002, 95\%$ CI: [.11, .45]. There was no unique main effect of measured reasons for certainty, however, $B = .01, t(142) = .21, p = .83, 95\%$ CI: [-.07, .09].

There was, however, a marginally significant interaction between measured perceived reasons for certainty and the manipulation, $B = .07, t(141) = 1.87, p = .06, 95\%$ CI: [-.004, .15] (Figure 3a). The interaction was such that the feedback manipulation significantly affected perceived strength of confidence bases the more people endorsed strong individual reasons over weak ones (at 1 SD above the mean: $B = .26, t(141) = 2.79, p = .01, 95\%$ CI: [.08, .45]). At relatively weak perceived reasons for certainty, the manipulation did not affect perceived strength, $B = .01, t(141) = .14, p = .89, 95\%$ CI: [-
.17, .20]. Notably, however, the relationship between endorsed reasons for certainty and perceived strength of one’s reasons for certainty was not significant within either conditions, $ps > .11$.

**Thought Valence.** A set of ANCOVA analyses were run to test the effects of the manipulation on the types of thoughts participants generated in response to the persuasive message. Each model tested the effect of the manipulation, controlling for degree of certainty itself, on the number of message- unfavorable (i.e., pro-recycling), message-favorable (i.e., anti-recycling), and message-neutral thoughts respectively. The manipulation significantly affected the number of resistant, message-unfavorable thoughts such that participants who were led to believe that they had weak reasons for certainty generated fewer such thoughts ($M = 1.09, SE = .19$) than participants who were led to believe that they had strong reasons for certainty ($M = 1.76, SE = .20$), $F(1, 143) = 5.53, p = .02, \eta^2_p = .04$. There was no evidence, however, that the manipulation affected the generation of the other types of thoughts, $ps > .30$. Also, in no case was certainty itself a significant predictor of the number of such thoughts generated, $ps > .15$

Another set of analyses were run to test whether measured perceived reasons for certainty interacted with the manipulation. For each thought valence variable, data were submitted to a hierarchical multiple regression model, entering initial certainty, measured perceived reasons for certainty, and the manipulation in Step 1 and the 2-way interaction term in Step 2. Results show that the effect of the manipulation on message-unfavorable thoughts remains when controlling for measured perceived reasons for certainty, $B = .35$, $t(142) = 2.46, p = .02, 95\%$ CI: [.07, .62]. There is no main effect of measured reasons, $B$
For message-favorable thoughts, however, no main effects emerged as significant \((p_s > .21)\), but there was an interaction between the manipulation and measured perceived reasons for certainty, \(B = -.15, t(141) = -2.11, p = .04, 95\% \text{ CI: } [-.28, -.01]\) (Figure 3c). The interaction is such that among people who endorse relatively strong (vs. weak) individual reasons for certainty (1 SD above the mean), receiving feedback that their reasons were weak led to more message-favorable thoughts \((\hat{y} = 1.41)\), compared to receiving feedback that their reasons were strong \((\hat{y} = .67)\), \(B = 4.25, t(141) = -2.22, p = .03, 95\% \text{ CI: } [-.70, -.04]\). There was no such effect of the manipulation among people who endorsed relatively weak (vs. strong) individual reasons for certainty (1 SD below the mean), \(B = .86, t(141) = .79, p = .43, 95\% \text{ CI: } [.19, .45]\). Analyzed slightly differently, within the strong reasons condition, increasing initial endorsement of strong (vs. weak) reasons for certainty was marginally associated with fewer message-favorable thoughts, \(B = -.19, t(141) = -1.73, p = .09, 95\% \text{ CI: } [-.40, -.03]\). However, within the weak reasons condition, increasing initial endorsement of strong (vs. weak) reasons for certainty was not significantly associated with message-favorable thoughts, \(B = .10, t(141) = 1.20, p = .24, 95\% \text{ CI: } [-.07, .28]\).

For message-neutral thoughts, no main effects nor the interaction emerged as significant, \(p_s > .31\).
Attitudes. Another ANCOVA was run to test the effect of manipulated strength of bases for certainty on the extent to which people successfully resisted attitude change in response to the message. Thus, the manipulation of strength was entered as a predictor of post-message attitudes, covarying initial attitudes and certainty. Participants who were told they had relatively weak reasons for being certain later indicated significantly less favorable attitudes toward recycling ($M = 7.00, SE = .15$) than participants who were told they had relatively strong reasons for being certain ($M = 7.46, SE = .16$), controlling for initial attitudes, $F(1, 142) = 3.54, p = .06, \eta^2_p = .02$. In this model, initial attitudes still also strongly predicted post-message attitudes, $F(1, 142) = 35.64, p < .001, \eta^2_p = .18$, but certainty only marginally predicted post-message attitudes, $F(1, 142) = 2.80, p = .10, \eta^2_p = .02$, supporting its overall effect on resistance.

Data were also submitted to a hierarchical multiple regression model predicting post-message attitudes. Initial degree of certainty, measured perceived reasons for certainty, and the manipulation were entered in Step 1, and the interaction between measured reasons and the manipulation was entered in Step 2. Results are interpreted from the first step of the model in which they appear. As documented in the above ANCOVA, there was a positive main effect of initial attitudes, $B = .67, t(141) = 5.91, p < .001, 95\% \text{ CI: [.44, .89]}$, a positive main effect of initial certainty, $B = .27, t(141) = 1.69, p = .09, 95\% \text{ CI: [-.05, .59]}$, and a positive main effect of the manipulation, $B = .21, t(141) = 1.84, p = .07, 95\% \text{ CI: [-.02, .43]}$. There was no unique effect of measured perceived reasons for certainty, $B = -.03, t(141) = -.46, p = .65, 95\% \text{ CI: [-.17, .10]}. $
There was, however, a significant interaction between the manipulation and measured perceived reasons for certainty, $B = .14, t(140) = 2.09, p = .04, 95\% CI: [.01, .27]$ (Figure 3d). This interaction was such that the manipulation affected post-message attitudes among people who endorsed stronger (vs. weaker) reasons for certainty (1 SD above the mean), $B = .45, t(140) = 2.79, p = .01, 95\% CI: [.13, .76]$. Among people who endorsed weaker (vs. stronger) reasons for certainty (1 SD below the mean), the feedback manipulation did not affect post-message attitudes, $B = -.03, t(140) = -.17, p = .87, 95\% CI: [-.34, .28]$. Notably, however, the relationship between endorsed reasons for the certainty and post-message attitudes was not significant within either condition, $ps > .10$.

**Behavioral Intentions.** Finally, we tested the extent to which the different responses to persuasion initiated by perceptions of having either strong or weak reasons underlying a general sense of attitude certainty would create differentially impactful attitudes. To do so, data were submitted to a multiple regression analysis predicting behavioral intentions in which the feedback manipulation and post-messages attitudes were entered as predictors in the first step, and their interaction term was entered in the second step. Results are interpreted in the first step of the model in which they appear.

There was a significant main effect of attitudes on behavioral intentions such that more positive attitudes toward recycling were associated with greater intentions to recycle in the next week, $B = .27, t(143) = 7.54, p < .001, 95\% CI: [.20, .35]$. There was no main effect of feedback on behavioral intentions, $p = .40$. Post-message attitudes and feedback did, however, interact to predict intentions, $B = .08, t(142) = 2.19, p = .03, 95\% CI: [.01, .15]$ (Figure 4). Although participants in the weak reasons condition showed
correspondence between their post-message attitudes and subsequent behavioral intentions, $B = .20$, $t(142) = 4.08$, $p < .001$, 95% CI: [.10, .30], participants in the strong reasons condition showed greater such correspondence, $B = .36$, $t(142) = 6.82$, $p < .001$, 95% CI: [.25, .46].

To test whether this effect was further moderated by the individual reasons for certainty that participants endorsed before receiving the feedback, the data were submitted to another multiple regression model, entering the feedback manipulation, post-message attitudes, measured perceived reasons for certainty, all 2-way interaction terms, and the 3-way interaction term as predictors of behavioral intentions. Results fail to support an overall 3-way interaction, $B = -.001$, $t(138) = -.04$, $p = .97$, 95% CI: [-.05, .05]. Thus, the above post-message attitude × feedback manipulation effect was not moderated by measured perceived reasons for certainty.

Discussion

As the results of Study 11 show, merely perceiving that one’s attitude certainty comes from relatively strong (vs. weak) reasons can be enough to prompt more thoughtful responses to a counterattitudinal persuasive message. Further, perceiving one’s attitude certainty as coming from strong (vs. weak) bases also leads to greater resistance to persuasion and attitudes that better predict behavioral intentions. Together, these findings extend the results of the previous studies by documenting the causal influence of perceptions of reason strength, independent of any specific reasons for certainty.

39 This interaction remains significant when controlling for initial attitude certainty and/or pre-message attitudes toward recycling.
It is worth noting that the manipulation tended to be most influential among participants who had endorsed relatively strong (vs. weak) reasons for their certainty prior to receiving the feedback. This could mean that it is easier to convince people who endorse stronger reasons for certainty that their confidence bases are either strong or weak, thus prompting a range of relevant resistance processes. It may be that people are especially likely to attend to and internalize feedback about the strength of their confidence bases when they already have a clear sense of their certainty’s origins, which are then either clearly bolstered by the feedback or undermined by the feedback.⁴⁰

---

⁴⁰ On average, people tended to endorse more strong (vs. weak) reasons for their certainty on the initial measurement. This means that 1 SD above the mean on this measure does reflect relatively strong reasons for certainty (4.25 on a scale from -6 to +6). It is more difficult to interpret the results at 1 SD below the mean on this measure because it does not necessarily reflect great endorsement of weak reasons for certainty (.86 on a scale from -6 to +6). Thus, this point on the continuum may represent “mixed” reasons for certainty or no discernible reasons for certainty rather “weak reasons” per se. More data are needed at the extreme low end of endorsed reasons for certainty to understand the full nature of these interaction patterns.
Chapter 6: General Discussion

The prior research on attitude certainty has uncovered many of the actual origins of confidence, but the present research is the first to consider why people think they are confident in an opinion and whether this matters for how they respond to counterattitudinal persuasive communications. We examined whether people who perceive themselves to have relatively strong (vs. weak) reasons for certainty would respond more or less thoughtfully to counterattitudinal persuasive messages. Among some other indications of the resistance process, we focused on whether people counterargued the message more (i.e., critically analyzing the message’s arguments and pointing out their flaws) as a case of thoughtfully resisting persuasion. We proposed that people’s perceived reasons for certainty would be associated with thoughtful counterarguing, which could result in greater actual resistance to change (i.e., less attitude change following the message) but could also result in equivalent resistance because even less thoughtful resistance strategies can nonetheless succeed in protecting the attitude from change.

The results of the reported studies, which considered a diverse array of topics including social, political, environmental, and educational issues, show that people who perceive themselves to have stronger reasons for certainty engage more thoughtfully with
counterattitudinal persuasive messages. First, an initial series of studies documented the variety of bases on which people perceive their certainty to rest (Studies 1 and 2) and showed that these various reasons for certainty are generally seen as differing in how strong they are as bases for confidence (Study 3). Next, in a series of studies that exposed people to persuasive messages arguing against their own opinions, people who endorsed (Studies 4, 5, and 7), were induced to perceive (Study 6), or freely provided (Study 8) relatively strong reasons for their initial certainty in those opinions responded to the message by critically evaluating and counterarguing its points, compared to those who perceived having relatively weak bases for their initial confidence. Also consistent with more thoughtful and effortful resistance strategies, stronger perceived reasons for certainty were also associated with spending more time actually reading the message (Studies 4 – 6) and using more words to respond to the counterattitudinal claims (Study 8).

A final series of studies tested whether the previous effects were driven by nuances in the specific reasons for certainty that were used to reflect “strong” and “weak” confidence bases or were instead due to people’s more general perceptions that their confidence bases were strong or weak. Study 9 provided initial evidence that people’s perceptions of the strength of their own confidence bases—not necessarily tied to any specific bases—mattered. The more people thought that their reasons for certainty were indeed strong bases for confidence, the more they expected to respond to persuasion using thoughtful resistance strategies. The more they thought that their reasons were

---

41 For an additional set of studies that were conducted but not reported in the main text of this dissertation, see Appendix F.
instead weak bases, the more they expected to respond using less thoughtful strategies. Study 10 extended these results, showing that the individual reasons for certainty identified in Study 3 and used as independent variables in Studies 4 – 7 have their effects on thoughtful resistance strategies because people view them as relatively strong or weak bases for confidence. Study 11 further clarified these effects by directly manipulating people’s perceptions that their confidence bases were relatively strong or weak (independent of any *specific* confidence bases).

Several studies relied on a measure of perceived reasons for certainty consisting of people’s endorsement of a set of “strong” and a set of “weak” confidence bases, combined into an index. This index represented a continuum ranging from greater endorsement of weak over strong bases at the low end to greater endorsement of strong over weak bases at the high end. Although this approach simplified the analyses and interpretations of the reported effects, Appendix E summarizes further analyses that treat strong and weak confidence bases separately in a regression model. Across the relevant studies, greater endorsement of strong confidence bases tended to be *positively* associated with measures of thoughtful resistance, and greater endorsement of weak confidence bases tended to be *negatively* associated with measures of thoughtful resistance. Although the patterns of which of these unique effects are statistically significant vary somewhat from study to study, these analyses help demonstrate that the effects reported with the composite measure are not solely due to either the strong or the weak confidence bases.

It is also crucial to note that the current research not only found that people resist persuasion using different strategies when they begin with relatively strong or weak
perceived reasons for their attitude certainty. Rather, Studies 7, 10, and 11 also showed that the more thoughtful resistance strategies are ultimately consequential because they strengthen the resulting attitude. That is, perceiving that one is confident for relatively strong reasons is associated with more thoughtful resistant responses to counterattitudinal persuasive communications, which is ultimately associated with being *more* confident in the opinion after reading the message (Studies 7 and 10) and with having an opinion that better predicts relevant behavioral intentions (Studies 7 and 11).

Despite relatively consistent effects on the *process* of resistance (e.g., using counterarguing as a means of resisting), these studies had mixed results for resistance as an *outcome*. That is, in Studies 4 – 7 there was no evidence that people who endorsed stronger (vs. weaker) reasons for certainty ended up resisting the message to any greater extent. However, as Studies 10 and 11 showed, perceiving that one’s reasons for certainty were weak (vs. strong) was associated with holding more message-consistent attitudes.

As outlined previously, either of these attitude change results are sensible, and it seems that perceiving weak reasons for one’s certainty only undermines resistance when people acknowledge the weakness of those reasons. We return to this point later in the discussion.

In addition to the effects on resistance processes and outcomes, the present research also contributes to the attitude certainty literature by showing that people do endorse a range of reasons for their certainty. Although much prior research has documented various actual origins of confidence, from thinking deeply about relevant information (e.g., Barden & Petty, 2008) to having an opinion that comes to mind quickly
(e.g., Holland et al., 2003) to being in a more positive mood (e.g., Briñol, Petty, & Barden, 2007), it is interesting that people show a similar diversity in the reasons they think underlie their confidence. As Studies 1 and 2 showed, people do not just think that certainty comes from a single origin, such as knowing a lot about the issue—they acknowledge that it can come from their feelings in the moment, from wanting to fit in with other people, from their personality etc. Even extremely weak reasons (e.g., the weather) received some degree of endorsement with a reasonable degree of variance in these studies, even if they were overall endorsed less than the stronger confidence bases.

**What Makes Something a “Strong” or “Weak” Basis for Confidence?**

In Chapter 2, we were careful to note that the difference between “strong” and “weak” reasons for certainty, as we consider them in this research, is a difference in common perceptions. That is, reasons like “knowledge” are seen as relatively strong whereas reasons like “personality” are seen as relatively weak. Although we made no specific claims about what constitutes a “strong” vs. a “weak” basis for confidence, beyond overall perceptions, one might still wonder why some confidence bases seem stronger than others.

Although speculative, two underlying considerations may determine perceived strength: thoughtfulness and attitude-specificity. First, note that the confidence bases that were rated as being the strongest bases in Study 3 (“knowledge,” “learning,” “direct experience,” and “thinking”) seem more thoughtful in nature than the other bases. Bases that were rated less strong include the ease with which the opinion comes to mind,
emotional responses, and motivations to hold confident attitudes. Thus, perhaps people come to believe that well-founded confidence is rooted in knowledge and careful thought.

Second, in addition to reflecting greater thought, the bases that were rated as being relatively strong are also variables that are more specific to the particular attitude in question. For instance, a person who says that she is confident because she has thought about the issue is expressing a reason to be confident in a particular opinion (i.e., “I have thought about this issue”). By contrast, a person who says that he is confident because he is a confident person is expressing a reason to be confident of any opinion. Thus, people may simply assess the strength of a reason for certainty by evaluating its specificity to the attitude in question.

Although those two explanations may be plausible, it is likely that there is no universality in what confidence bases people deem “strong” or weak.” For instance, the more thoughtful or attitude-specific bases of confidence may be seen as especially strong within the relatively educated, Western samples recruited to participate in these studies. These more analytical confidence bases may be seen as “strong” because they match prevailing cultural values, whereas more intuitive bases may be seen as stronger reasons for certainty in cultures that emphasize more holistic reasoning (cf. Nisbett, Peng, Choi, & Norenzayan, 2001).

Thus, regardless of why a particular reason for certainty is seen as strong or weak, we argue that the perception of reason strength—whatever the specific reason—is most important. As some of the previous studies showed, it was the direct perception of reason strength that mediates the effects of the individual strong and weak reasons that people
endorse (Study 10), and experimentally inducing the perception that one’s reasons for certainty are weak reduces thoughtful resistance to persuasion, even among people who endorse the relatively thoughtful confidence bases (Study 11). Therefore, it seems as though perceived strength of one’s reasons for certainty is more impactful than the idiosyncrasies of individual confidence bases.

Notably, the present research considered attitudes about which people were relatively confident, and as such, we specifically examined people’s perceived reasons for being certain. What about people who are unsure of their attitude? Are perceived reasons for doubt similar in content, perceived strength, and consequence as perceived reasons for certainty? It is possible that people can also have various reasons for doubt that differ in their perceived strength, and perhaps many of the same reasons people have for certainty can also be reasons for doubt. For instance, amount of thought can be a basis for confidence and a basis for doubt. In this case, however, some could consider both high and low thought to be strong reasons for uncertainty. That is, someone may think that he is uncertain because he has thought very little about the issue and someone else may think that she is uncertain because she has thought a lot about the issue and understands just how inconclusive the evidence is. Both of these could plausibly be considered strong reasons for doubt but are nevertheless quite different. This makes studying perceived reasons for uncertainty potentially distinct from studying perceived reasons for certainty and beyond the scope of the present discussion but still an intriguing avenue for future research.
Limitations and Future Directions

The present research has extended the attitude certainty and persuasion literatures in a number of ways, but there remain several avenues for future inquiry. First, the attitude change results in Studies 10 and 11 suggest a novel persuasive strategy: undermining perceived confidence bases. As reviewed earlier, attitudes held with certainty are less likely to change than attitudes held with uncertainty. This poses a challenge in persuasion because sometimes the very opinions one wishes to change are the ones that people hold confidently. Because people showed more message-consistent attitudes when they read that the bases of their confidence were quite weak (vs. strong), it suggests that one persuasion tactic is to first guide people to question the legitimacy of their confidence and then provide counterattitudinal persuasive information. Future research is needed to demonstrate the reliability of this persuasion effect, design other effective means of getting people to think that their reasons for certainty are weak, and document the mechanism by which this ultimately undermines resistance.

Second, based on the current evidence, it remains unclear whether people spontaneously attend to their reasons for attitude certainty. In all of the presented studies, perceived confidence bases are made salient either by providing direct feedback about them or by asking people to reflect on their certainty by completing a series of survey questions. Thus, it is possible that these effects only occur when people are explicitly prompted to consider why they are certain and that people otherwise do not go through the trouble of accessing the reasons why they think they are sure. In fact, a similar limitation is raised by research on attitude certainty more generally: do people
spontaneously attend to their degree of confidence in an attitude if they are not prompted? Indeed, most studies draw people’s attention to certainty before the key outcomes under consideration. Some evidence from research on thought confidence, however, suggests that there are times when contextual features prompt people to question their confidence. In this work, people are exposed to some information about which they generate a variety of cognitive responses. Then, new information comes to light that either makes people confident in their initial reactions or doubt their initial reactions (for a review, see Briñol & Petty, 2009). For example, learning that the author of a persuasive message is not actually a credible source can make people doubt their initial reactions to the message (Briñol, Petty, & Tormala, 2004).

Therefore, future studies should examine whether people spontaneously consider their reasons for certainty and test whether the same effects occur when people are not explicitly prompted to consider their bases for confidence. Nevertheless, even if such future work reveals that people never spontaneously consider their reasons for certainty, the present research still highlights the utility in measuring those perceptions. People’s responses to those questions still predicts important outcomes. Further, the results of the experiments utilizing false feedback manipulations (Studies 6 and 11) illustrate the effects of drawing people’s attention to the strength or weakness of their reasons for certainty. In sum, although it is theoretically interesting to consider whether people typically think about why they are certain, it does not undermine the contribution of the present research.
Third, future research is needed to further distinguish “perceived reasons for certainty” and “perceived reasons for holding a particular attitude.” It is possible that our operationalization of perceived reasons for certainty instead captures how well founded people think their attitudes are, which may be redundant with attitude strength indicators that have already been established (knowledge, accessibility, etc.). Study 7 attempted to show that the effects on thoughtful resistance strategies were specific to people’s perceived reasons for certainty. We did this by including a new measure that was nearly identical to the “perceived reasons for certainty” measure but with the language adapted to reflect perceived reasons for holding positive attitudes toward recycling. The results showed that the effects on self-reported counterarguing were uniquely predicted by the certainty-related measure and not by the attitude-related measure. Although this is compelling evidence of a certainty-based phenomenon, it is possible that in adapting the “reasons for certainty” measure, we inadvertently created a measure that did not adequately capture people’s perceived reasons for holding pro-recycling attitudes.

Despite the benefits of keeping the two measures as similar as possible, reasons like “amount of thinking” and “time of day” may not be as plausible as reasons for holding an attitude as they are reasons for being confident. Future research should develop additional tests of this alternative explanation by designing alternative measures to assess strong and weak perceived reasons for holding a particular attitude.

Fourth, future research should consider the malleability of various confidence bases’ perceived strength. As discussed above, individual reasons for certainty are unlikely to be universally seen as strong or weak confidence bases. For example,
“thinking” may stand as a compelling reason to be confident among people who see logic and reason as especially valid, but among people who value intuition, “thinking” may seem like a relatively weak reason for certainty (cf. Tormala et al., 2011). This approach, however, may also help establish the roles of confidence bases that were not closely considered in the present studies. For instance, Studies 1 and 2 showed that “consensus” is one reason why people think they are sure of their opinions, but Study 3 revealed that this is not a basis for confidence that people see as especially strong or weak. Instead, it is likely that people vary in how legitimate they think it is to base one’s confidence on the fact that many other people agree on the issue. Some other work suggests that this is the case, showing that people’s goals to either belong or be unique affect whether consensus information increases or decreases confidence (Clarkson et al., 2013). It is thus plausible that people who think that their confidence has arisen from social consensus information will resist persuasive communications differently depending on whether they think that consensus is a strong or a weak reason to be certain.

Similarly, consider bases for confidence such as “emotion” and “ease of retrieval.” Like consensus, these bases are not seen as purely strong or weak reasons for certainty in Study 3, but people vary in whether they see them as compelling bases for confidence. This variation may tap a broader belief that “going with one’s gut” or intuitive responses are either very weak reasons to feel sure or indeed quite compelling reasons to be sure. Among people who view their intuition as strong guides for what must be correct, perceiving that their attitude certainty stems from these bases could lead to more effortful engagement with counterattitudinal information. Among people who view
intuition as a rather weak basis for confidence, however, perceiving such a basis for their own attitude certainty would instead undermine effortful engagement with counterattitudinal information. Studies like these would help further test the relative impact of the more general perceptions of reason strength vs. the idiosyncrasies of individual reasons for certainty.

Fifth, the present research focuses specifically on the reasons people think they are certain. At this point, however, there is little indication of how accurate people are in these perceptions. That is, if someone thinks that “knowledge” is a primary reason why he or she is certain of an attitude, is knowledge actually likely to have been the basis for that person’s confidence? Does it matter? Because several of the present studies manipulated people’s perceptions of their confidence bases, it is clear that these perceptions need not be accurate in order to influence resistance processes. However, in spite of this, it is worth asking whether the true origins of a person’s certainty are consequential at all. Will someone whose confidence actually comes from deep thinking respond differently than someone whose confidence actually comes from merely repeating his attitude several times? Although some research has attempted to test the differential effects of unique origins of certainty (Statzer, 2010), it is difficult to ensure that distinct manipulations will produce equivalent effects on attitude certainty (yet different effects on resistance processes and consequences).42 Nevertheless, examining the unique outcomes of actual origins of certainty is a clear extension of the present

42 Although Statzer (2010) predicted that value-relevance and quality of evidence would be distinct origins of certainty that have distinct effects on resistance processes, only the value relevance manipulation affected pre-message attitude certainty. Thus, it was impossible to compare the outcomes of certainty with truly distinct origins.
research. It may be that perceived reasons for certainty and actual reasons for certainty are consequential in different ways. Recent research has shown that whether people think their attitudes are based on affect or cognition can be consequential in ways that are different than the effects of whether people’s attitudes are actually based on affect vs. cognition (See, Fabrigar, & Petty, 2013; See et al., 2008).

Finally, the introduction opened by discussing the long history of examining subjective certainty in many areas of psychology. The present research focused squarely on people’s perceived reasons for attitude certainty, but it will be important to extend these findings to other areas where certainty has been a prominent construct. Why do people think they are sure of a choice they have made, a memory they have had, or a belief about themselves? Do those perceptions matter in those domains as they do in the attitudinal domain and if so, how? As an example, consider memory confidence. Two eyewitnesses who confidently recall the details of a past event may nonetheless differ in why they think they are confident. Person A believes that she has strong reasons to be sure of her memory whereas Person B believes that his reasons to be sure of his memory are relatively weak. Person A may thus stick to her testimony more ardently if questioned or asked to consider the implications of other evidence whereas Person B may try to ignore challenges to his testimony or even end up altering his memory of the events.

Even beyond this direct extension of the resistance findings, considering reasons for certainty may also inform issues that have been central to other literatures on certainty—namely, confidence-accuracy correlations. Recall that memory confidence is sometimes positively related to accuracy, unrelated to accuracy, and even negatively
related to accuracy. Perhaps people’s perceived reasons for memory confidence could help explain these varied effects. For instance, people who perceive themselves to have strong reasons to be confident might be the ones who show positive confidence-accuracy correlations, and people who perceive themselves to have weak reasons to be confident might be the ones who show negative confidence-accuracy correlations. These extensions beyond the attitudes domain remain speculative, of course, but they may nonetheless prove illuminating.

Conclusion

Just like people can become certain of their opinions for many different reasons (Rucker et al., 2014), they can also perceive that their current degree of certainty is founded upon many different bases. These bases vary in how much they seem to be strong, legitimate reasons for certainty, and the more people believe that their own certainty rests on bases that they think are compelling, the more they are likely to respond thoughtfully and critically to communications that challenge their opinions and act on the opinions that follow persuasive attacks. The results of the present research extend the existing literature by highlighting how not all certainty operates through the same process. Moving forward, it will be important to consider the role of what lies beneath the global sense of attitude certainty that has inspired so much research in attitudes and persuasion.
References


Kopp, B. (2010). A non-elaborative path to attitude confidence: Attitude certainty via actual and perceived accessibility (Unpublished doctoral dissertation). Ohio State University, Columbus, OH.


Luttrell, A. (2012). *Perceived bases for attitude certainty and resistance to persuasive communication* (Unpublished master’s thesis). Ohio State University, Columbus, OH.


Luttrell, A., Petty, R. E., & Briñol, P. (2016b). *The interactive effects of ambivalence and certainty on opinion stability: Evidence from the Florida Voter Panel Study*. Unpublished manuscript, Department of Psychology, Ohio State University, Columbus, OH.


Sawicki, V. (2013). *Attitude strength and motives to bolster weak attitudes: The impact of (un)certainty on attitude similarity effects on attraction* (Unpublished doctoral dissertation). Purdue University, West Lafayette, IN.


Appendix A: Tables

Table 1

*Categories Used to Code Free Response Reasons for Certainty (Study 1)*

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Example from Participant Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambivalence</td>
<td>Reference to considering both pros and cons</td>
<td><em>There is very little I dislike about it and a plethora of aspects that I love, so I know that that number represents my true feelings of certainty because I weighed the pros and cons of it.</em></td>
</tr>
<tr>
<td>Body</td>
<td>Reference to bodily responses when considering the attitude object</td>
<td>n/a</td>
</tr>
<tr>
<td>Consensus</td>
<td>Reference to a social group</td>
<td><em>I share the same feelings as my family, friends, etc. so this group mentality helps boost my certainty.</em></td>
</tr>
<tr>
<td>Ease</td>
<td>Reference to the attitudes accessibility or ease of retrieval</td>
<td><em>The number represents my true feelings because I did not hesitate to answer and knew it right when I read the question.</em></td>
</tr>
<tr>
<td>Emotion</td>
<td>Reference to emotional response</td>
<td><em>I know that I am very certain of my attitude toward OSU Football, because it is something I enjoy a lot, and I know am very certain of it.</em></td>
</tr>
<tr>
<td>Experience</td>
<td>Reference to the past, present, or future with respect to expectations or direct experience</td>
<td><em>That number represents my true feelings because I have drank diet coke on several occasions and find no enjoyment from it, so I am certain I dislike it.</em></td>
</tr>
<tr>
<td>Extremity</td>
<td>Reference specific argument(s) about the attitude object indicating extremity of like or dislike</td>
<td><em>I feel certain because my feelings are to one extreme.</em></td>
</tr>
<tr>
<td>Interest</td>
<td>Reference to personal interests and values</td>
<td><em>Recycling is important to me.</em></td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td>Reference to an understanding of the topic (or lack thereof)</td>
<td>I am certain of my attitude toward Obama because of what I have learned about him and his policies. I followed the election and took into account what I learned in US Government and am positive that I do not like Obama very much.</td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td>Reference to wanting to be confident</td>
<td>As a member of OSU, I am proud of OSU all the time.</td>
</tr>
<tr>
<td><strong>Personality</strong></td>
<td>Reference to a personal disposition to be confident or doubtful</td>
<td>I know what my opinions are so I am convinced that the number represents my true feelings.</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>Reference to status or power</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Self-Esteem</strong></td>
<td>Reference to one’s sense of self-worth</td>
<td>It raises my self-esteem, which then effects my whole life. This is why I am certain I love recycling.</td>
</tr>
<tr>
<td><strong>Thinking</strong></td>
<td>Reference to the amount of time or effort spent considering the topic</td>
<td>I am convinced that that number represents my true feelings of certainty because I thought carefully about it and selected my number with a lot of thought.</td>
</tr>
<tr>
<td><strong>Restate Confidence</strong></td>
<td>Merely asserting confidence without further explanation</td>
<td>I am very certain of my liking of recycling and would not change that idea at all.</td>
</tr>
</tbody>
</table>
Table 2

*Categories of Reasons for Certainty about Barack Obama, University Football, Diet Coke, and Recycling (Study 1)*

<table>
<thead>
<tr>
<th>Category</th>
<th>Barack Obama</th>
<th>Football Team</th>
<th>Diet Coke</th>
<th>Recycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambivalence</td>
<td>10.34%</td>
<td>8.62%</td>
<td>10.71%</td>
<td>15.79%</td>
</tr>
<tr>
<td>Body</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Consensus</td>
<td>6.90%</td>
<td>6.90%</td>
<td>0.00%</td>
<td>3.51%</td>
</tr>
<tr>
<td>Ease</td>
<td>0.00%</td>
<td>1.72%</td>
<td>3.57%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Emotion</td>
<td>1.72%</td>
<td>15.52%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Experience</td>
<td>5.17%</td>
<td>18.97%</td>
<td>50.00%</td>
<td>14.04%</td>
</tr>
<tr>
<td>Extremity</td>
<td>0.00%</td>
<td>0.00%</td>
<td>1.79%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Interest</td>
<td>1.72%</td>
<td>15.52%</td>
<td>1.79%</td>
<td>5.26%</td>
</tr>
<tr>
<td>Knowledge</td>
<td>53.45%</td>
<td>8.62%</td>
<td>17.86%</td>
<td>50.88%</td>
</tr>
<tr>
<td>Motivation</td>
<td>5.17%</td>
<td>17.24%</td>
<td>3.57%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Personality</td>
<td>6.90%</td>
<td>3.45%</td>
<td>10.71%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Power</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Thinking</td>
<td>8.62%</td>
<td>3.45%</td>
<td>0.00%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Restatement</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>3.51%</td>
</tr>
</tbody>
</table>

Note. Figures are the percentages of valid responses characterized by each category.
Table 3

*Average Attitudes and Certainty (Study 2)*

<table>
<thead>
<tr>
<th></th>
<th>Attitude</th>
<th>Certainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football Team</td>
<td>6.09 (1.65)</td>
<td>6.16 (1.51)</td>
</tr>
<tr>
<td>Windows Vista</td>
<td>4.76 (1.33)</td>
<td>4.71 (1.77)</td>
</tr>
<tr>
<td>Applying for College</td>
<td>4.27 (2.11)</td>
<td>5.67 (1.58)</td>
</tr>
<tr>
<td>Drawing</td>
<td>4.58 (1.61)</td>
<td>5.33 (1.57)</td>
</tr>
<tr>
<td>Health Care Reform</td>
<td>4.26 (2.00)</td>
<td>4.67 (1.76)</td>
</tr>
<tr>
<td>Hockey Fans</td>
<td>4.53 (1.70)</td>
<td>4.51 (1.99)</td>
</tr>
<tr>
<td>Hillary Clinton</td>
<td>3.58 (1.49)</td>
<td>4.68 (1.85)</td>
</tr>
<tr>
<td>Gay Marriage</td>
<td>4.22 (1.81)</td>
<td>5.30 (1.63)</td>
</tr>
<tr>
<td>iPhone</td>
<td>5.46 (1.69)</td>
<td>5.66 (1.60)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are presented in parentheses.
Table 4

Endorsement of Individual Reasons for Attitude Certainty (Study 2)

<table>
<thead>
<tr>
<th></th>
<th>Sample A ((N = 45))</th>
<th>Sample B ((N = 43))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Football Team</td>
<td>Windows Vista</td>
</tr>
<tr>
<td>Ambivalence</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.49 (2.15)</td>
<td>3.18 (1.77)</td>
</tr>
<tr>
<td>Body</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.49 (2.21)</td>
<td>2.36 (1.68)</td>
</tr>
<tr>
<td>Consensus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.04 (2.13)</td>
<td>2.87 (1.75)</td>
</tr>
<tr>
<td>Ease</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.71 (2.01)</td>
<td>3.60 (1.78)</td>
</tr>
<tr>
<td>Emotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.20 (1.62)</td>
<td>2.93 (1.84)</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.16 (2.06)</td>
<td>4.29 (2.08)</td>
</tr>
<tr>
<td>Interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.73 (1.66)</td>
<td>4.29 (1.97)</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.16 (2.13)</td>
<td>4.56 (1.97)</td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.27 (1.72)</td>
<td>3.69 (1.90)</td>
</tr>
<tr>
<td>Personality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.91 (1.92)</td>
<td>3.64 (1.77)</td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.51 (1.90)</td>
<td>3.36 (1.69)</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.11 (1.90)</td>
<td>2.96 (1.91)</td>
</tr>
<tr>
<td>Thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.53 (1.78)</td>
<td>3.87 (1.88)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are presented in parentheses.

Continued
Table 4 continued

<table>
<thead>
<tr>
<th></th>
<th>Sample C (N = 50)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hillary Clinton</td>
<td>Gay</td>
<td>iPhone</td>
</tr>
<tr>
<td>Ambivalence</td>
<td>3.34 (1.66)</td>
<td>3.04 (1.84)</td>
<td>3.32 (1.72)</td>
</tr>
<tr>
<td>Body</td>
<td>2.32 (1.67)</td>
<td>2.42 (1.89)</td>
<td>2.52 (1.82)</td>
</tr>
<tr>
<td>Consensus</td>
<td>3.22 (1.72)</td>
<td>3.30 (1.97)</td>
<td>3.88 (1.92)</td>
</tr>
<tr>
<td>Ease</td>
<td>3.66 (1.60)</td>
<td>4.14 (1.78)</td>
<td>3.86 (1.87)</td>
</tr>
<tr>
<td>Emotion</td>
<td>3.64 (1.97)</td>
<td>4.10 (1.88)</td>
<td>3.66 (1.84)</td>
</tr>
<tr>
<td>Experience</td>
<td>3.72 (1.93)</td>
<td>3.08 (2.22)</td>
<td>4.04 (2.18)</td>
</tr>
<tr>
<td>Interest</td>
<td>3.88 (1.89)</td>
<td>4.04 (2.01)</td>
<td>4.20 (1.68)</td>
</tr>
<tr>
<td>Knowledge</td>
<td>4.48 (1.88)</td>
<td>4.14 (1.96)</td>
<td>4.32 (1.95)</td>
</tr>
<tr>
<td>Motivation</td>
<td>3.16 (1.69)</td>
<td>3.74 (2.07)</td>
<td>3.94 (1.88)</td>
</tr>
<tr>
<td>Personality</td>
<td>3.58 (1.68)</td>
<td>4.44 (1.89)</td>
<td>4.02 (1.90)</td>
</tr>
<tr>
<td>Power</td>
<td>3.44 (1.75)</td>
<td>3.40 (1.88)</td>
<td>3.68 (1.90)</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>2.46 (1.70)</td>
<td>2.80 (1.82)</td>
<td>3.12 (2.11)</td>
</tr>
<tr>
<td>Thinking</td>
<td>3.86 (1.82)</td>
<td>4.06 (1.80)</td>
<td>3.90 (1.78)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are presented in parentheses.
Table 5

*Average Perceived Strength of Individual Reasons for Certainty (Study 3)*

<table>
<thead>
<tr>
<th>Reason</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>6.24 (1.10)</td>
</tr>
<tr>
<td>Learning</td>
<td>6.22 (1.17)</td>
</tr>
<tr>
<td>Experience</td>
<td>5.86 (1.04)</td>
</tr>
<tr>
<td>Thinking</td>
<td>5.37 (1.34)</td>
</tr>
<tr>
<td>Interest</td>
<td>4.62 (1.59)</td>
</tr>
<tr>
<td>Ambivalence</td>
<td>4.14 (1.69)</td>
</tr>
<tr>
<td>Consensus</td>
<td>3.88 (1.63)</td>
</tr>
<tr>
<td>Power</td>
<td>3.86 (1.74)</td>
</tr>
<tr>
<td>Location</td>
<td>3.84 (1.73)</td>
</tr>
<tr>
<td>Personality</td>
<td>3.75 (1.77)</td>
</tr>
<tr>
<td>Motivation</td>
<td>3.75 (1.79)</td>
</tr>
<tr>
<td>Ease</td>
<td>3.66 (1.62)</td>
</tr>
<tr>
<td>Emotions</td>
<td>3.40 (1.86)</td>
</tr>
<tr>
<td>Body</td>
<td>3.11 (1.70)</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>2.92 (1.71)</td>
</tr>
<tr>
<td>Time of Day</td>
<td>2.63 (1.58)</td>
</tr>
<tr>
<td>Time of Year</td>
<td>2.45 (1.54)</td>
</tr>
<tr>
<td>Weather</td>
<td>2.05 (1.50)</td>
</tr>
</tbody>
</table>

Note. Confidence bases are presented in descending order by mean perceived strength.
Table 6

*Correlations Between Predictors (Study 7)*

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-message Attitudes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Composite Attitude Bases</td>
<td>.41**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Initial Certainty</td>
<td>.51**</td>
<td>.34**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Composite Certainty Bases</td>
<td>.34**</td>
<td>.70**</td>
<td>.36**</td>
<td></td>
</tr>
</tbody>
</table>

Note: **p < .01, *p < .05, †p < .10
Table 7

Correlations Between Certainty, Perceived Reason Strength, and Predicted Resistance Strategies (Study 9)

<table>
<thead>
<tr>
<th></th>
<th>Raw Correlation Analysis</th>
<th>Partial Correlation Analysis (Controlling for Certainty)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Certainty</td>
<td>Perceived Strength of Certainty Bases</td>
</tr>
<tr>
<td>Counterarguing</td>
<td>.25**</td>
<td>.29**</td>
</tr>
<tr>
<td>Attitude Bolstering</td>
<td>.34**</td>
<td>.36**</td>
</tr>
<tr>
<td>Assertions of Confidence</td>
<td>.32**</td>
<td>.28**</td>
</tr>
<tr>
<td>Source Derogation</td>
<td>-.24**</td>
<td>-.27**</td>
</tr>
<tr>
<td>Selective Exposure</td>
<td>-.20**</td>
<td>-.31**</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>-.13*</td>
<td>-.09</td>
</tr>
<tr>
<td>Social Validation</td>
<td>.07</td>
<td>-.04</td>
</tr>
</tbody>
</table>

Note: **p < .01, *p < .05, †p < .10
Figure 1. Attitudes toward recycling following a persuasive message interact with initial perceived reasons for certainty to predict intentions to recycle over the following week (Study 7). Initial degree of certainty is entered as a covariate.
Figure 2. Sequential mediation model entering perceived strength of confidence bases and self-reported counterarguing as mediators of the effect of perceived reasons for certainty on post-message attitude certainty (Study 10). Initial degree of attitude certainty is included as a covariate.
Figure 3. Moderation of the false feedback effects by initially reported (strong vs. weak) reasons for certainty (Study 11). Figures illustrate results on perceived strength of one’s confidence bases, (B) message-unfavorable (resistant) thoughts, (C) message-favorable thoughts, and (D) post-message attitudes. All graphs present predicted values with initial certainty entered as a covariate. The model used to plot graph D also controls for pre-message attitudes.
Figure 3 continued

C.

![Graph showing the relationship between Endorsed Reasons for Certainty and Message Favorable (Positive) Thoughts between Weak Reasons Condition and Strong Reasons Condition.]

D.

![Graph showing the relationship between Endorsed Reasons for Certainty and Post Message Attitudes between Weak Reasons Condition and Strong Reasons Condition.]

Figure 4. Moderation of the correspondence between post-message attitudes and behavioral intentions by the manipulation of perceived strength of bases for certainty (Study 11).
Appendix C: Measurement Instrument (Study 2)

**Ambivalence:** When we think about a topic, we sometimes have thoughts that conflict. How much did your conflicting thoughts affect how certain you were about your opinion toward health care reform?

**Body:** How much did your bodily responses to health care reform affect the certainty with which you hold your attitude about it? Examples of bodily responses are jumping up and down, raising your hands in the air, etc.

**Consensus:** How much do other people's opinions about health care reform affect your own certainty in your attitude about Health care reform?

**Ease:** Sometimes we feel certain in our attitudes because of how easy it was to think of the answer. How much did this ease affect your certainty in your opinion toward health care reform?

**Emotion:** How much did your emotional association with health care reform affect your feelings of certainty about how much you liked/disliked it?

**Experience:** How much did your past experience with health care reform affect how certain you are about your attitude toward health care reform?

**Interest:** How much did your interest in health care reform affect your certainty of your attitude toward health care reform?

**Knowledge:** How much did your knowledge/lack of knowledge about health care reform affect your certainty?

**Motivation:** How much did your motivation to like/dislike health care reform affect how certain you were of that attitude?

**Personality:** How much did your personality affect the certainty with which you hold your attitude toward health care reform?

**Power:** How much did the feeling of power associated with your attitude toward health care reform affect your certainty in your attitude of how much you like/dislike it?
**Self-Esteem:** How much did a desire to feel good about yourself affect how certain you feel about health care reform?

**Thinking:** How much did the amount of thinking you have done about health care reform affect your certainty?
Appendix D: Measurement Instrument (Study 3)

The study was introduced with the following description:

We all have opinions about issues and perceptions of whether things are good or bad. Additionally, we can have more or less certainty in these opinions and perceptions. For instance, a person can be very sure about his or her stance on a political issue whereas another person can be less sure.

We can base this sense of certainty on different factors, and some of the reasons a person has for being certain can be stronger than other reasons.

Below are a several reasons a person might have for being certain in an opinion. Please rate each of these reasons on a scale from “very weak” to “very strong” based on whether you think each reason is a weak or strong reason to certain of an opinion on an issue.

Perceived strength was indicated in response to the following statements:

- **Ambivalence**: “I am certain because I do not have many thoughts about this issue that conflict with one another.”
- **Body**: “I am certain because I have bodily responses that accompany my opinion about this issue.”
- **Consensus**: “I am certain because I know what other people think about this issue.”
- **Ease**: “I am certain because when I think about this topic, my opinion comes to mind very quickly.”
- **Emotion**: “I am certain because I have emotional reactions to this issue.”
- **Experience**: “I am certain because I have had past experience with this issue.”
- **Interest**: “I am certain because I am very interested in this issue.”
- **Knowledge**: “I am certain because I know a lot about this issue.”
- **Learning**: “I am certain because I have spent a lot of time learning about the issue.”
- **Location**: “I am certain because I am in a place where I feel more confident.”
- **Motivation:** “I am certain because I have a strong motivation to hold a particular opinion about this issue.”
- **Personality:** “I am certain because my personality leads me to be confident in my opinions.”
- **Power:** “I am certain because I have a sense of power when it comes to this issue.”
- **Self-Esteem:** “I am certain because I have a desire to feel good about myself.”
- **Thinking:** “I am certain because I have thought a lot about this issue.”
- **Time of Day:** “I am certain because I tend to be more confident at some times more than others.”
- **Time of Year:** “I am certain because I tend to be more confident during this time of year.”
- **Weather:** “I am certain because the weather makes feel better and therefore more confident.”
Appendix E: Strong vs. Weak Reasons as Predictors

Several studies in this dissertation rely on a measurement of people’s reasons for certainty as the key predictor variable. This variable is computed by subtracting participants’ average endorsement of three weak reasons for certainty from their average endorsement of three strong reasons for certainty. This composite thus reflects a continuum from greater endorsement of weak over strong reasons at the low end to greater endorsement of strong over weak reasons at the high end.

Although this approach offers a streamlined view of perceived confidence bases’ effects, it is also possible to treat strong and weak reasons separately. Table 8 presents the results of these analyses. For ease of comparison across studies, we identified a dependent variable that appears in all of the studies where perceived confidence bases are measured: counterarguing. Notably, however, counterarguing is sometimes assessed by asking participants to report how much they counterargued, and sometimes it is assessed by coding the thoughts they have in response to the persuasive message. Because these variables differ in their measurement, we present standardized $\beta$ weights from the regression models.

For each applicable study, the counterarguing results are presented from two regression models. The first model uses the composite measure of perceived reasons for certainty, as reported in the main text, and the second model enters strong and weak
reasons separately as simultaneous predictors. Initial degree of certainty is included in all models.
**Table 8**

*Summary of Analyses on Counterarguing*

<table>
<thead>
<tr>
<th>Study</th>
<th>Model</th>
<th>DV:</th>
<th>Variable</th>
<th>df</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>PCA</td>
<td>Initial Certainty</td>
<td>96</td>
<td>.32</td>
<td>2.64</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Composite Reasons</td>
<td>96</td>
<td>.19</td>
<td>3.19</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>Initial Certainty</td>
<td>95</td>
<td>.26</td>
<td>2.15</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strong Reasons</td>
<td>95</td>
<td>.31</td>
<td>3.70</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weak Reasons</td>
<td>95</td>
<td>-.09</td>
<td>-1.15</td>
<td>.25</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>PCA</td>
<td>Initial Certainty</td>
<td>71</td>
<td>.23</td>
<td>2.18</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Composite Reasons</td>
<td>71</td>
<td>.27</td>
<td>3.58</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>Initial Certainty</td>
<td>70</td>
<td>.23</td>
<td>2.19</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strong Reasons</td>
<td>70</td>
<td>.20</td>
<td>1.77</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weak Reasons</td>
<td>70</td>
<td>-.29</td>
<td>-3.47</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CCA</td>
<td>Initial Certainty</td>
<td>71</td>
<td>.02</td>
<td>.39</td>
<td>.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Composite Reasons</td>
<td>71</td>
<td>.16</td>
<td>3.83</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>PCA</td>
<td>Initial Certainty</td>
<td>86</td>
<td>.21</td>
<td>1.73</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Composite Reasons</td>
<td>86</td>
<td>.14</td>
<td>2.30</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>Initial Certainty</td>
<td>85</td>
<td>.20</td>
<td>1.63</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strong Reasons</td>
<td>85</td>
<td>.22</td>
<td>2.76</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weak Reasons</td>
<td>85</td>
<td>-.05</td>
<td>-.63</td>
<td>.53</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>PCA</td>
<td>Initial Certainty</td>
<td>116</td>
<td>.34</td>
<td>2.27</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Composite Reasons</td>
<td>116</td>
<td>-.02</td>
<td>-.34</td>
<td>.74</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>Initial Certainty</td>
<td>115</td>
<td>.30</td>
<td>2.02</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strong Reasons</td>
<td>115</td>
<td>.16</td>
<td>1.48</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weak Reasons</td>
<td>115</td>
<td>.18</td>
<td>1.84</td>
<td>.07</td>
</tr>
</tbody>
</table>

*Note.* Dependent variables (DV) are labelled either “Perceived Counterarguing” (PCA) or “Coded Counterarguing” (CCA).
Appendix F: Unreported Studies

In a line of research, sometimes studies are conducted but are not reported in a final publication of the results. This was also true of this dissertation. In this appendix, several studies are reported that were conducted as we examined the relationship between perceived reasons for certainty and thoughtful resistance to counterattitudinal persuasive messages. For each, a brief description of the procedure and the results are provided.

**Study F1: Free Response Reasons as a Predictor**

Study 8 offered an important opportunity to generalize the key effects to a consequential domain—the 2012 U.S. presidential election. The independent variable was different than the other ways in which strength of perceived reasons for certainty have been assessed in other studies. Participants were merely asked to briefly explain why they were confident in their preferred presidential candidate, and these responses were then rated by third party coders for their apparent strength as bases for confidence. The dependent variable in that study also differed from those used in other studies; it was the number of words that participants used to respond to a counterattitudinal claim.

Although the pattern of results in Study 8 was consistent with other studies’ results—stronger perceived reasons for certainty are associated with more effortful responding to counterattitudinal attacks—we wanted to further test the predictive ability of this way of assessing the strength of perceived reasons for certainty. Thus, a new study
was conducted in which this assessment approach was used in a paradigm like the other studies in this dissertation. Seventy-eight undergraduate students (demographics not recorded) indicated their attitudes toward recycling and corresponding certainty. They were then asked to describe why they were certain of their attitude using up to six text-entry boxes. As in Study 1, the instructions clarified that we were “not asking for what led you to be pro- or anti-recycling but rather what led you to be certain of whether you are pro- or anti-recycling.”

For each response, three coders rated how strong it was as a reason for the indicated level of certainty on a 5-point scale anchored at “very weak reason” and “very strong reason” such that higher ratings indicated reasons perceived to be stronger. These coders were given information from pilot testing as a guide to understanding the range of reasons people give for certainty and the variance in perceived strength. For each coder, ratings of reason strength were averaged within each participant to create new variables representing the mean strength of a participant’s reason(s) for certainty, as rated by each coder. Coders’ ratings of reason strength were internally consistent (α = .78), so the ratings were averaged to form an index of reason strength for each participant such that higher scores indicate stronger reasons for certainty.

All participants read the anti-recycling message used in other studies and reported the thoughts they had while reading it. These thoughts were later coded for valence and for whether they reflected counterarguing, specifically (as in Studies 5 and 6).

The results of Study F1 were consistent with the other studies in this dissertation. The stronger a person’s perceived reasons for certainty (as rated by the external coders),
the longer he or she tended to spend reading the message, $B = 10.78$, $t(75) = 1.74$, $p = .09$, the more message-unfavorable thoughts he or she provided, $B = .44$, $t(75)$, $p = .01$, and the more counterarguments, specifically, that he or she provided, $B = .25$, $t(75) = 2.61$, $p = .01$. Also consistent is that the measures of strength of perceived reasons for certainty did not predict post-message attitudes (controlling for pre-message attitudes), $B = .03$, $t(74) = .19$, $p = .85$, nor did it predict number of message-favorable, $B = .04$, $t(75) = .26$, $p = .82$, or message-neutral thoughts, $B = -.20$, $t(75) = -1.41$, $p = .16$.

Although these results replicate the patterns shown in the other studies, we omitted these data from the dissertation report because the measurement of perceived reasons for certainty is still not as clean as in the other studies and the results do not add much beyond what is reported in the dissertation. It is also somewhat unusual that both the key independent and dependent variables were coded by the same group of raters, even though each variable was coded separately. Nevertheless, we kept Study 8 in the final report because it provides important external validity despite its reliance on this free response assessment of perceived confidence bases.

**Study F2: Testing Mediation of the Manipulation**

Study 10 showed that the effects of having stronger reasons for certainty were mediated by the direct perception that those reasons for certainty were strong (vs. weak). This study measured people’s endorsement of a set of strong and a set of weak confidence bases and also measured how strong people *thought* their reasons for certainty were. In another study, we took a similar approach using the manipulation from Study 6.
That is, we tested whether the false feedback manipulation had its effects because it made people think that their reasons for certainty were strong (vs. weak).

Ninety-four undergraduate students ($M_{age} = 19.38, SD = 1.85$, 54.3% male) participated in the study and began by reporting their attitudes toward recycling and their corresponding certainty. They later received false feedback about their certainty using only the “Strong Reasons” and “Weak Reasons” conditions from Study 6’s manipulation and then reported how strong they thought their reasons for certainty were (using the measure reported in Studies 9 – 11). Finally, they read a persuasive message, recorded their thoughts, which were later coded for valence and counterarguing, and reported their perceived counterarguing.

This study suffered from failure of random assignment. Participants in the “Weak Reasons” condition also happened to have reported higher degrees of initial attitude certainty ($M = 5.52, SD = .58$) than participants in the “Strong Reasons” condition ($M = 5.22, SD = .79$), $t(92) = 2.11, p = .04$. Thus, degree of certainty was entered as a covariate in the key analyses to help account for this potential confound.

Although perceived reasons strength was higher for participants in the “Strong Reasons” (vs. “Weak Reasons”) condition, after controlling for initial certainty, the effect was not significant, $F(1, 91) = .91, p = .34$. Also directionally consistent, the participants in the “Strong Reasons” (vs. “Weak Reasons”) condition spent more time reading the message, generated more thoughts coded as counterarguments, and reported greater counterarguing, but none of these effects were significant, $ps > .29$. 

182
Despite the apparent issues with the manipulation in this study, the measure of perceived strength of one’s confidence bases was tested as a predictor of relevant outcomes, covarying initial degree of certainty. One key effect emerged as significant: greater perceived strength of one’s confidence bases was associated with greater self-reported counterarguing, $B = .53, t(91) = 2.61, p = .01$. The effect was in the same direction for counterarguing as indicated by coders’ ratings of message-evoked thoughts, $B = .29, t(91) = 1.02, p = .31$. Also, consistent with the pattern shown in Study 10, greater perceived strength of one’s confidence bases was associated with more resistance, albeit nonsignificantly, as indicated by more positive post-message attitudes, controlling for pre-message attitudes, $B = .33, t(90) = 1.55, p = .13$.

Study F2 presents several issues, but it is worth noting that although many of the effects are null, their patterns are directionally consistent with the results of the other studies. Thus, these data may nonetheless support the key hypotheses in this line of research even though they are weak overall.

**Study F3: Argument Quality**

In the other studies in this dissertation, the persuasive message that participants read was designed to be *moderately* strong. It was important that the message was strong enough that it was taken seriously but not so strong as to limit the opportunity to observe counterarguing. However, because stronger perceived reasons for certainty are associated with more thoughtful engagement with counterattitudinal persuasive messages, it remains possible that people who perceive strong reasons for their certainty may actually be most susceptible to persuasion when the persuasive message is extremely compelling. That is,
because these individuals are more likely to pay attention to the message, they may be more likely to succumb in these situations. By contrast, people who perceive weaker reasons for their certainty may not pay as much attention to the message and thus fail to notice the cogency of its arguments.

This hypothesis was tested with 92 undergraduate students ($M_{age} = 19.51$, $SD = 3.00$, 50% male). This study used the same false feedback manipulation that was used in Study 6. Participants rated their attitudes toward a senior comprehensive exam policy and received a “confidence score.” They were then told that the confidence score was either derived from a set of strong bases or a set of weak bases (or no information about the bases was provided in the control condition). They then read an essay arguing against the exam policy, which was composed of either strong arguments or weak arguments (Petty & Cacioppo, 1986). More thoughtful engagement with the message would be illustrated by a larger effect of the argument quality manipulation on post-message attitudes.

Results of a $2 \times 2$ ANCOVA on post-message attitudes, entering initial attitudes as a covariate, revealed only a main effect of argument quality; attitudes were more positive in the strong arguments ($M = 3.69$, $SD = 1.65$) than in the weak arguments condition ($M = 2.91$, $SD = 1.62$), $F(1, 85) = 12.05$, $p < .001$. Neither the main effect of the perceived confidence basis manipulation nor the 2-way interaction were significant, $ps > .78$. That is, as was the case with the other studies in this dissertation using this manipulation, the manipulation of strength of certainty bases failed to influence post-message attitudes.
Reading time was also assessed and submitted to a $2 \times 2$ ANOVA. Consistent with the other studies in this dissertation, people spent more time reading the message in the strong perceived confidence bases condition ($M = 115.96$ sec, $SD = 57.65$) than in the weak perceived confidence bases condition ($M = 105.45$ sec, $SD = 42.46$), but the overall main effect was not significant, $F(2, 86) = 1.45$, $p = .24$. Neither the main effect of argument quality nor the interaction were significant, $p > .32$ predictors of reading time.

**Summary**

In general, the results from the studies excluded from the dissertation produced findings that were significant support for key hypotheses or were at least directionally consistent with those reported in the text. As such, inclusion of these data would contribute meta-analytically in a positive way to the results reported in the dissertation (see Fabrigar & Wegener, in press) and do not undermine the conclusions drawn.