The bigger they come, the harder they fall: The paradoxical effect of regulatory depletion on attitude change

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HIGHLIGHTS

- People with high attitude certainty expect to resist persuasion.
- Experiencing regulatory resource depletion can increase openness to persuasion.
- Resource depletion can undermine perceived counterargument strength.
- Perceived counterargument performance mediates the depletion-persuasion link.

ARTICLE INFO

ABSTRACT

The present research explores a new effect of regulatory resource depletion on persuasion by proposing that the experience of depletion can increase or decrease openness to attitude change by undermining perceived counterargument strength. Ironically, this openness is hypothesized to be strongest for individuals holding attitudes with high (versus low) certainty, as individuals should expect high certainty attitudes to be more resistant—an expectation the experience of depletion is hypothesized to violate. Supporting the hypotheses, three studies demonstrate that individuals expect high certainty attitudes to be stable (Study 1), the experience of resource depletion violates this expectancy and increases the openness to counterattack (Study 2), and this openness is driven by decreased perceptions of counterargument strength (Study 3). By augmenting (attenuating) the effect of argument quality for high (low) certainty attitudes, the experience of depletion on perceived counterargument performance offers insight into novel means by which resource depletion can influence persuasion.

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The *strength model of self-control* (Baumeister, Bratslavsky, Muraven, & Tice, 1998; see Muraven & Baumeister, 2000) has been the dominant perspective by which researchers have studied self-regulation over the past fifteen years. The model contends that people possess a reserve of regulatory resources that are necessary for executive functioning (Baumeister, Schmeichel, & Vohs, 2007; Vohs & Baumeister, 2011). Consistent with the notion that this reserve is limited in resources, expenditures reduce the availability of these resources and consequently the ability to succeed at subsequent self-regulatory behaviors. In support of the model, a wealth of research across a range of domains demonstrates that a limited capacity of regulatory resources impairs subsequent behaviors that require access to this limited reserve of resources (for a review, see Mead, Alquist, & Baumeister, 2010).

Recently, researchers from a variety of domains have explored the effects of this limited capacity of regulatory resources on resistance to persuasion (Burkley, 2008; Burkley, Anderson, & Curtis, 2011; Fennis, Das, & Pruyn, 2004; Fennis, Janssen, & Vohs, 2009; Janssen, Fennis, & Pruyn, 2010; Janssen, Fennis, Pruyn, & Vohs, 2008; Wan, Rucker, Tormala, & Clarkson, 2010; Wheeler, Briñol, & Hermann, 2007; see also Clarkson, Hirt, Jia, & Alexander, 2010). Indeed, much of the existing research is focused on a single question—that of the role of regulatory depletion on people's ability to successfully resist counterattacks of varying strength (Burkley, 2008; Clarkson et al., 2010; Wheeler et al., 2007). A common paradigm in this research is to present participants with a depletion or non-depletion task before exposing them to a strong or weak counterattack. The typical finding is that depleted and non-depleted individuals are equally resistant to the weak attack but differentially resistant to the strong attack (Burkley, 2008; Clarkson et al., 2010). In particular, non-depleted individuals are more resistant to the strong attack relative to depleted individuals, as regulatory resources appear necessary to successfully counterargue strong (but not weak) arguments.

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A new role for regulatory depletion in persuasion

The focus of the present research, however, is to examine a possible, alternative means by which depletion can influence persuasion—and the resistance process in particular. Specifically, we argue that, beyond affecting people's actual ability to counterargue (Clarkson et al., 2010; Fennis et al., 2004, 2009; Wheeler et al., 2007), regulatory depletion can also alter people's *metacognitive* appraisals of the resistance experience. Broadly defined, metacognition refers to people's thoughts about their thoughts (i.e., a secondary cognition based on a primary cognition: see Petty, Briñol, Tormala, & Wegener, 2007), and considerable work shows that individuals exposed to a persuasive message often reflect upon the resistance experience to inform their response (e.g., Petrocelli, Clarkson, Tormala, & Hendrix, 2010; see Tormala, 2008). It is our contention that regulatory depletion can affect this reflective process by altering people's perceptions of specific features of the resistance process—namely, their counterargument performance.

Indeed, people often reflect upon and make inferences about their counterargument performance after facing a persuasive counterattack (e.g., "Were my counterarguments effective enough to protect my attitude?"; Tormala, Clarkson, & Petty, 2006). Additionally, factors beyond *actual counterargument strength* have been shown to affect people's perceptions of these counterarguments—such as feedback about their performance resisting (Hedges, 1974; Tormala et al., 2006). Finally, people's perceptions about the quality of their counterarguments have been shown to predict attitude change (Hedges, 1974) and influence behavioral intentions (Tormala et al., 2006), critical consequences that occurred irrespective of any differences in actual counterargument strength. Thus, people do form perceptions about their counterargument performance, these perceptions can be affected by external factors, and these perceptions can be consequential for subsequent attitude change apart from any differences in peoples' actual counterarguments.

Our intent is to demonstrate that the experience of depletion can impact the formation of these perceptions of counterargument performance. However, we believe any metacognitive influence of regulatory depletion on perceived counterargument strength is dependent on people's pre-existing expectations of their attitude's performance—expectations we believe are embodied in, among other factors, the amount of certainty people have in their attitude.

The influence of attitude certainty

Attitude certainty refers to the subjective sense of confidence, clarity, or correctness about an attitude (Krosnick & Petty, 1995; Petrocelli, Tormala, & Rucker, 2007; Tormala & Rucker, 2007). A wealth of research demonstrates that certainty increases an attitude's resistance to counterattitudinal messages (Bassili, 1996; Kelley & Lamb, 1957; Swann, Pelham, & Chidester, 1988; Tormala & Petty, 2002; Visser & Mirabile, 2004). In other words, the experience of high (as opposed to low) certainty has been repeatedly shown to increase an attitude's resistance to persuasion (for a review, see Rucker, Tormala, Petty, & Briñol, 2014). As noted, however, we propose that individuals hold pre-existing expectancies about how their attitude *should* fare in response to persuasive attack, expectancies we believe are biased by attitude certainty. Consequently, because high certainty attitudes are more likely to increase resistance than low certainty attitudes, we contend that people *expect* their high certainty attitudes to be more resistant than their low certainty attitudes.

Moreover, consistent with reference-point reasoning (Holyoak & Gordon, 1983; Kahneman & Tversky, 1979), we believe that these expectancies serve as important reference points for any metacognitive inferences that might occur once attitudes of high and low certainty are exposed to counterattack. Indeed, these expectations should inform the manner in which individuals holding high and low certainty attitudes define difficulty during the resistance process. In particular, we believe that these pre-existing expectancies should interact with

resource depletion to determine the conditions under which individuals unexpectedly expend resources to resist. This unexpected use of resources, in turn, should define the diagnostic value of the resistance experience and thus inform any inferences concerning counterargument strength (see Tormala, 2008).

An expectancy-violation and misattribution hypothesis

Persuasive interactions can be likened to a competitive event, whereby two or more people defend their opposing positions (Ferrara, 2013; Menegatti & Rubini, 2013; Raubolt, 2006; Smith, 1975). Much like any competitive event, a priori expectations should be diagnostic in evaluating one's performance and overall ability. For instance, expecting to perform well in a swimming meet and finishing last would naturally lead any swimmer to doubt his or her abilities. On the other hand, expecting to perform poorly, yet finishing in the top five, would likely boost one's confidence in his or her abilities. In a similar vein, we contend that people hold a priori expectations about their attitudes that are diagnostic to the evaluation of the viability of the attitude following exposure to a counterattack. Moreover, we posit that individuals hold varying expectations concerning the resistance of attitudes held with high versus low certainty, as high certainty attitudes are consistently more resistant to persuasive counterattacks (see Rucker et al., 2014).

Our interest is in the effect of resource depletion on the evaluation of high and low certainty attitudes following exposure to a counterattack, as the experience of resource depletion has been shown to increase the perceived amount of effort expended resisting a persuasive appeal (Wan et al., 2010). Consequently, we predict that the experience of enhanced effort, due to resource depletion, will interact with attitude certainty and the strength of the persuasive counterattack to alter individuals' evaluation of their perceived performance in defending their attitudes through counterarguments and thereby dictate attitude change. Our conceptual model is outlined in Table 1.

When individuals hold attitudes with high certainty, they should expect to experience relative ease resisting a persuasive counterattack. In addition to being affected by one's expectations, perceptions of his/her counterargument performance should be affected by the strength of the persuasive counterattack. Thus, like the boxer who reevaluates his abilities more *negatively* after needing several more rounds than expected to win the fight (e.g., winning by decision after ten rounds rather than the expected second- or third-round knockout), the feeling of increased effort to resist under high resource depletion should be interpreted as diagnostic of the attitude's ineptitude and in turn be misattributed to the perceived *weakness* of one's performance in defending his/her attitude (e.g., "I expected to hold strong, but it took more than I expected to resist this message—the reasons for my attitude must be weaker than I thought.") and the result should paradoxically be heightened persuasion. We expect this mind-set to be particularly prevalent when depleted individuals encounter strong arguments than when they encounter weak arguments, and subsequently lead to greater attitude change. When people with high attitude certainty are not depleted of their regulatory resources, there should be no perceived increased effort to resist, perceptions of counterargument performance should not be affected, and the effect of argument quality on attitude change should be comparatively attenuated. In other words, depletion is expected to amplify the effect of argument quality on the degree to which high certainty attitudes change in the persuasive context.

Conversely, when individuals hold attitudes with low certainty, they should expect to experience relative difficulty resisting a persuasive counterattack. Thus, like the boxer who reevaluates his abilities *positively* after enduring the entire ten rounds of a fight against an opponent for whom he expected to fall early (e.g., losing by decision after ten rounds rather than the expected second- or third-round knockout), the feeling of increased effort to resist under high resource depletion should be interpreted as diagnostic of the attitude's durability and in turn be misattributed to the perceived *strength* of one's performance in

Table 1
Conceptual model of the process of attitude change under varying conditions of regulatory resource state, the strength of a counterattack, and perception of counterargument performance.

Attitude certainty/(expectation)	Regulatory resource state	Strength of counterattack	Perception of counterargument performance	Attitude change
High (stability)	Not depleted	Strong	Fair (as expected)	Moderate
		Weak	Good (as expected)	Minimal
	Depleted	Strong	Poor (worse than expectations)	Considerable
		Weak	Good (worse than expectations)	Minimal
Low (instability)	Not depleted	Strong	Poor (as expected)	Considerable
		Weak	Good (as expected)	Minimal
	Depleted	Strong	Fair (better than expectations)	Moderate
		Weak	Good (better than expectations)	Minimal

defending his/her attitude (e.g., "I expected to flop easily, but hung in there and I was able to resist longer than anticipated—the reasons for my attitude must be stronger than I expected.") and the result should be heightened resistance. When people with low attitude certainty are not depleted of their regulatory resources, there should be no perceived increased effort to resist, perceptions of counterargument performance should not be affected, and the effect of argument quality on attitude change should be comparatively augmented. In other words, depletion is expected to deflate the effect of argument quality on the degree to which low certainty attitudes change in the persuasive context.

Thus, we propose that the experience of regulatory depletion alters subjective judgments about the experience of resisting a persuasive counterattack by misattributing the subjective sense of depletion to one's performance in defending his/her attitude. Importantly, however, these effects should be bolstered under conditions where actual resistance is difficult. Given that strong arguments require greater effort to counterargue than do weak arguments (Wheeler et al., 2007), we predict that these effects will be stronger following a counterattack consisting of strong rather than weak persuasive arguments. Additionally, given that the non-depleted experience is not associated with feelings of heightened effort, we expect attitudes held with both low and high certainty to be less vulnerable to attitude bolstering and change respectively when people are not depleted of their resources. However, our reasoning is consistent with findings reported by Burkley (2008). Burkley showed that people can resist weak arguments when they are and when they are not depleted of their regulatory resources. We suspect that this is due to the fact that few resources are typically necessary for people to recognize weak arguments and successfully resist them. Furthermore, because of the similarity in terms of effort between depletion tasks and defending one's attitude (Burkley, 2008), we believe that it is more likely for one to misattribute the subjective sense of regulatory depletion to his/her efforts at resisting strong arguments than to his/her efforts at resisting weak arguments.

It should be noted that such misattribution processes are by no means unique. Schwarz and Clore (1983, 2003), for instance, showed that people can misattribute transient emotional experiences to more general judgments about one's life. Similarly, as alluded to above, Wan et al. (2010) showed that highly motivated individuals can misattribute the experience of depletion to the amount of time spent processing a persuasive appeal. Essentially, then, we propose that people's metacognitive appraisals of their counterargument performance can be distorted by the experience of depletion, such that the experience of difficulty/greater than expected effort can lead to the perception of weaker or stronger counterarguments. Subsequently, perceptions of one's counterargument performance should serve as an important cue to change or maintain his/her attitude. Interestingly, these hypotheses lead to the ironic possibility that, under conditions of regulatory depletion, attitudes held with high (as opposed to low) certainty are *more*

susceptible to counter-persuasion because of their a priori expectations to resist—expectations that the inference of certainty establishes and the experience of depletion violates.

Overview

To explore these hypotheses, we first examined the extent to which attitudes held with high and low certainty do indeed elicit differing expectancies regarding their ability to resist a persuasive counterattack (Study 1). We then assessed the effects of resource depletion of the resistance of attitudes high or low in certainty to a counterattitudinal appeal consisting of strong or weak arguments. Specifically, participants were provided with background information about a counterattitudinal policy (i.e., a mandatory comprehensive exam policy ostensibly under consideration at their university; Petty & Cacioppo, 1986). Participants reported their attitudes toward the policy before we either measured (Study 2) or manipulated (Study 3) participants' certainty in their attitude toward the policy. We then presented participants with a depletion or non-depletion task before exposing them to the counterattitudinal message consisting of either strong or weak arguments. In support of our expectancy-based process, we predicted that those *low* in attitude certainty should be more persuaded by the strong appeal when not depleted of their regulatory resources. Conversely, we predicted that those *high* in attitude certainty should be more persuaded by the strong appeal when depleted, as feelings of resource depletion should undermine the perceived strength of counterarguments for those with high certainty attitude and, consequently, engender greater persuasion.

Study 1

Our hypotheses regarding the effects of regulatory resource depletion on attitudes rest heavily on the assertion that people have a priori expectancies concerning their attitude's ability to resist persuasion that vary depending on the level of certainty that they have in their attitudes. Specifically, we contend that people expect high certainty attitudes to be more resistant to counterattack and low certainty attitudes to be less resistant to counterattack. Although these expectations would be consistent with actual resistance of high and low certainty attitudes (Tormala & Rucker, 2007; see also Rucker et al., 2014), we are unaware of any work showing that people hold an expectation relating specifically to the future resistance of high and low certainty attitudes. Thus, we first examined the extent to which attitude certainty elicits these different expectancies. This examination consisted of two tasks in which individuals indicated their expectations toward a novel (Task 1) or pre-existing (Task 2) attitude object. In both tasks, we assessed people's certainty in their attitude as well as their expectation of the attitude's resistance. We predicted that the experience of high attitude certainty would be associated with relatively stronger expectations of

future resistance, and low attitude certainty would be associated with relatively weaker expectations of future resistance, regardless of the novelty of the attitude object.

Method

Participants and design

Thirty-four Wake Forest University (WFU) undergraduates participated for partial fulfillment of a course requirement. The current study used both a correlational design (for the first task) and a single within-subjects factor design (for the second task).

Procedure

For the first task, participants were asked to consider the notion of a mandatory comprehensive exam policy as a requirement for graduation. They were provided with background information about the policy and then asked to report their attitude toward the policy on a single nine-point semantic differential scale anchored at *unfavorable/favorable*. Afterward, they reported their certainty in their attitude toward the policy on two items (adopted from Petrocelli et al., 2007): "How clear do you think your attitude is in your mind?" and "How correct do you think your attitude is?" using nine-point response scales anchored at 1 (*extremely unclear/incorrect*) to 9 (*extremely clear/correct*). Responses were significantly correlated ($r = .53, p < .01$) and thus averaged to form a composite index of certainty. Participants then reported their expectations concerning their attitude's ability to resist on two items: "How resistant do you think your attitude would be to a counterattitudinal persuasive attack?" and "How easily do you think you could be persuaded to think differently about this issue?" using nine-point response scales anchored at 1 (*not at all resistant/not at all*) to 9 (*extremely resistant/very easily*).

For the second task, participants were asked to think about an attitude object (e.g., social issue, person or idea) for which they have a relatively *strong* attitude and to report how certain they are about their *strong* attitude using a single nine-point item with 1 (*extremely uncertain*) and 9 (*extremely certain*) as the response anchors (Fazio & Zanna, 1978). Participants were then asked to respond to the same two expectancy items as those used for the exam policy issue. This process was then repeated for a relatively *weak* attitude before participants' were debriefed and thanked for their time.

Results

Comprehensive exam policy attitude

As hypothesized, greater attitude certainty toward the exam policy was associated with greater expected resistance ($r = .38, p < .01$) and lower expected persuasion ($r = -.54, p < .01$).

Strong versus weak attitudes

Consistent with prior research linking certainty to attitude strength (e.g., Bassili, 1996), participants indicated greater certainty in the strong (versus weak) attitude. More importantly, however, participants

expected their strong (versus weak) attitude to be more resistant to counterattack (see Table 2).

Discussion

These findings offer considerable insight into people's pre-existing expectations regarding the ability of high and low certainty attitudes to resist counterattack. Specifically, people expect high certainty attitudes to be more resistant than low certainty attitudes. Moreover, these expectations occurred for a novel attitude object as well as participants' own idiosyncratic attitudes, which suggests that these resistance expectancies are ubiquitous across different attitudes.

Study 2

Having demonstrated that individuals hold different expectations for high and low certainty attitudes, Study 2 was designed to test whether attitude certainty biases the documented effect of regulatory resource depletion on persuasive susceptibility. Given the inconsistencies in the regulatory resource depletion/persuasion literature (see Burkley, 2008; Wheeler et al., 2007) our examination of the role of attitude certainty in the context of resource depletion and persuasion is of great importance.

As noted, Wheeler et al.'s (2007) research demonstrated that regulatory depletion can increase the persuasive efficacy of weak arguments; in fact they found that the largest difference between strong and weak argument quality conditions occurred for non-depleted participants. Although Wheeler et al. neglected to test cognitive responses (i.e., favorability index) as a mediator of their depletion condition × argument quality condition interaction, their findings appear to be driven by depletion's interference with counterarguing. The notion that thoughts in response to a persuasive counterattack are affected by resource depletion is also consistent with Clarkson et al.'s (2010; Experiment 4) findings. Because counterarguing is associated with high attitude strength variables such as attitude certainty (Petty & Krosnick, 1995), regulatory resources might interact with certainty such that people with high certainty show greater attitude change in response to weak arguments when they are depleted of their regulatory resources than when they are not depleted.

On the other hand, research conducted by Burkley (2008) suggests that regulatory depletion can augment the efficacy of strong arguments. Furthermore, Burkley found no evidence in favor of the notion that thoughts in response to a persuasive counterattack are affected by resource depletion (see Study 4).

However, we again note that previous investigations of persuasion in the context of resource depletion ignored the potential influence of attitude certainty. In light of previous research and our attitude expectancy model, one possibility is that depletion may augment the effects of argument quality on attitude change when people hold high attitude certainty (consistent with Burkley, 2008) and attenuate the effects of argument quality on attitude change when people hold low attitude certainty (consistent with Wheeler et al., 2007). Such findings would not only demonstrate a new role for depletion in persuasion, but it would also outline an important instance in which high certainty attitudes are vulnerable to counterattack. In Study 2, then, participants' attitudes and attitude certainty toward a mandatory comprehensive exam policy were measured prior to completing a manipulation of regulatory depletion. Participants were then presented with a counterattitudinal message and reported their final attitudes.

Method

Participants and design

One hundred eleven WFU undergraduates (59.5% female) participated for partial fulfillment of a course requirement. The current study was conducted as a 2 (regulatory resources: not depleted vs.

Table 2
Descriptive statistics and results of repeated measures ANOVAs in Study 1.

Dependent variable	Weak attitude		Strong attitude		$F(1, 33)$
	M	SD	M	SD	
Certainty	4.82	1.96	8.03	.90	93.33[*]
Expected resistance	4.08	1.62	6.38	2.50	17.21[*]
Expected ease of persuasion	6.18	1.88	2.73	1.68	54.37[*]

[*] $p < .001$.

depleted) × 2 (argument quality: strong vs. weak) between-subjects design, with initial attitude certainty as a predictor.[1]

Procedure

Seated at computers in private cubicles, participants were presented with introductory information about a mandatory comprehensive exam policy as a requirement for graduation ostensibly under consideration at their university (e.g., Wheeler et al., 2007). They then provided their initial attitudes and attitude certainty toward the exam policy. Afterward, participants completed a series of tasks intended to deplete (or not) their regulatory resources (see Regulatory resources manipulation). Participants were then presented with additional information about the exam policy ostensibly to further understand their reactions. This information, however, took the form of a persuasive counterattack that included either strong or weak arguments in support of the policy (see Argument quality manipulation). Following the message, participants again reported their attitudes toward the exam policy. Finally, participants indicated their perceptions of the depletion manipulation before being debriefed and thanked for their time.

Independent/predictor variables

Regulatory resource manipulation

Participants were randomly assigned to either a depleting or non-depleting task, presented as an assessment of students' cognitive abilities. In the *not depleted* condition, participants were instructed to: 1) spend 10 min crossing out every "e" that appeared in a passage from a statistics textbook, and 2) spend 3 min "freely thinking and writing about whatever comes to mind." In the *depleted* condition, participants were instructed to: 1) spend 5 min crossing out every "e" that appeared in the passage of text from a statistics book and another 5 min crossing out every "e" except when another vowel follows the "e" in the same word or when the vowel is one letter removed from the "e" in either direction (e.g., in the word "vowel"), and 2) spend 3 min "freely thinking and writing about whatever comes to mind except a white bear." These tasks were adapted from prior depletion work (Baumeister et al., 1998; Muraven, Tice, & Baumeister, 1998) with the rationale that inhibiting a habitual response (i.e., changing instructions after 5 min) and suppressing a dominant response (i.e., an active thought like 'white bear') requires—and thus depletes—regulatory resources.

Argument quality manipulation

Participants were presented with a persuasive attack in favor of the exam policy. This attack was ostensibly provided by the university administration and consisted of either *strong* (e.g., graduate and professional schools prefer students from schools with comprehensive exams) or *weak* (e.g., four parents wrote letters to the university favoring the exams) arguments (adapted from Petty & Cacioppo, 1986).

Attitude certainty

Attitude certainty was assessed on a single item adapted from prior research (Fazio & Zanna, 1978): "How certain are you of your opinion about mandatory comprehensive exams?" using a nine-point response scale anchored at 1 (*not certain at all*) to 9 (*extremely certain*).

Dependent measures

Time 1 attitude

Participants reported their attitudes toward the exam policy on a nine-point semantic differential scale anchored at 1 (*unfavorable*) to 9 (*favorable*).

Attitude change

Following the persuasive message, participants again reported their attitudes toward the exam policy on the same item used to measure the initial attitude. An attitude change index was created by subtracting participants' initial attitude from their final attitude. Given that the majority of the participants reported unfavorable attitudes toward the policy (see Footnote 1), positive values on the index reflected greater persuasion.

Regulatory-task perceptions

Participants were asked to think back to the regulatory resource manipulation and report the extent to which they enjoyed the task, found it difficult, or found it interesting on a series of scales ranging from 1 (*not at all*) to 9 (*very much*).

Results

Regulatory-task perceptions

Consistent with prior research, our regulatory resource manipulation did not affect the extent to which participants enjoyed the task, found it difficult, or found it interesting (all $ps > .18$). Thus, our subsequent effects involving regulatory resources are not due to differential perceptions of task enjoyment, interest, or difficulty.

Time 1 attitude

As expected, a one-way analysis of variance (ANOVA) test revealed that initial attitudes ($M = 2.78$, $SD = 1.60$) did not differ across conditions, $F(3, 107) = 1.20$, *ns*.

Attitude change

Following the recommendations of Cohen, Cohen, West, and Aiken (2003), a hierarchical regression analysis was conducted, treating attitude certainty (continuous, mean centered), regulatory resource condition (dummy coded: $-.50$ = not depleted, .50 = depleted; mean centered) and argument quality condition (dummy coded: $-.50$ = weak, .50 = strong; mean centered) as predictors of attitude change. As expected, the analysis revealed a significant main effect for argument quality, $\beta = .41$, $t(107) = 4.60$, $p < .001$; strong (versus weak) arguments generated greater attitude change. Additionally, a significant regulatory resources × attitude certainty interaction emerged in a pattern consistent with our hypotheses, $\beta = .24$, $t(104) = 2.82$, $p < .02$; greater certainty led to more persuasion when participants were depleted than when they were not depleted. These effects, however, were qualified by the predicted regulatory resources × argument quality × attitude certainty interaction, $\beta = .23$, $t(103) = 2.79$, $p < .01$.

We elected to examine this interaction at one standard deviation above and below the attitude certainty mean (see Fig. 1). Consistent with expectations, this analysis revealed that attitudes held with low certainty were more persuaded by strong arguments when participants were not depleted than when they were depleted, $\beta = -.34$, $t(103) = -2.17$, $p < .05$. Conversely, attitudes held with high certainty were more persuaded by strong arguments when participants were depleted than when they were not, $\beta = .54$, $t(103) = 3.36$, $p < .01$. Individuals holding relatively low, $\beta = -.07$, $t(103) = -.39$, *ns*, and high
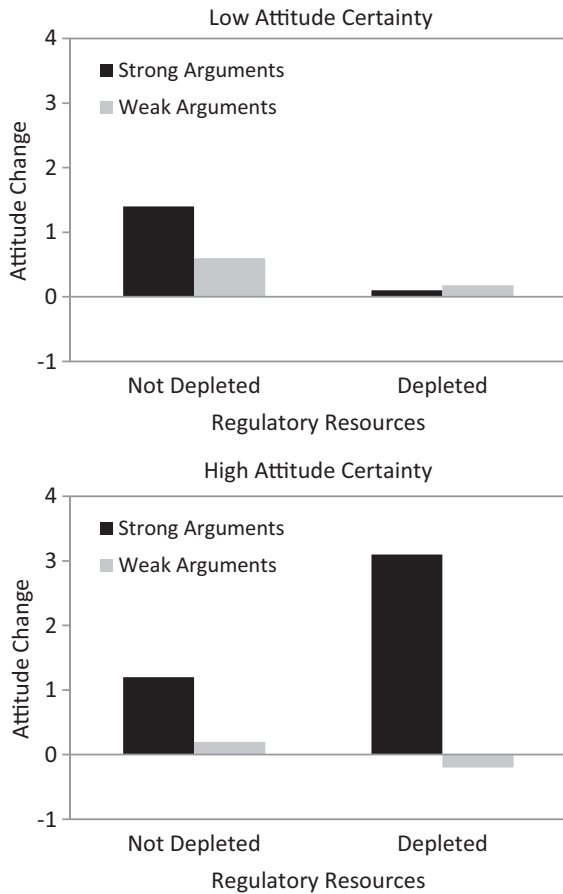
Fig. 1. Predicted attitude change regression means as a function of resource depletion and argument quality at low (−1 SD) and high (+1 SD) attitude certainty in Study 2.

attitude certainty, $\beta = -.11$, $t(103) = -.67$, *ns*, were equally unaffected by weak arguments across regulatory resource conditions. From another angle, results showed that when depleted participants were exposed to strong arguments, highly certain participants showed significantly more attitude change in favor of the exams than did their less certain counterparts, $\beta = .82$, $t(103) = 4.87$, $p < .001$.[2]

Discussion

Study 2 revealed that the effect of regulatory resources on individuals' susceptibility to counterattacks is critically dependent on participants' level of attitude certainty. Specifically, attitudes held with low certainty demonstrated greater change to strong arguments in the not-depleted condition, whereas attitudes held with high certainty demonstrated greater change to strong arguments in the depleted condition. This latter effect is especially intriguing given the general finding in the attitude strength literature that attitude certainty is associated with significant resistance to persuasion (Gross, Holtz, & Miller, 1995; Rucker et al., 2014; Tormala & Rucker, 2007). Finally, as expected, weak

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[2] For interested readers, we used the analytical recommendations advocated by Dawson and Richter (2006) to examine the depletion × argument quality interaction terms from the omnibus test of the three-way interaction. The depletion × argument quality interaction was significant for high ($\beta = 1.30$, $t(103) = 2.77$, $p < .001$) but not low ($\beta = -.55$, $t(103) = -1.20$, *ns*) certainty attitudes. These effects notwithstanding, subsequent analyses revealed that the difference in attitude change between strong and weak argument conditions was significant only when participants with relatively high attitude certainty were depleted ($\beta = .91$, $t(103) = 6.05$, $p < .001$) and marginally significant when participants with relatively low attitude certainty were not depleted ($\beta = .24$, $t(103) = 1.53$, $p = .13$).

arguments showed no effect, presumably because of the minimal regulatory resources needed to counterargue such arguments (Burkley, 2008).

Though observed in prior research (Burkley, 2008; Wheeler et al., 2007), we find it noteworthy that these data did not yield a significant regulatory resources × argument quality interaction ($\beta = .17$, $t(104) = 1.14$, $p = .26$). Interestingly, however, the pattern of the interaction trended toward Burkley's reported pattern; that is, those who were depleted of their regulatory resources showed greater discrimination between strong ($M = 1.86$, $SD = 2.60$) and weak arguments ($M = .00$, $SD = 1.14$) than did those who were not depleted (strong arguments: $M = 1.31$, $SD = 1.62$; weak arguments: $M = .35$, $SD = .71$). Though consistent in pattern, we believe that the relative weakness of this interaction may be attributed to the salience of individuals' attitude certainty and therefore pre-existing expectancies regarding resistance. We revisit this issue in the general discussion.

Study 3

The purpose of Study 3 was to gain insight into the mechanism underlying the attitude change effect observed in Study 2. In other words, why is attitude certainty altering the persuasive impact of regulatory resource depletion? As noted, prior research has documented the role of regulatory resource depletion in inhibiting the generation of counterarguments toward strong counterattacks (Clarkson et al., 2010; Wheeler et al., 2007). Yet despite the clear impact of regulatory resources on counterargument generation, we believe that differential inhibition of counterargument generation cannot account for the entirety of the attitude change effects demonstrated in Study 2. We do, however, believe that understanding these different attitude expectancies provides a framework by which to understand the attitude change effects.

Recall that the relative presence of increased difficulty when an individual is depleted of his/her resources should increase the diagnostic value of the resistance experience for attitudes high and low in certainty, though in different directions. Specifically, people with high certainty attitudes should perceive weaker counterarguments and thus exhibit greater attitude change when they expend more effort than expected, whereas people with low certainty attitudes should perceive stronger counterarguments and thus exhibit less attitude change when they expend more effort than expected.

To test this hypothesis, we replicated the procedure of Study 2 by directly manipulating attitude certainty and including measures of both counterargument generation and perceived counterargument strength. As in Study 2, we predicted an interaction to emerge between attitude certainty, regulatory resources at the time of processing/counterarguing a persuasive communication, and argument quality for attitude change. Here, however, we further hypothesized that participants' *perceived* counterargument performance would mediate the relationship between the three-way interaction term and attitude change.

Method

Participants and design

One hundred fifty-eight WFU undergraduates (63.9% female) participated for partial fulfillment of a course requirement. The current study was conducted as a 2 (attitude certainty: low vs. high) × 2 (regulatory resources: not depleted vs. depleted) × 2 (argument quality: strong vs. weak) between-subjects factorial design.

Procedure

The procedure was similar to Study 2, with two important exceptions. First, we manipulated (as opposed to measured) attitude certainty. Second, we assessed both participants' counterarguments toward the persuasive message as well as their perceptions of their counterargument performance. Otherwise, the procedure replicated the method

of Study 2. That is, participants received background information and then indicated their attitude toward the mandatory comprehensive exam policy. They were then exposed to our manipulation of attitude certainty which took the form of false feedback directed at the strength of the thoughts underlying participants' initial attitude (*see attitude certainty manipulation*). Participants then completed the regulatory resource manipulation and were exposed to a counterattack consisting of either strong or weak arguments before being debriefed and thanked for their time.

Independent variables

Attitude certainty manipulation

After indicating their initial attitudes toward the comprehensive exam policy, participants were asked to list three reasons for their attitude toward the policy. Participants were then ostensibly informed that their reasons would be compared to others' reasons for their attitude toward the same issue. Specifically, they were told that their reasons would be compared to responses accumulated in a global database containing various attitude profiles collected by a global, non-profit research organization. Furthermore, it was explained that people hold attitudes for a variety of reasons which often vary in their strength, and that we were interested in comparing their reasons for their attitude toward the exam policy to the reasons collected in this database to obtain an assessment of strength. Participants were then informed that the computer would analyze their listed reason-responses (using software similar to that used to content-analyze other types of written material, such as *U*-Test which checks student term papers for plagiarism), compare it to those from the database, and provide them with a brief evaluation of the strength of the reasons underlying their attitude toward the exam policy. After receiving these instructions and following a 13-second delay, participants were then exposed to one of two feedback screens.

Participants in the *high certainty* condition were informed that they scored 28 out of 30 on the strength index, which indicated that their reasons were "very strong and very compelling". Conversely, participants in the *low certainty* condition were informed that they scored 3 out of 30 on the strength index, which indicated that their reasons were "very weak and not very compelling". This manipulation was based on prior false feedback manipulations used to successfully manipulate attitude certainty (e.g., Tormala et al., 2006).

Regulatory resource manipulation

This manipulation was identical to the procedure outlined in Study 2.

Argument quality manipulation

Participants were exposed to the same strong or weak persuasive message about a senior comprehensive exam policy as described in Study 2.

Dependent measures

Time 1 attitude

Participants reported their attitudes toward the exam policy on nine-point semantic differential scales anchored by *negative/positive* and *bad/good*. The mean of the two items was used as the initial attitude ($r = .92, p < .001$).

Attitude certainty

Following the attitude certainty manipulation, participants answered four items (two of which included the items used in Study 1/ Task 1) about their attitude certainty (adapted from Petrocelli et al., 2007). These items were averaged to compute a composite index of certainty ($\alpha = .83$).

Attitude change

Following the persuasive message, participants again reported their attitudes toward the exam policy on the same items used to measure the initial attitude ($r = .94, p < .001$). Again, an attitude change index was created by subtracting participants' initial attitude from their final attitude, such that positive values indicated greater persuasion (see Footnote 1).

Thought-listing

After reporting their Time 2 attitudes, participants completed a thought-listing task (see Petty & Cacioppo, 1986). Specifically, participants were asked to type any thoughts they had in reaction to the message about the policy. Participants then coded each of their thoughts as being opposed to, neutral toward, or in favor of the exam policy. A thought favorability index was computed by subtracting participants' frequency of negative thoughts from their positive thoughts and dividing this difference by their total frequency of thoughts generated (Wegener, Downing, Krosnick & Petty, 1995). Higher values indicated a greater proportion of positive to negative thoughts toward the exam policy.

Perceived counterargument performance

Participants then rated how well they counterargued the persuasive message on three items: "How well do you feel that you have counterargued the persuasive message?"; "How confident do you feel about your performance in counterarguing the persuasive message?"; and "How much do you agree with the following statement? I did a good job of arguing my case against the persuasive message" using nine-point response scales anchored at 1 (*not well at all/not at all confident/strongly disagree*) to 9 (*extremely well/extremely confident/strongly agree*). The three items were averaged ($\alpha = .96$) to create a composite index of perceived counterargument performance, with higher values indicating greater perceived counterargument performance.

Regulatory-task perceptions

As in Study 2, participants were asked to think back to the cognitive assessment and report the extent to which they enjoyed the task, found it difficult, and found it interesting.

Results

Preliminary analyses

Regulatory-task perceptions

As in Study 2, our regulatory resource manipulation did not affect the extent to which participants enjoyed the task, found it difficult, or found it interesting (all $ps > .17$).

Time 1 attitude

As expected, initial attitudes ($M = 2.97, SD = 1.69$) did not differ across conditions, $F(7, 150) = .49$, *ns*.

Attitude certainty

Analysis of the certainty index revealed that participants who were led to believe that their thoughts were very strong and compelling reported greater certainty ($M = 7.32, SD = 1.78$) than did participants who were led to believe that their thoughts were not very strong and compelling ($M = 5.98, SD = 2.12$), $t(156) = 4.32, p < .001$.

Main analyses

Attitude change

Participants' attitude change scores were submitted to a 2 (attitude certainty: low vs. high) × 2 (regulatory resources: not depleted vs. depleted) × 2 (argument quality: strong vs. weak argument) between-subjects ANOVA. As expected, the main effect of argument quality was

significant, $F(1, 150) = 24.25$, $p < .001$; strong (versus weak) arguments led to more attitude change. Moreover, two separate two-way interactions also emerged as significant: regulatory resources × argument quality, $F(1, 150) = 4.51$, $p < .05$; attitude certainty × regulatory resources, $F(1, 150) = 6.91$, $p < .01$. However, these effects were qualified by the predicted attitude certainty × regulatory resources × argument quality interaction, $F(1, 150) = 4.63$, $p < .05$.

As in Study 2, we elected to further examine this interaction first with respect to attitude certainty (see Fig. 2). This analysis revealed that attitudes held with low certainty were more persuaded by strong arguments than weak arguments regardless of regulatory resources. Essentially, the analysis revealed an argument quality main effect, $t(150) = 2.85$, $p < .01$, such that strong arguments generated greater attitude change ($M = 1.19$, $SD = 1.78$) than did weak arguments ($M = .30$, $SD = 1.38$). The resources × argument quality interaction did not emerge as significant, $t(150) = -.02$, ns.[3]

Among participants assigned to the high attitude certainty condition, strong arguments again generated greater attitude change ($M = 1.56$, $SD = 1.70$) than did weak arguments ($M = .15$, $SD = .89$), $t(150) = 4.14$, $p < .001$. Conversely, however, the resources × argument quality interaction reached statistical significance among high certainty condition participants, $t(150) = 3.00$, $p < .01$. Attitudes held with high certainty were more persuaded by strong arguments when participants were depleted than when they were not, $t(150) = 4.05$, $p < .001$. Participants assigned to the low, $t(150) = -.84$, ns, and high attitude certainty conditions, $t(150) = -.35$, ns, were equally unaffected by weak arguments across regulatory resource conditions. Also, in another comparison of interest, results showed that when depleted participants were exposed to strong arguments, highly certain participants showed significantly more attitude change in favor of the exams than did their less certain counterparts, $t(150) = 3.18$, $p < .01$.

Counterarguments

To explore the impact of participants' counterarguments on the attitude change results, the three-way between-subjects ANOVA was conducted on the thought favorability index. The interaction, however, was not significant, $F(1, 150) = 1.56$, $p = .21$.[4]

Perceived counterargument performance

We explored the impact of participants' perceived counterargument strength on attitude change. Thus, the three-way between-subjects ANOVA was performed on the perceived counterargument performance index. A significant main effect was observed for attitude certainty condition, $F(1, 150) = 4.05$, $p < .05$, such that high attitude certainty participants reported better performance ($M = 4.95$, $SD = 1.75$) than did low attitude certainty participants ($M = 4.38$, $SD = 2.05$). Additionally, a significant attitude certainty × regulatory resources interaction was obtained, $F(1, 150) = 6.09$, $p < .02$. However, these effects were qualified by the predicted three-way interaction, $F(1, 150) = 6.02$, $p < .02$.

Consistent with the attitude change data, we elected to break this interaction down with respect to attitude certainty (see Fig. 3). Among participants assigned to the low attitude certainty condition, the resources × argument quality interaction was marginally significant,

Fig. 2. Attitude change means as a function of resource depletion, argument quality, and attitude certainty in Study 3.

$t(150) = 1.80$, $p < .08$. As expected, this analysis revealed that attitudes held with low certainty were perceived to have more effectively counterargued the strong counterattack when participants were depleted than when they were not, $t(150) = 2.66$, $p < .01$. This finding is consistent with our anticipation that individuals with low attitude certainty misattribute the combination of regulatory depletion and the task of counterarguing strong arguments with an enhanced performance of defending their attitude.

Among participants assigned to the high attitude certainty condition, the resource × argument quality interaction reached statistical significance, $t(150) = 2.77$, $p < .01$. Conversely, attitudes held with high certainty were perceived to have more ineffectively counterargued the strong counterattack when participants were depleted than when they were not, $t(150) = -2.38$, $p < .05$. Both participants assigned to the low, $t(150) = .09$, ns, and high attitude certainty conditions, $t(150) = .07$, ns, perceived their counterarguing as equally effective against the weak counterattack across regulatory resource conditions. Also consistent with expectations, when compared to depleted low certainty participants, depleted high certainty participants reported more poorly counterarguing their position, $t(150) = -2.10$, $p < .05$. These findings replicate the attitude change pattern observed in Study 2.

Mediation analyses

Mediated moderation, as described by Muller, Judd, and Yzerbyt (2005) (see also Wegener & Fabrigar, 2000), occurs when distal variables interact to influence a mediator variable, with that mediator directly carrying the effects of the interacting variables to the dependent measure. Parallel three-way attitude certainty × regulatory resources × argument quality interaction on attitude change and perceived counterargument

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[3] The astute reader will note that an apparent inconsistency in the results displayed in Figs. 2 and 3 is found among the depleted, low attitude certainty, strong and weak argument conditions. However, this inconsistency only reached marginal significance, $t(150) = 1.89$, $p = .07$. These effects notwithstanding, subsequent analyses revealed that the difference in attitude change between strong and weak argument conditions was significant only when participants in the high attitude certainty condition were depleted, $t(150) = 5.26$, $p < .001$. However, by making individuals' certainty salient in Study 3, we would expect more polarized effects in the depletion condition. In other words, the lack of pure replication could be due to the increasing salience of individuals' attitude certainty. Thus, while the replication may not be pure, the effects across the studies are very similar.

[4] Total thought frequency and negative thought frequency were also subjected to a similar analysis. Conclusions did not vary from that of the thought favorability data.
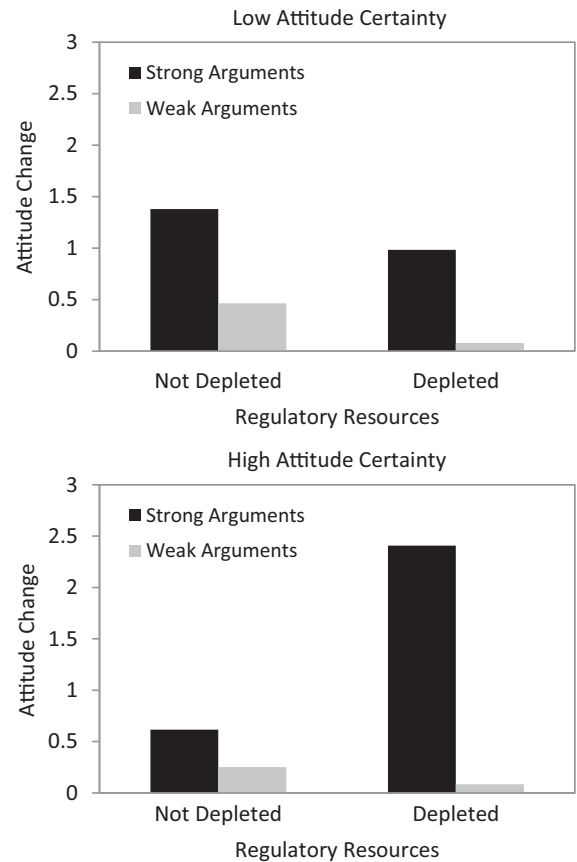
Low Attitude Certainty
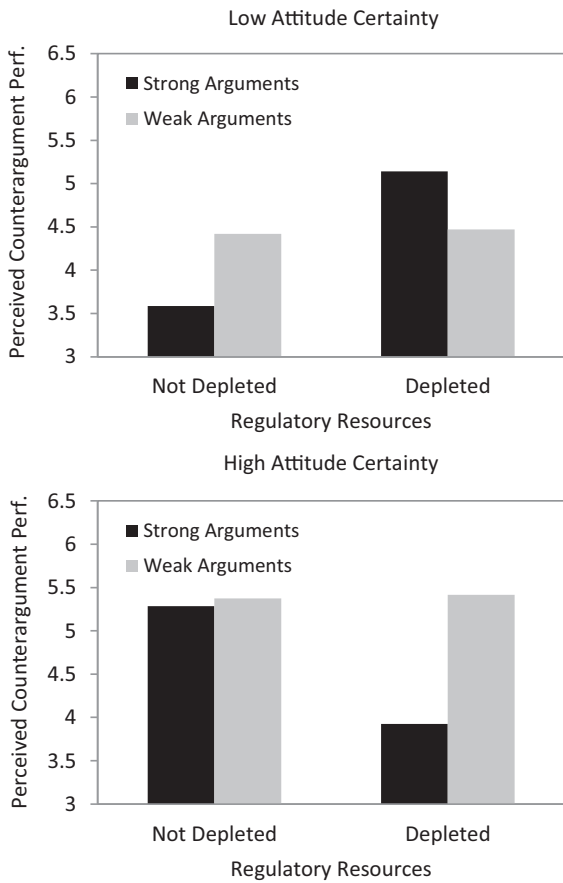

High Attitude Certainty

Fig. 3. Perceived counterargument performance means as a function of resource depletion, argument quality, and attitude certainty in Study 3.

performance are consistent with counterargument performance mediating the three-way interaction on attitude change. This type of mediated moderation would be reflected in the observed interaction on counterargument performance, coupled with a direct relationship between counterargument performance and attitude change.

Building on Baron and Kenny's (1986) recommendations, Muller et al. (2005) specified a set of hierarchical regression analyses (see also Wegener & Fabrigar, 2000) by replacing the initial predictor with an interaction term (while controlling for the main effects and, in our case, controlling for the two-way interactions as well). To test our mediated moderation hypothesis, we used a bootstrap procedure to construct bias-corrected confidence intervals based on 5000 random samples with replacement from the full sample (following the recommendations of Hayes, submitted for publication; 2013; Preacher & Hayes, 2004, 2008). This method tests whether or not the size of an indirect effect differs significantly from zero. For this analysis we dummy-coded all three of our independent variables, using "0" for low attitude

certainty, not depleted, and weak arguments, and using "1" for high attitude certainty, depleted, and strong arguments. The size of the indirect effect of the highest order interaction was $-.61$ ($SE = .29$). Furthermore, the 95% confidence interval excluded zero [-1.29, $-.11$] (see Fig. 4). Thus, consistent with expectations, perceived counterargument performance significantly mediated the relationship between the three-way interaction term and attitude change.

Discussion

As in Study 2, the effects of regulatory resources on attitude change depended on attitude certainty. However, in the present study, the impact of attitude certainty was shown to occur through perceptions of counterargument performance. Specifically, high certainty attitudes were perceived to be less effective at counterarguing the strong persuasive attack when resources were depleted, whereas low certainty attitudes were perceived to be less effective at counterarguing the strong persuasive attack when resources were not depleted. This result is consistent with our contention that attitudes of high and low certainty activate different expectations concerning the ability to resist counterattacks—expectations that interact with feelings of depletion to bias the diagnosticity of different resistance experiences, one's perceptions about his/her performance resisting, and consequently their susceptibility to counterattack.

Consistent with prior research (Burkley, 2008), the effect of regulatory depletion on attitude change appears to be independent of the favorability of one's thoughts in response to a counterattack. Importantly, the effect also does not appear to be dependent on the degree to which one counterargues nor on how well one actually counterargues. Our data suggest that people's metacognitive assessments of the strength of their cognitive reactions—specifically, their perceived counterargument performance—is shaped by both pre-existing expectations of resistance and regulatory resources. Subsequently, perceived counterargument performance appears to influence the degree by which people change their attitudes in response to persuasion. When our participants believed they had performed worse than their expectations, they tended to change their attitudes in the direction of the persuasion; when they believed they had performed better than their expectations they tended to resist.

General discussion

Through two different methods, Study 1 demonstrated that people holding high versus low attitude certainty have very different expectations about the likelihood that they will successfully resist persuasion. To our knowledge, our Study 1 findings serve as the first demonstration that high attitude certainty is more strongly associated with expectations of resistance than is low attitude certainty. We propose that this key difference in expectations sets the stage for a paradoxical effect of regulatory depletion on attitude change. Consistent with Burkley's (2008) findings, two of our studies suggest that regulatory depletion augments the difference found between strong and weak arguments. However, consistent with our expectancy model, this was only found
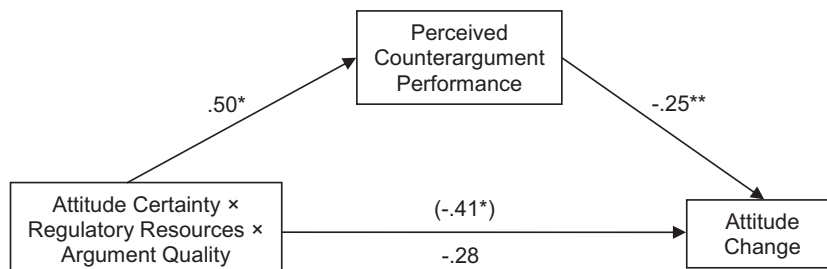

Fig. 4. Results of mediated moderation analysis in Study 3. *Note.* Values displayed above are standardized beta coefficients. *p < .05. **p < .01.

among those individuals holding relatively high attitude certainty. Also consistent with our predictions, the argument quality affect was generally attenuated under conditions of regulatory depletion among those individuals holding relatively low attitude certainty.

Following from our Study 3 finding that perceptions of one's counterargument performance mediated the three-way interactive effect of depletion levels, argument quality, and attitude certainty on attitude change, we echo earlier proposals (Hedges, 1974; Tormala et al., 2006) that suggest the subjective sense of success, or lack thereof, in defending one's attitude is a critical component to the resistance/attitude change process. Interestingly, however, our data suggest that attitude change is a function of one's perceptions of defending his/her attitude (with respect to his/her expectations of resistance prior to the persuasive attack), independent of the degree to which one actually defends his/her attitude.

In describing our hypotheses, we drew attention to research that characterized persuasive interactions similar to competitive events, whereby two or more people defend their opposing positions (Ferrara, 2013; Menegatti & Rubini, 2013; Raubolt, 2006; Smith, 1975) and proposed that a priori expectations should serve as important standards of comparison in evaluating one's performance in defending his/her attitude. It is important to note that when competitive event outcomes clash with prior event expectations, negative feelings and cognitions can emerge from desirable outcomes (e.g., winning a competitive event) and positive feelings and cognitions can emerge from undesirable outcomes (e.g., losing a competitive event). Much like the change in the subsequent approach of a highly ranked college football team after nearly losing to an unranked foe, it is reasonable to change one's attitude when the result of the event is relatively unexpected, negative feelings or cognitions. On the other hand, much like the maintenance in the subsequent approach of an unranked college football team after nearly beating a highly ranked foe, it is reasonable to maintain one's attitude when the result of the event is relatively unexpected, positive feelings or cognitions. It is worth noting that such reasoning is in line with research demonstrating that prior outcomes can promote both action and inaction (see: Zeelenberg, van Dijk, van des Bos, & Pieters, 2002).

Implications

By exploring a new role of regulatory depletion in persuasion, the current report joins a select set of studies (Albarracín & Mitchell, 2004; Clarkson, Tormala, & Rucker, 2008, 2011; Swann et al., 1988) that document increased susceptibility to persuasion for high attitude certainty attitudes. Specifically, when regulatory resources are depleted, people with high (versus low) attitude certainty showed greater susceptibility to a strong persuasive counterattack. Moreover, this attitude change difference was shown to stem from differences in individuals' perceptions of counterargument strength. The experience of resource depletion, then, appears to alter individuals' metacognitive inferences, inferences that depend on the certainty with which the attitude is held. Our investigation provides additional evidence to support the previous research finding that performance in logical reasoning regarding complex intellectual tasks is undermined when individuals are depleted of their regulatory resources (e.g., Schmeichel, Vohs, & Baumeister, 2003).

Of great importance to the current set of findings is the role of attitude expectancies. Specifically, individuals reported expecting attitudes held with high (versus low) certainty to be more resistant. This expectation, in turn, set the stage for the experience of resource depletion to be interpreted in a way that affects individuals' perceptions of the resistance process. Given that people often process or reflect more on information that violates their expectancies (e.g., Gilovich, 1983; Wong & Weiner, 1981), it comes as little surprise that expectancy violation in our experimental paradigm would increase reflection on the resistance process (see Petrocelli et al., 2010). What is surprising is that violating individuals' expectations concerning the efficacy of high certainty

attitudes to resist counterattacks with ease undermined the perceived strength of their counterarguments and therefore resulted in increased attitude change.

Because perceived counterargument performance was measured after post-message attitudes in Study 3, an alternative explanation for our results is that rather than perceived poor performance leading to persuasion, participants in the depleted condition inferred from their attitude change that their counterarguing was poor. This objection is similar to that advanced against the post-attitude measure thought-listing technique: Instead of revealing a cause of attitude change, it provides an opportunity for participants to justify their attitudes (Eagly & Chaiken, 1995). However, this explanation is dependent on participants realizing that their attitudes had changed after the persuasive message. While certainly possible, it is more often the case empirically that individuals fail to identify change in their attitudes (Tormala, DeSensi, Clarkson, & Rucker, 2009; Tormala & Petty, 2002; see Ross, 1989).

Finally, in Studies 2 and 3, we asked participants about their initial attitudes toward the exam policy and then either measured or manipulated their attitude certainty. Though intentional to isolate the role of attitude certainty, these procedures may have inadvertently heightened the salience of individuals' expectations concerning their attitudes' resistance as a function of certainty (see Study 1). In other words, emphasizing attitude certainty at the outset of the experiment might have increased individuals' awareness of their attitudinal expectations. While this heightened salience is consistent with the goals of the current study, it does beg the question of whether these effects would weaken if individuals' attitude certainty—and the resulting expectations that elicits—was less salient. Indeed, absent an expectation to violate, the experience of resource depletion might exert less influence on the openness of high certainty attitudes to counterattack. However, we leave these questions to future research to further disambiguate.

The present research also sheds light on whether the processes by which attitude certainty "shields" current attitudes from persuasive attacks are cognitive or metacognitive in nature. Prior research shows that resistance appraisals are a metacognitive mechanism by which individuals gain attitude certainty (Tormala & Rucker, 2007). The current research suggests that counterargument appraisals might act as a metacognitive mechanism by which attitude certainty leads to resistance against a persuasive appeals.

Limitations

The current research is not without its limitations. One concern involves the very nature of the effect of regulatory depletion on attitudes in the context of persuasion. Similar to Wan et al.'s (2010) conclusion that regulatory depletion can be misattributed to one's perceived elaboration, we contend that depletion can also be misattributed to one's performance in defending his/her attitude. Such misattributions would seem to require that participants were unaware of the possibility that regulatory depletion can have an effect on their perceptions of their counterargument performance. Although we find it unlikely that our participants were aware of the potential that depletion could affect their subsequent resistance to persuasion, we have no data to refute this possibility and thus look to future research to elucidate what effect, if any, awareness has on individuals' misattribution of depletion to their attitudes.

Another important concern involves the inconsistency in our selection of measurements of attitude and attitude certainty with respect to the number of items included and their content. Depending on the study, both attitude and attitude certainty may have been measured with a single item or with multiple items. However, we note that inter-item correlations of both attitude and attitude certainty measures are often quite strong. In fact, Petrocelli et al. (2007) reported a .70 average correlation between the global measure of attitude certainty (Fazio & Zanna, 1978) and single items of attitude clarity and attitude correctness. These data, then, suggest that assessment of specific

constructs (e.g., valence and certainty toward a specific attitude object) may require different standards for validation than assessments of more general constructs (e.g., multi-faceted personality traits). Furthermore, given that our hypotheses were generally supported by the evidence, we find the variation in our measures to be a potential strength of our investigation.

Finally, our misattribution hypothesis requires that participants are unaware that the depletion manipulation could affect their subsequent counterargument performance. Although we have no data that speak to the level of awareness of our participants (as noted), we find it unlikely that people are generally aware of the potential effect of depletion on perceived counterargument performance. Furthermore, our misattribution hypothesis is based on research demonstrating that individuals do in fact misattribute their feelings of depletion. As but one illustration, individuals' misattribute the feeling of depletion to their perception of the passage of time (i.e., 'the extended now' effect; Vohs & Schmeichel, 2003; Wan et al., 2010). Indeed, research has directly explored the extent to which the feeling of depletion can be misattributed and shown that misattribution processes play a central role in differentiating between individuals' actual and perceived depletion (see Clarkson et al., 2010).

Interestingly, researchers (Job, Dweck, & Walton, 2010; Job, Walton, Bernecker, & Dweck, 2013; Miller et al., 2012) have empirically documented that people have rather robust lay theories about the experience of depletion. Yet, these lay theories presume people identify the experience as resource depletion—and that need not always be the case. As a common parallel to depletion, consider the experience of emotions and the earlier research on misattribution in that domain (e.g., Dutton & Aron, 1974; Loftis & Ross, 1974; Schachter & Singer, 1962). People hold to a host of beliefs and expectations about emotions, yet these same people constantly misattribute their emotions to alternative sources (e.g., Schwarz & Clore, 1983). Here, then, we do not contest the finding that people hold to beliefs, expectancies, or lay theories concerning the experience of depletion; we simply argue (in a manner consistent with existing research) that they misattribute that experience to alternative sources (e.g., their counterargument strength).

Future directions

Exploration of a new role of regulatory depletion in persuasion and the findings of the current investigation invite a number of potential future directions. For instance, little is known about the role of regulatory resources and the process of attitude formation. That is, the current research examined attitude maintenance (i.e., resistance) under different levels of depletion, but what are the implications of attitudes formed under different levels of depletion? One possibility appears to be that resource depletion can alter the amount of perceived effort expended in processing new information. That is, under resource depletion, one might conclude that he/she has extensively processed the information and consequently feel more certain than they would have otherwise (Barden & Petty, 2008). However, if the individual expected to form the attitude with relative ease, then individuals might be less certain of their attitude if that attitude was formed under resource depletion. Research in this area may also do well to consider both implicit and explicit attitudes, as Hofmann, Rauch, and Gawronski (2007) have shown that the influence of automatic attitudes on behavior depends greatly on one's available regulatory resources. The amount of certainty in a newly formed attitude under resource depletion, then, may vary as a function of individuals' expectations concerning the ease with which the attitude should be formed.

Another potentially fruitful direction suggested by the current research is to examine alternative expectancies elicited by attitude certainty. For instance, what expectations do individuals hold concerning the elaboration of information related to an attitude held with high or low certainty? The sufficiency principle (Chaiken, Liberman, & Eagly, 1989) might suggest that people expect to engage in less elaboration

for high certainty attitudes, as they only need to engage in effortful or systematic information processing when there is sufficient doubt to bolster their attitude through information search. Moreover, violating this expectation could undermine their high certainty attitude—for instance, engaging in extensive information processing related to a high certainty attitude might lead the individual to question the strength of the attitude if extensive information is sufficient. In general, then, exploring the expectations elicited by attitudes—and attitude certainty—can offer novel insights into potential factors that can engender different metacognitive inferences regarding the validity of one's attitude.

Lastly, we find it important to consider the sustainability of attitudes altered through the experience of resource depletion. An attitude altered under depletion might revert to its prior state when the person is no longer depleted or reconsiders their attitude. The implications of depletion-induced persuasion for an individual's future behavior are thus dependent on the degree to which the attitudes persist over time and resist change in the face of new information that challenges the attitude. This suggests that the sustainability of attitudes changed under depletion might be affected by the strength of the new attitudes. Wan et al. (2010) showed that when high motivation to cognitively elaborate on a persuasive message was induced, depleted participants did not change their attitudes, but increased their attitude certainty. On the basis of previous attitude strength research, one might expect high certainty in the depletion-induced attitude to render greater stability (Krosnick & Petty, 1995). However, combining Wan et al.'s (2010) results with those of the present investigation suggests that perhaps the hidden effect of repeated regulatory depletion might be to make attitudes more certain and thus more vulnerable to persuasion. High certainty might render them vulnerable to attitude change if presented with a strong argument during a subsequent episode of depletion, as occurred in the current investigation. Given that people will generally expend only as much effortful processing as is necessary to gain a sufficient degree of confidence in their attitudes (Eagly & Chaiken, 1995), one way depletion-induced high certainty might lead to attitude stability is by reducing the extent to which people process subsequent attitude-relevant information or by biasing the processing of this information (Lord, Ross, & Lepper, 1979; Tiedens & Linton, 2001; Tormala, Rucker, & Seger, 2008). This would have obvious implications for people's reactions to counterattitudinal persuasive messages, but could also influence the processing of other information, such as disconfirming evidence (Babad, Ariav, Rosen, & Salomon, 1987). Thus, the attitude change effects under depletion may be highly stable or unstable and future research should explore the factors that result in more or less stability.

Conclusion

The present studies provide evidence that resource depletion can impact the metacognitive inferences that arise during the resistance process. Moreover, these inferences elicited negative or positive appraisals of the subjective strength attributed to individuals' counterarguments as a function of whether the attitude was held with high or low certainty, respectively. Additionally, this inference process appears activated by distinct expectancies related to attitudes of high and low certainty. These findings, then, not only document an important condition under which attitudes high in certainty can be more vulnerable to counterattack, but perhaps more importantly they provide novel insight into the means by which resource depletion can impact the persuasion process.

The expectancy-violation and misattribution hypothesis is clearly counterintuitive considering the large number of studies demonstrating that resistance to persuasion and persistence of one's attitude is highly associated with high attitude certainty (not low attitude certainty). However, people clearly base metacognitive aspects of their attitudes on their experience of depletion. For instance, Wan et al. (2010) showed that people apparently infer important information from the experience

of resource depletion—specifically they showed that depletion following a persuasive appeal that people report greater attitude certainty because they infer from their state of depletion that they have more thoroughly processed attitude relevant information—an effect know to enhance attitude certainty independent of actual processing (Barden & Petty, 2008).

Research examining attitude strength variables in the context of regulatory depletion can uncover novel and significant ways that attitudes and situational factors can interact to affect persuasion processes. When regulatory resources are depleted and people are exposed to strong counterattitudinal arguments, they display greater attitude change when attitudes are held with high rather than low certainty. This research makes a contribution to the attitude strength literature by demonstrating conditions under which high attitude certainty renders individuals especially vulnerable to persuasion, and it joins the growing number of studies that address metacognitive aspects of attitude change (e.g., Petty, Briñol, & Tormala, 2002). The findings also support and extend previous research on the information processing consequences of regulatory depletion. People in daily life are frequently challenged by tasks that require the application of self-regulation; therefore, understanding how regulatory depletion affects attitude change and resistance to persuasion, as well as the underlying processes, constitutes an important undertaking for attitude researchers.

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