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Self-Regulation and Selective Exposure: The Impact of Depleted Self-Regulation Resources on Confirmatory Information Processing

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In the present research, the authors investigated the impact of self-regulation resources on confirmatory information processing, that is, the tendency of individuals to systematically prefer standpoint-consistent information to standpoint-inconsistent information in information evaluation and search. In 4 studies with political and economic decision-making scenarios, it was consistently found that individuals with depleted self-regulation resources exhibited a stronger tendency for confirmatory information processing than did individuals with nondepleted self-regulation resources. Alternative explanations based on processes of ego threat, cognitive load, and mood were ruled out. Mediational analyses suggested that individuals with depleted self-regulation resources experienced increased levels of commitment to their own standpoint, which resulted in increased confirmatory information processing. In sum, the impact of ego depletion on confirmatory information search seems to be more motivational than cognitive in nature.

Keywords: self-regulation, depletion of self-regulation resources, confirmatory information processing, selective exposure

> Lack of will power has caused more failure than lack of intelligence or ability—Flower A. Newhouse

Selective exposure to information addresses the phenomenon that people tend to prefer information that is consistent with their decisions, attitudes, and beliefs and, in contrast, neglect information that is standpoint-inconsistent (biased information search). In previous research it was reported that such biased information search processes occur in a wide range of areas, such as self-serving conclusions (Holton & Pyszczynski, 1989), stereotypes (Johnston, 1996), attitudes (Lundgren & Prislin, 1998), expectations (Pinkley, Griffith, & Northcraft, 1995), and individual (Frey, 1986; Jonas, Schulz-Hardt, Frey, & Thelen, 2001) as well as group decision-making processes (Schulz-Hardt, Frey, Lüthgens, & Moscovici, 2000). Because it is known that confirmatory information search can severely decrease decision quality (cf. Janis, 1982; Kray & Galinsky, 2003), it is important to investigate factors and psychological processes that affect confirmatory tendencies in information processing and information search.

Selective exposure is often caused by a person's tendency to neglect standpoint-inconsistent information when searching for new information. There are several reasons for this neglect: Compared with standpoint-consistent information, standpoint-inconsistent information increases the averse motivational state of dissonance (Festinger, 1957; Frey, 1986), is more difficult and complex to process (Ditto & Lopez, 1992; Ditto, Scepansky, Munro, Apanovitch, & Lockhart, 1998), is perceived to be of low quality (Fischer, Jonas, Frey, & Schulz-Hardt, 2005), threatens the recipient's self-concept (Pyszczynski & Greenberg, 1987), and evokes negative emotions (Kruglanski & Klar, 1987). In the context of these findings, seeking and processing inconsistent information should be a laborious, effortful, and joyless task that is assumed to require considerable amounts of self-regulation (i.e., control of the self by the self, cf. Schmeichel, Vohs, & Baumeister, 2003), if it is to take place at all. More specifically, if people are to expose themselves to inconsistent information, they must regulate their immediate need to receive standpoint-consistent feedback and must endure the negative cognitions and emotions associated with standpoint-inconsistent information. Hence, processing of and confrontation with standpoint-inconsistent information might require self-regulation resources, which are regarded as a limited resource similar to a kind of energy or strength. Thus, they can become depleted if a specific task (e.g., enduring the negative implications of standpoint-inconsistent information) draws on this type of energy (cf. Muraven & Baumeister, 2000). In the present research, derived from this line of reasoning, we tested whether reduced self-regulation resources are associated with increased biases in confirmatory information processing, that is, confirmatory information evaluation and confirmatory information search.

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Research on Confirmatory Information Processing

Confirmatory information processing has been observed in a variety of different research contexts, including positive test strategies in hypothesis testing (e.g., Klayman & Ha, 1987; Snyder & Swann, 1978), judgment biases and sampling errors (Fiedler, Brinkmann, Betsch, & Wild, 2000), anchoring effects and information processing (Chapman & Johnson, 1999), information processing in the context of child aggression (Dodge & Crick, 1990), mood and motivation's impact on the evaluation of persons (Isbell & Wyer, 1999), and comparison processes in social judgments (Mussweiler, 2003).

In the present research, we consider how people evaluate and search for standpoint-consistent and standpoint-inconsistent information after they have made a preliminary decision. With regard to information search, dissonance theory is the dominant theoretical and empirical framework. According to dissonance theory, after having made a decision, individuals experience cognitive dissonance because of the negative implications of the chosen alternative and the positive implications of the nonchosen alternative (Festinger, 1957, 1964). Because dissonance is perceived as an aversive arousal state, people are motivated to reduce this unpleasant psychological state. One way of doing this is through selective exposure to information, that is, searching for information that is consistent with one's decision and/or neglecting information that is inconsistent (Frey, 1986). The extent to which a person prefers standpoint-consistent over standpoint-inconsistent information (i.e., the difference between number of chosen consistent pieces of information and number of chosen inconsistent pieces of information) is also called *confirmation bias* and is the typical indicator of selective exposure (e.g., Jonas et al., 2001). Various situational variables that increase confirmatory information search have been identified, such as limited availability of information (Fischer et al., 2005), negative mood (Jonas, Graupmann, & Frey, 2006), or high commitment (Schwarz, Frey, & Kumpf, 1980).

With regard to information evaluation, related studies have addressed how people evaluate information as a function of their decisions, opinions, attitudes, and expectations (biased assimilation research). Similar to the findings on biased information search, biased assimilation research has reliably revealed that information that is consistent with one's standpoint is systematically assessed as being of higher quality (i.e., more credible and more important) than standpoint-inconsistent information (cf. Edwards & Smith, 1996; Greitemeyer & Schulz-Hardt, 2003). These findings have mainly been explained by individuals' tendency to test inconsistent information more critically and extensively (e.g., Ditto & Lopez, 1992; Ditto et al., 1998). Because biased information evaluation and search are strongly interconnected (e.g., Fischer et al., 2005), they are combined in the present research into an overall index of confirmatory information processing and are investigated as a function of the availability of self-regulation resources.

Self-Regulation: Current Research on the Limited Resource View

Self-regulation is defined as the "exertion of control over the self by the self" (Muraven & Baumeister, 2000, p. 247). Self-control (or self-regulation, respectively) is used when an individual tries to "change the way he or she would otherwise think, feel, or behave" (Muraven & Baumeister, 2000, p. 247; see also Baumeister, Bratlavsky, Muraven, & Tice, 1998; Schmeichel et al., 2003). Thereby, "self-control behaviors are designed to maximize the long-term best interests of the individual" (Muraven & Baumeister, 2000, p. 247; see also Barkley, 1997). In the context of the limited resource view, the self has a limited amount of a certain resource, which in previous literature has been considered as being similar to a form of "energy or strength" (Schmeichel et al., 2003, p. 33; see also Baumeister & Heatherton, 1996; Vohs, Baumeister, & Ciarocco, 2005). This self-regulation resource can be used for several different tasks, including "regulating thoughts, controlling emotions, inhibiting impulses" (Schmeichel et al., 2003, p. 33), or dealing with frustration. However, this resource becomes depleted when the self actively changes, overrides, or otherwise regulates psychological and behavioral responses (Baumeister et al., 1998; Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000; Schmeichel et al., 2003; Vohs et al., 2005).

A variety of studies has supported the assumption that self-control is a limited resource by demonstrating that prior use of self-regulation resources leads to impaired subsequent self-regulation performance. In the typical paradigm, people have been instructed to work on a self-regulation task, for example, actively guiding attention, withstanding temptation, or controlling cognitions and emotions. Afterward, the performance of another task involving self-regulation is measured (e.g., decision making, intellectual performance, self-presentation, task persistence), with the consistent result that the performance of the second self-regulation task is reduced as a consequence of prior self-regulation behavior (e.g., Baumeister et al., 1998; Muraven, Tice, & Baumeister, 1998; Schmeichel et al., 2003; Vohs & Heatherton, 2000). Furthermore, an increasing body of research has suggested that the limited resource of self-regulation is required for various psychological and behavioral activities, including intellectual performance, decision making, controlling aggressive responses, dieting, positive self-perception and mental health processes, and impression management and self-presentation (e.g., Baumeister et al., 1998; Fischer, Greitemeyer, & Frey, 2007; Schmeichel et al., 2003; Vohs et al., 2005; for an overview, see Muraven & Baumeister, 2000). Most relevant for the present research, reduced states of ego depletion have also been shown to be associated with reduced abilities to "persist in the face of frustration or failure" (Schmeichel et al., 2003, p. 33), which is a first hint that self-regulatory resources are necessary to deal with and withstand the negative psychological implications of standpoint-inconsistent information or feedback.

Self-Regulation and Confirmatory Information Processing: The Present Research

In a state of reduced self-regulation resources, people are expected to show an increased tendency for confirmatory information processing. Individuals with depleted self-regulation resources should avoid and devalue inconsistent information because they are less able to deal with "frustration or failure" (Schmeichel et al., 2003, p. 33), and because standpoint-inconsistent information typically contains unfavorable implications for the self (e.g., Pyszczynski & Greenberg, 1987), arouses dissonance and negative emotions (e.g., Frey, 1986; Kruglanski & Klar, 1987), and is laborious

to process (Ditto & Lopez, 1992; Ditto et al., 1998). In contrast, in a state of reduced self-regulation resources (and thus a lower level of frustration tolerance; cf. Schmeichel et al., 2003), consistent pieces of information should be evaluated even more positively and searched for more frequently because they have positive implications for the depleted self, they can potentially reduce both dissonance and associated negative affect (Frey, 1986; Jonas et al., 2006), and they require fewer processing capabilities and are thus expected to be processed more easily (Ditto & Lopez, 1992; Ditto et al., 1998; Fischer et al., 2005). Considering these arguments, one would expect states of reduced self-regulation resources to be associated with an increased tendency for confirmatory information processing (i.e., increased confirmatory tendencies in information evaluation and search). This perspective on the self and related confirmatory information processing opens a new, more dynamic and functional perspective on self-relevant information processing especially because previous research mostly manipulated self-relevant psychological states not in a quantitative (i.e., by quantitatively exhausting the self by ego depletion manipulations) but in a qualitative manner, such as attacking the (self-perceived) attributes of the self by providing negative intelligence feedback (Frey, 1981) or inductions of negative mood (Jonas et al., 2006). The impact of the mere dynamic and quantitative regulatory functioning of the self on confirmatory information processing (without any qualitative, self-relevant changes caused by attacks or mood inductions) has been neglected by previous research so far.

The following research comprises four studies aimed to test the proposition that reduced self-regulation resources following a preceding self-control task increase confirmatory tendencies in information processing. Depletion of self-regulation resources was varied at the beginning of each experiment by letting participants (a) work on a task that was known to substantially reduce available self-regulatory resources or (b) work on a task that was known to draw less on regulatory resources. As a function of resource depletion manipulation, confirmatory information processing that occurred in evaluation of and search for standpoint-consistent and standpoint-inconsistent information was compared between groups.

Study 1

The goal of this study was to provide initial evidence for our main hypothesis that individuals with reduced self-regulation resources exhibit a stronger tendency for confirmatory information processing (i.e., confirmatory information evaluation and search) than do individuals with unimpaired self-regulation resources.

Method

Participants and design. Forty-nine people (26 females and 23 males) participated in this study (ages ranging between 21 years and 55 years; $M = 36.84$, $SD = 10.52$). To circumvent a pure student sample, participants were recruited both at the Ludwig-Maximilians-University in Munich, Germany (LMU) and in a pedestrian zone near the university campus. Of the participants, 15 were students and 34 were nonstudents (26 employed, 8 self-employed). The study was a one-factorial design with two experimental between-subjects conditions (low depletion of self-regulation resources vs. high depletion of self-regulation resources).

Material and procedure. After participants arrived at the laboratory, they were told that they were going to participate in two different and completely unrelated studies. The first study dealt with person-perception (depletion manipulation), whereas the second study addressed information-perception of political information in the mass media (information evaluation and search). Participants learned that for efficiency reasons both experiments would be performed together in one experimental session.

The manipulation of self-regulation utilized attention control and was similar to the type of manipulation successfully used by Gilbert, Krull, and Pelham, (1988); Schmeichel et al. (2003), and Fischer et al. (2007). All participants were asked to watch a 5 min video clip without sound effects that showed the former German foreign secretary[1] in a political interview. Participants were informed that this experiment addressed assessments of personality characteristics on a nonverbal basis; participants would subsequently have to make person-perception assessments (see Schmeichel et al., 2003, p. 35) of this former foreign secretary. Besides the interview footage, the video clip contained a series of well-known short words (e.g., car, flower) appearing on the lower third of the screen. Each word was shown for about 10 s and was printed in white letters on a black background. The appearing words were not related to the interview. The depletion manipulation took place as follows: In the low depletion condition, participants did not receive any instructions concerning the appearing, irrelevant words nor were these words mentioned before participants started viewing the video clip. In contrast, in the high depletion condition, participants were instructed not to look at the irrelevant words that might appear on the bottom of the computer screen. In addition, participants in the high depletion condition were instructed to focus their attention back on the interview with the foreign secretary whenever they noticed that their attention had drifted to the words on the lower third of the screen (for a similar procedure, see Schmeichel et al., 2003). Subsequent to depletion manipulation, as manipulation checks, participants were asked (a) "to what extent the previous task was laborious" (0 = *not at all*, 10 = *extremely*) and (b) "to what extent they were able to concentrate during the previous task" (0 = *not at all*, 10 = *extremely*; reverse coded). Both variables were highly correlated ($r = .60$, $p < .001$) and were thus collapsed into an overall scale of depletion.

Next, participants were asked to start working on the second task concerning political information in the mass media, which is a typical decision paradigm in research on biased information evaluation and search (cf. Fischer et al., 2005; Frey, 1986). Participants were told that while they were performing their task, the experimenter would prepare the questionnaires to be used in the person-perception task of the first study. Participants were informed that the psychology department of the LMU was conducting studies on the reception of political information in the mass media: The present research was to focus on processes of percep-

[1] This particular former foreign secretary (Hans-Dietrich Genscher) was a member of the Freie Demokratische Partei (Free Democratic Party; a rather small liberal German party). Thus, because in the information search material only information about CDU/CSU versus SPD was used, we would not expect any interfering effects from the choice of this foreign secretary as a stimulus for the depletion manipulation.

tion, understanding, and assessment of political information as presented in newspapers and magazines. Following this introduction, participants were asked which one of the two major German parties, Sozialdemokratische Partei Deutschlands (Social-Democratic-Party of Germany; SPD) or Christlich Demokratische Union/Christlich Soziale Union (Christian Democratic Union/Christian Social Union; CDU/CSU), they would vote for if elections were held tomorrow. This decision was the basis for categorizing standpoint-consistent and standpoint-inconsistent information. It was also the basis for all further analyses in which the factor type of decision was used (which is the case for all four experiments). Next, participants were given 12 pieces of political information in the form of main theses (two to three sentences in length). Half of these were consistent and half were inconsistent with the participants' political preference (note that consistent pieces of information were those that go along with the participants' political opinion, and inconsistent pieces of information were those that ran counter to the participants' political opinion). They were told that lengthier newspaper articles existed for each of the main theses and could be read in detail after completion of the experiment. Of the 12 main theses, 3 were consistent and 3 were inconsistent with the politics of the SPD, and 3 were consistent and 3 were inconsistent with the politics of the CDU/CSU. An example of a piece of information consistent with the SPD was, "The SPD has performed well over the last few months. Many important reforms have been initiated, and the increase in public debts has been halted." A piece of information inconsistent with the politics of the CDU/CSU was, "The current leaders of the CDU/CSU are not prepared for the political problems facing Germany. Instead of overcoming Germany's economic problems, they conduct tasteless personal attacks on politicians from other parties." In sum, independent from their specific political opinion, participants were confronted with 6 pieces of information that were consistent with their political opinion (i.e., pieces of information that go along with their political opinion) and 6 pieces of information that were inconsistent with their political opinion (i.e., pieces of information that run counter to their political opinion). Participants were asked to evaluate the quality of each article according to its credibility (0 = *not at all*, 10 = *definitely*) and importance (0 = *not at all*, 10 = *definitely*). Ratings of credibility and importance were highly correlated ($r = .89$, $p < .001$) and were thus collapsed into one scale of information evaluation. After the participants had finished the information evaluation task, the experimenter collected the evaluation questionnaires.

In the last part of the experiment, participants were given the same 12 main theses (6 consistent and 6 inconsistent with their political opinion) on an extra sheet of paper to prevent demand effects between information evaluation and information search. They were asked to indicate which articles they wanted to read in more detail. Participants were allowed to select freely among the available pieces of information (i.e., they could select between no information and 12 pieces of information). Note that in none of the present studies did participants actually receive the information they selected. Note also that because preexisting political attitudes instead of spontaneously made decisions were assessed, we did not expect any attitude changes from pre- to postinformation evaluation and search. Thus, no final attitude was measured. The same applies to Study 4. After completing the experiment, participants were informed of the experimental hypotheses, thanked for their participation, and dismissed.

Results

Manipulation check. A one-way analysis of variance (ANOVA) with depletion as the independent variable and depletion scale as the dependent variable revealed a significant effect, $F(1, 47) = 8.38$, $p = .01$, $\eta^2 = .15$, indicating that participants in the high depletion condition ($M = 3.48$, $SD = 2.35$) reported being more exhausted than did participants in the low depletion condition ($M = 1.85$, $SD = 1.46$). Hence, the manipulation of self-regulation resources was successful.

Confirmatory information processing. We computed difference values for information evaluation and information search by subtracting the corresponding values for standpoint-inconsistent information from the values for standpoint-consistent information.[2] Overall, both a significant evaluation bias ($M = 0.98$, $SD = 2.89$), $t(48) = 4.95$, $p < .001$, and a significant confirmation bias in information search ($M = 0.98$, $SD = 2.12$), $t(48) = 3.24$, $p = .002$, were observed. For the following analyses, we transformed both difference values into z values. Because they were highly correlated ($r = .76$, $p < .001$), they were collapsed into an overall index of confirmatory information processing.

A one-way ANOVA with depletion of self-regulation resources as the independent variable (low vs. high) and confirmatory information processing as the dependent variable revealed a significant main effect, $F(1, 47) = 4.71$, $p = .04$, $\eta^2 = .09$, indicating that participants with reduced self-regulation resources ($M = 0.27$, $SD = 0.99$) exhibited stronger confirmatory information processing tendencies than did nondepleted participants ($M = -0.29$, $SD = 0.80$).

Check for interfering effects. Of the participants, 18 were CDU/CSU voters (7 in the low and 11 in the high depletion condition) and 31 were SPD voters (17 in the low and 14 in the high depletion condition). To check for interfering effects of party preference, sex, and age, a 2 (ego depletion) × 2 (party preference) × 2 (sex) analysis of covariance (ANCOVA) with confirmatory information processing as the dependent variable and age as a covariate was performed. With regard to information search, we found a significant main effect for party preference, $F(1, 40) = 37.45$, $p < .001$, $\eta^2 = .48$, indicating that conservative (CDU/CSU) voters ($M = 0.84$, $SD = 0.80$) exhibited stronger confirmatory information processing tendencies than did liberal (SPD) voters ($M = -0.49$, $SD = 0.61$). However, party preference did not interact with the depletion manipulation ($F < 1$). Moreover, no significant effects were found for either gender or age (Fs < 2.66, ps > 11). In sum, party preference, gender, and age are unlikely to systematically affect our main findings that ego depleted participants exhibit stronger tendencies for confirmatory information processing than nondepleted participants.

[2] Note that standpoint-inconsistent information runs against the participants' political standpoint and that standpoint-consistent information supports the participants' political standpoint.

Discussion

Study 1 provided initial evidence that reduced self-regulation resources lead to elevated confirmatory information processing. However, a limitation of Study 1 is that we used preexisting attitudes. Thus, it is not clear whether depletion of self-regulation resources would have a similar effect on information processing in the context of preferences that occur more spontaneously within a shorter time range, as decisions do. In Study 2, we addressed this shortcoming by using a personnel decision case (in which participants had to make a decision rather than simply indicate their attitude) about whether to extend the contract of a manager. Because this decision case is fictional, it is less likely to be unintentionally affected by a person's history or prior knowledge. In addition, we also used an alternative manipulation of depletion of self-regulation resources to further generalize our findings from Study 1.

Another limitation of the first study is that the results could be due to ego threat and/or failure cognitions, which might be imposed by the high depletion condition. Participants who partially fail to suppress their thoughts might experience an increased level of failure cognitions and associated negative emotions (cf. Wegner, 1994), which in turn might increase the preference for standpoint-consistent information and at the same time decrease the preference for standpoint-inconsistent information (i.e., increased confirmatory information processing). For example, Jonas et al. (2006) found that induced negative affect increases the tendency for confirmatory information search. Moreover, Frey (1981) found that people who received negative feedback on an intelligence task subsequently exhibited a stronger preference for information that devalued the validity of intelligence tests than did people who received positive feedback. However, research on the impact of ego threat on information processing is not uniform. For example, there is a body of cognitive-oriented research showing that individuals' decision-relevant information processing becomes even more balanced when participants are ego threatened, for example, in decision cases and associated outcomes that are framed negatively or that imply subjective risks and personal losses (e.g., Dawson, Gilovich, & Regan, 2002; Denes-Raj & Epstein, 1994; Dunegan, 1993; Fischer, Jonas, Frey, & Kastenmüller, et al., in press; Lopes, 1987). Hence, besides generalizing the results of Study 1 to the context of decisions, Study 2 also addresses the question of whether the impact of ego depletion on confirmatory information processing can be distinguished from the impact of ego threat on confirmatory information processing.

Study 2

The design of Study 2 included three groups: low depletion of self-regulation resources, high depletion of self-regulation resources, and ego threat. As in Study 1, we expected depleted participants to exhibit higher levels of confirmatory information processing than nondepleted participants. As noted above with regard to ego threat, both increased and reduced confirmatory information processing could be expected. On the basis of these considerations, we propose that participants with reduced self-regulation resources exhibit more pronounced confirmatory information processing than do nondepleted and ego threatened participants (Contrast 1). No significant difference regarding confirmatory information processing was expected between nondepleted and ego threatened participants (Contrast 2).

Method

Participants and design. Eighty-five undergraduate students from LMU (52 women and 33 men) took part in the study. Participants were recruited on the university campus. The experiment was a one-factorial design with three experimental between-subjects conditions (high depletion of self-regulation resources vs. low depletion of self-regulation resources vs. ego threat).

Material and procedure. Participants in all experimental conditions were informed that they were to participate in two different studies. The first study would deal with processes of cognitive imagination (high and low depletion of self-regulation resources) or with recollection of past experiences (ego threat), whereas the second study would concern processes of personnel decision making. The depletion manipulation was similar to the white bear paradigm successfully used by Muraven et al. (1998); Wegner, Schneider, Carter, & White (1987); and Fischer et al. (2007). Participants were asked to imagine a visit to the zoo and to write down everything and every animal that came to mind during this imaginary journey. Participants in the high depletion condition were instructed not to think about a white bear. Whenever they thought of a white bear, they were to suppress this thought and continue thinking about other animals and situations in the zoo. Participants in the low depletion condition received no such extra instruction. Because the manipulation of self-regulation resources in this study (as well as in the following studies) has been successfully used in various previously published studies (e.g., Fischer et al., 2007; Muraven et al., 1998), we abstained from using manipulation checks.

Instead of the white bear task, participants in the ego threat condition wrote a short essay about the most embarrassing situation in their life (for a related procedure in the context of self-affirmation research, see Steele & Liu, 1983). They were asked to recall this situation to the best of their ability and to try to recall how they had felt. As a manipulation check for ego threat, participants in all three conditions were asked, on a scale from 1 (*not at all*) to 7 (*extremely*), to what extent they felt frustrated, uncomfortable, restive, and worried. Because all items were correlated between $r = .42$ and $r = .71$ ($ps < .001$), they were collapsed into a scale of ego threat ($\alpha = .87$).

Next, in accordance with former research on selective exposure, we used a decision paradigm in which participants had to decide on the basis of the following cover story whether the contract of a manager (Mr. Miller) should be extended (Fischer et al., 2005; Fischer, Schulz-Hardt, & Frey, in press; Frey, 1986). Mr. Miller had been taken on to manage a fashion store 1 year ago. The participants were to imagine being the storeowner. They had inherited the fashion store and had been looking for an expert (like Mr. Miller) to run the business. Mr. Miller's contract had been limited to 1 year; after this year, further negotiations were started concerning a possible prolongation of the contract. The participants were told that Mr. Miller's tenure had been of mixed success. For example, he was successful in gaining new customers by launching new product lines. However, some regular customers had been lost because they were not attracted by the store's new men's fashion and women's fashion collections. Overall positive

and negative aspects, attributes, and achievements of Mr. Miller's work were balanced. After reading this background information about Mr. Miller's work so far as a manager, participants made a preliminary decision on whether to extend his contract. As in all other present studies, the preliminary decision was always the basis for deciding whether participants choose standpoint-consistent versus standpoint inconsistent information.

Subsequently, participants were told that additional information regarding the decision problem was available. These additional pieces of information consisted of 12 one-page statements written by Mr. Miller's former colleagues. Each piece of information (statement) was summarized by a main thesis of about two sentences. The main thesis contained the key argument of the corresponding statement and indicated whether the colleague was in favor of or against a prolongation of Mr. Miller's working contract. An example of a main thesis in favor of an extension was, "Mr. Miller's work has been satisfactory; therefore, his contract should be extended." An example of a main thesis against an extension was, "Mr. Miller hasn't fulfilled our expectations; therefore, his contract shouldn't be extended." Hence, independent of whether the participants were in favor of or against an extension of the contract, 6 statements supported their decision (i.e., decision-consistent information) and 6 statements conflicted with it (i.e., decision-inconsistent information).

Participants were instructed to evaluate the expected quality of all available pieces of information with regard to their credibility ("How credible do you expect this information to be?" 0 = *not at all*, 10 = *extremely*) and importance ("How important will this information be for making a good decision?" 0 = *not at all*, 10 = *extremely*). Because credibility and importance assessments were highly correlated ($r = .85$, $p < .001$), they were collapsed into a scale of information evaluation. After information evaluation, participants were asked to indicate which articles they wanted to read in more detail. Participants were allowed to select freely among the available pieces of information (i.e., they could select between no information and 12 pieces of information). When participants had completed their information evaluation and selection, they were asked to make a final decision on whether to extend Mr. Miller's contract. Once the experiment was completed, participants were debriefed, thanked for their participation, and dismissed.

Results

Manipulation check. A one-way ANOVA with experimental condition as the independent variable and ego threat as the dependent variable revealed a significant effect, $F(2, 82) = 3.15$, $p < .05$, $\eta^2 = .07$. As intended, planned contrasts revealed that participants in the ego threat condition reported higher levels of ego threat (contrast weight: 2; $M = 3.52$, $SD = 1.85$) than did participants in the high (contrast weight: -1; $M = 2.72$, $SD = 1.18$) and low depletion conditions (contrast weight: -1; $M = 2.66$, $SD = 1.17$), $t(82) = 2.51$, $p < .02$. Thus, the manipulation was successful. The remaining irrelevant orthogonal contrast comparing high ego depletion (contrast weight: 1) versus low ego depletion (contrast weight: -1; ego threat, contrast weight: 0) reached no significance, $t(82) < 1$.

Confirmatory information processing. As in Study 1, we computed difference values for information evaluation and search by subtracting the corresponding values for decision-inconsistent information from the values for decision-consistent information. Overall, a significant evaluation bias ($M = 1.11$, $SD = 1.96$), $t(84) = 5.25$, $p < .001$, and confirmation bias in information search ($M = 0.33$, $SD = 1.48$), $t(84) = 2.05$, $p = .04$, occurred. For the following analyses, we transformed both difference values into z values. Because they were highly correlated ($r = .82$, $p < .001$), they were collapsed into an overall index of confirmatory information processing.

A one-way ANOVA with the experimental condition (low depletion vs. high depletion vs. ego threat) as the independent variable and confirmatory information processing as the dependent variable revealed a significant overall effect, $F(2, 82) = 4.05$, $p = .02$, $\eta^2 = .09$. Planned contrasts revealed that the confirmatory information processing tendencies of participants with reduced self-regulation resources (contrast weight: 2; $M = 0.36$, $SD = 1.08$) were stronger than those of nondepleted (contrast weight: -1; $M = -0.19$, $SD = 0.53$) and ego threatened participants (contrast weight: -1; $M = -0.18$, $SD = 0.81$), $t(82) = 2.85$, $p < .01$. In contrast, the related irrelevant orthogonal contrast comparing ego threat (contrast weight: 1) with the nondepletion condition (contrast weight: -1; contrast weight for high depletion: 0) did not reach significance, $t(82) < 1$.

Check for interfering effects. In the preliminary decision, 30 participants decided for prolongation and 55 decided for termination of the manager's contract; in the final decision, 33 decided for prolongation and 50 decided for termination; 2 participants did not indicate a final decision. We checked for interfering effects concerning gender and preliminary decision by conducting a 3 (experimental condition) $\times$ 2 (preliminary decision) $\times$ 2 (gender) ANCOVA with confirmatory information processing as the dependent variable and age as a covariate. No significant main effects or interactions occurred for these checking variables (Fs < 1, ps $> .54$). Finally, when negative emotions related to ego threat were controlled as a covariate, the impact of the relevant contrast (contrast weights: high depletion = 2; low depletion = -1; ego threat = -1) on confirmatory information processing was still significant ($p < .01$), and negative emotions had no significant impact on the overall index of confirmatory information processing ($F < 1$). In addition, no effect was found for the remaining irrelevant orthogonal contrast when negative emotions related to ego threat were controlled as a covariate, (Fs < 2.06, ps $> .15$).

Discussion

By the use of an alternative decision case in which participants had to make a decision rather than simply indicate their own attitude, Study 2 replicated the findings of Study 1; that is, participants with reduced self-regulation resources exhibited more pronounced confirmatory information processing tendencies than did participants without reduced self-regulation resources. Furthermore, we found evidence that depletion of self-regulation resources and ego threat had different effects on confirmatory information processing: In contrast to the high depletion condition, ego threatened participants exhibited rather balanced information processing tendencies.

It is interesting to note that (in contrast to the ego depletion manipulation) the ego threat manipulation resulted not in increased levels of confirmatory information processing but in balanced information processing. In the light of previous research, in which

both increasing (e.g., Jonas et al., 2006) and decreasing (e.g., Fischer, Jonas, et al., in press) levels of confirmatory information processing as a function of ego threat manipulations (e.g., by inducing negative emotions, failure cognitions, or loss cues) were found, this result could have been somehow expected as a mean of both tendencies that can occur in this context. However, to make a clearer and more generalized distinction between effects of ego threat and depletion of self-regulation resources on confirmatory information processing, we conducted a further study in which we used an alternative manipulation of ego threat.

Study 3

Besides ego threat, another important potential alternative explanation for the findings of the first two studies must be noted. Namely, one could argue that the observed effects of reduced self-regulation resources on confirmatory information processing might be a result of cognitive load resulting from fatigue and exhaustion induced by the ego depletion manipulation. For instance, if a person is exhausted after working on difficult math tasks, he or she would probably experience cognitive load and might thus no longer be able to engage in greater scrutiny and increased cognitive effort in counterarguing and actively devaluing standpoint-inconsistent information. In Study 3, we investigated whether cognitive load can be an alternative explanation for the impact of reduced self-regulation resources on confirmatory information search.

As for ego threat, research results on the impact of cognitive load on information processing are somewhat mixed. Some authors found that cognitive load increases confirmatory tendencies in information processing (e.g., for stereotypes, see Bodenhausen, 1990; for self-relevant information processing, see Paulhus, Graf, & Van Selst, 1989); others found that cognitive load leads to more balanced information processing (e.g., for information evaluation, see Ditto & Lopez, 1992, and Ditto et al., 1998; for information search, see Fischer et al., 2005; for stereotype maintenance, see Yzerbyt, Coull, & Rocher, 1999). Accounts proposing that cognitive load increases bias in information processing assume that under circumstances of cognitive busyness, automatic responses will dominate information processing. In other words, because self-consistent information and/or knowledge is embedded more deeply and strongly in an individual's cognitive system, under cognitive load, self-consistent information and/or knowledge will have a retrieval advantage and will thus dominate standpoint-relevant information processing (see Paulhus et al., 1989). In contrast, the main argument for why cognitive load can also reduce bias in information processing is that it prevents counterarguing against inconsistent evidence (e.g., Ditto & Lopez, 1992; Ditto et al., 1998; Fischer et al., 2005; Yzerbyt et al., 1999). For example, Ditto and Lopez (1992) showed that individuals under cognitive load were less able to critically test inconsistent information and were thus more balanced in information evaluation than were participants without a cognitive load manipulation (see also Ditto et al., 1998). Moreover, Yzerbyt et al. (1999) found that increased stereotype change could result when social perceivers have been made cognitively busy. Finally, Fischer et al. (2005) found that information evaluation and search after a preliminary decision was less biased under cognitive load than without cognitive load.

We propose that ego depletion and cognitive load are distinct psychological concepts and thus have distinct effects on confirmatory information processing. Ego depletion is more motivational, whereas cognitive load is more cognitive in nature. More specifically, because of increased exhaustion, ego depleted individuals want to approach standpoint-consistent information and avoid standpoint-inconsistent information (to protect their standpoint). Consequently, they exhibit a strong tendency for confirmatory information processing. In contrast, individuals under cognitive load are not motivated to avoid standpoint-inconsistent information. It is simply that they have fewer cognitive resources and are therefore not able to effectively counterargue and devalue inconsistent information. As a result, they demonstrate a more balanced and less confirmatory brand of information processing.

To test whether ego depletion, ego threat, and cognitive load indeed have differential effects on confirmatory information processing, we used four experimental conditions in Study 3: (a) high depletion condition—participants whose self-regulation resources were depleted prior to information evaluation and search by keeping in mind complex rules during a concentration task; (b) low depletion condition—participants without depleted self-regulation resources prior to information evaluation and search; (c) cognitive load condition: participants who were constrained by cognitive load while evaluating and selecting decision-relevant information; and (d) ego threat condition—participants who were ego threatened prior to information evaluation and search by the expectation of having to have a group discussion with people who held the opposite standpoint to themselves. We also assessed participants' mood to examine whether our findings can be explained by differences in affective experience. Specifically, we expected participants with reduced self-regulation resources to exhibit more pronounced confirmatory information processing than exhibited by participants in low depletion, cognitive load, and ego threat conditions. In contrast, lower levels of confirmatory information processing were expected for cognitive load, low depletion, and ego threat conditions (i.e., no differences were expected for the related orthogonal contrasts).

Method

Participants and design. Seventy-three undergraduate psychology students (58 females and 15 males) participated in this study (ages ranging between 18 years and 44 years; $M = 24.34$, $SD = 7.22$). Participants were recruited in an introductory psychology course. The experiment was a one-factorial design with four experimental between-subjects conditions (high depletion of self-regulation resources vs. low depletion of self-regulation resources vs. cognitive load vs. ego threat).

Material and procedure. Participants in the conditions with high and low depletion of self-regulation resources learned that they would participate in two different and completely unrelated studies. The first study dealt with concentration tests, the second dealt with economic decision making. Regulation resource depletion manipulation was modeled on a successful regulation resource depletion procedure by Baumeister et al. (1998) and Fischer et al. (2007): Participants received a standard letter-size sheet of paper (European size A4) bearing a difficult scientific text. In the low depletion condition, participants were asked to underline all letter *e*s (e.g., G*e*rtrud). In the high depletion condition, participants had

to consider extra rules. They were instructed to underline all *e*s only when the *e*s were not directly preceded or followed by another vowel. In addition, participants were not to underline those *e*s that lay only two letters away from another vowel (e.g., no *e* should be underlined in the name Peter). No time limit was set for participants working on this concentration task.

Subsequently, participants began the second study involving decision making. Participants in all four experimental conditions were introduced to a decision task that concerned an investment decision. Specifically, participants had to decide whether to open a fast food restaurant offering either only organic food or only low-fat products. After their preliminary decision, participants in the cognitive load condition (but not in the three remaining conditions) were asked to memorize a seven-digit number during the subsequent information search and evaluation tasks. Note that as a cover story, participants were informed that in the present study multitasking abilities were being investigated. This cognitive load manipulation was derived from Ditto and Lopez (1992), who successfully used a similar procedure. Participants in the ego threat condition did not have to work on the memorizing task but were informed that after this decision task, they would have a discussion with other participants who had made the opposite decision; as a cover story, participants were informed that group discussions increase the quality of decision outcomes. This ego threat manipulation was derived from similar procedures used in previous research (e.g., De Dreu & van Knippenberg, 2005). Participants in the high depletion, low depletion, and load condition received no such extra inductions.

After their preliminary decision (which is the critical decision that was used for all further analyses as well as for deciding which pieces of information were decision-consistent and decision-inconsistent for the participants), all participants reported their positive and negative emotions with the Positive and Negative Affect Scales (PANAS; Watson, Clark, & Tellegen, 1988). Then, participants were told that eight pieces of additional information were available concerning this decision problem. Of the additional pieces of information, half supported and half conflicted with the participants' prior decision. An example of information consistent with the organic fast food idea was, "Organic food products taste better than low-fat food products. Thus, one should support the organic fast food concept." An example of a piece of information consistent with the low-fat fast food idea was, "Low-fat food products are consistent with the current zeitgeist. Thus, one should support the low-fat fast food concept." As in previous studies, participants were first asked to evaluate the quality of each article according to its credibility (0 = *not at all*, 10 = *definitely*) and importance (0 = *not at all*, 10 = *definitely*). After participants had finished the information evaluation task, the experimenter collected all questionnaires. In the final part of the experiment, participants were given the same eight main theses on an extra sheet of paper. Participants were asked to indicate which articles they wanted to read in more detail. Participants were allowed to select freely among the available pieces of information (i.e., they could select between zero and eight pieces of information). Finally, they were asked to make a final investment decision (which is helpful to investigate how many participants change their opinion because of the additionally presented information). After completing the experiment, participants were informed of the experimental hypotheses, thanked for their participation, and dismissed.

Results

Confirmatory information processing. We computed difference values for information evaluation and information search by subtracting the corresponding values for decision-inconsistent information from the values for decision-consistent information. Because of the missing values in the main dependent variables, three participants had to be excluded from further data analyses. Overall, a significant evaluation bias ($M = 0.58$, $SD = 1.76$), $t(69) = 2.75$, $p = .01$, as well as a marginally significant confirmation bias in information search ($M = 0.27$, $SD = 1.32$), $t(69) = 1.72$, $p = .09$, occurred. For the following analyses, we transformed both difference values into z values. Because they were highly correlated ($r = .53$, $p < .001$), they were collapsed into an overall index of confirmatory information processing.

A one-way ANOVA with four experimental conditions as the independent variable and confirmatory information processing as the dependent variable revealed a significant overall effect, $F(3, 66) = 4.07$, $p = .01$, $\eta^2 = .16$. Planned contrasts revealed that confirmatory information processing of participants with reduced self-regulation resources (contrast weight: 3; $M = 0.62$, $SD = 1.05$) was stronger than that of nondepleted participants (contrast weight: -1; $M = -0.14$, $SD = 0.72$), ego threatened participants (contrast weight: -1; $M = -0.29$, $SD = 0.85$), and cognitive load participants (contrast weight: -1; $M = -0.11$, $SD = 0.62$), $t(66) = 3.41$, $p = .001$. In contrast, no significant orthogonal contrast was found when we compared nondepleted condition (contrast weight: 2) with ego threat condition (contrast weight: -1) and cognitive load condition (contrast weight: -1; high depletion received the contrast weight 0), $t(66) < 1$. Finally, no significant orthogonal contrast was found when we compared ego threat condition (contrast weight: -1) with cognitive load condition (contrast weight: 1; the high depletion and low depletion conditions both received the contrast weight 0), $t(66) < 1$.

Check for interfering effects. To check for interfering effects of type of decision, sex, and age, a 4 (experimental condition) $\times$ 2 (type of preliminary decision)[3] $\times$ 2 (sex) ANCOVA with confirmatory information processing as the dependent variable and age as a covariate revealed that age and sex were not significantly associated with confirmatory information processing (Fs < 1, ps $> .57$) nor did they interact with experimental condition (Fs < 1.36, ps $> .26$). However, there was a significant effect for type of decision, $F(1, 54) = 8.67$, $p = .01$, as well as an interaction between type of decision and experimental condition, $F(3, 54) = 3.81$, $p = .02$. However, for both decision alternatives, the strongest confirmatory information processing occurred in the high depletion condition (compared with the other 3 experimental conditions). Furthermore, the main effect for experimental condition ($p = .02$) as well as the relevant contrast ($p < .01$) were still significant when the impact of preliminary decision was controlled for.

Regarding the mood measure, a 4 (experimental condition) $\times$ 2 (mood: positive vs. negative) ANOVA with repeated measures on

[3] In the preliminary decision, 58 participants decided for the organic food restaurant, and 12 decided for the low-fat restaurant; in the final decision, 59 decided for the organic food restaurant, and 11 decided for the low-fat restaurant.

the last factor revealed a significant effect for mood, $F(1, 66) = 85.65$, $p < .001$, indicating that participants experienced a stronger positive ($M = 2.65$) than negative mood ($M = 1.58$). More important, the interaction was not significant, $F(3, 66) = 1.13$, p .34. Thus, mood did not differ as a function of experimental condition and could thus not mediate the effect of depletion on the overall index of confirmatory information processing.

Discussion

In summary, Study 3 replicated the findings of the previous two studies by use of an alternative (economic) decision scenario: Again, participants with reduced self-regulation resources exhibited a stronger tendency for confirmatory information processing than did nondepleted participants. Moreover, we used two further experimental conditions—cognitive load and ego threat—to eliminate them as possible alternative explanations for the effect of regulation resource depletion on confirmatory information processing. Compared with participants in high depletion condition, participants in cognitive load and ego threat conditions showed a significantly attenuated tendency for confirmatory information processing. Moreover, the effect of high depletion of self-regulation resources on confirmatory information processing was not mediated by mood.

However, please note that the reduced bias in the threat condition might be due to the specific manipulation used in Study 3. Because participants expected to discuss their decision with persons who were in favor of the opposite standpoint, it might be especially useful to read inconsistent information in order to gain more knowledge about possible counterarguments.[4] However, the effects of ego threat on information processing in Study 3 were similar to the effects in Study 2, in which a different ego threat manipulation was used. Hence, we can confidently assume that ego threat is unlikely to represent an alternative explanation for the effect of depleted self-regulation resources on confirmatory information processing.

Moreover, it is important to look at cognitive load results: We found that in a classic selective exposure paradigm (cf. Frey, 1986) cognitive load and ego depletion had opposite effects on confirmatory information processing. That is, ego depleted participants exhibited an increased tendency for confirmatory information processing, whereas cognitive load participants processed information in a relatively balanced way. How can cognitive load have such a differential effect compared with ego depletion? In our opinion, the answer lies in the assumption that ego depletion is more of a motivational state, whereas cognitive load is more of a cognitive psychological state. This psychological difference should mainly result from the differential way both psychological states are manipulated or induced. That is, ego depletion manipulations are carried out before participants work on the dependent variable—in our case, information evaluation and search (cf. Schmeichel et al., 2003; Vohs et al., 2005). In contrast, cognitive load manipulations are carried out simultaneously while participants work on the dependent variables (cf. Ditto & Lopez, 1992; Ditto et al., 1998; Fischer et al., 2005; Paulhus et al., 1989). As a consequence, ego depleted participants are fatigued immediately before they start working on the dependent measures (in our case, information evaluation and search), whereas cognitive load participants start with their full amount of regulatory resources (which just might decline over time while participants work on information evaluation and search). We do not argue that cognitive load manipulations cannot lead to states of ego depletion. Rather we feel it safe to assume that because of the different point in time of the manipulation, participants under cognitive load are in a different psychological state while working on information evaluation and search than are ego depleted participants. That is, ego depleted participants should be already fatigued when they begin to work on information evaluation and search, whereas cognitive load participants simply tire over time.

Derived from this line of argument, ego depletion should be a more motivational state that leads participants to a priori avoid standpoint-inconsistent information and approach standpoint-consistent information (in order to prevent high processing efforts in a state of fatigue). In contrast, participants under cognitive load do not intentionally avoid standpoint-inconsistent information but, because of cognitive busyness, are not able to effectively counterargue and devalue inconsistent information (see Ditto & Lopez, 1992; Ditto et al., 1998; Fischer et al., 2005). To conclude, on the basis of the findings in Study 3, we propose that ego depletion is more of a motivational state (i.e., ego depleted participants do not want to confront effortful standpoint-inconsistent evidence), whereas cognitive load is more of a cognitive state (i.e., cognitively busy participants cannot counterargue standpoint-inconsistent information so effectively). As a consequence, ego depletion should lead to increased confirmatory information processing, whereas cognitive load should lead to more balanced information processing, which is indeed the pattern observed in Study 3.

Finally, it is important to discuss the somewhat unexpected finding that participants in the low depletion condition were not more biased than participants in the cognitive load condition, which seems to be inconsistent with previous research on selective exposure that has mainly shown a general preference for supporting information. There are at least two possible explanations for this finding. First, underlining *e*s in a speed test (even if there were no complex rules to keep in mind as in the high depletion condition) could have led to a somewhat cautious mindset, which might have yielded a more balanced way to deal with standpoint-consistent and standpoint-inconsistent information. Second, the economic decision case forced people to decide between two business ideas, which might have brought participants into a careful economic mind set and—without an additional experimental manipulation—might thus have potentially prevented increased confirmatory information processing in the low depletion control group. This notion is supported by other studies that also failed to show a significant confirmation bias in the control condition when using similar economic or personnel decision problems (e.g., Fischer et al., 2005; Jonas, Greenberg, & Frey, 2003). Note, however, in this regard the crucial comparison was the high ego depletion condition with the cognitive load condition. Whereas depleted self-regulation resources led to increased tendencies for confirmatory information processing, cognitive load led to relatively balanced information processing. Thus, although these explanations for this finding are somewhat speculative, the results do

[4] We thank an anonymous reviewer of a previous version of this article for this important point.

not affect the main result of our series of experiments, namely that high ego depletion manipulations increase the tendency for confirmatory information processing.

Study 4

Now that we have ruled out plausible alternative explanations for our findings (i.e., ego threat, cognitive load, mood), we try to elucidate the psychological process believed to underlie our main findings more directly, by mediational analysis. The results of Study 3 suggest that the impact of ego depletion on confirmatory information search is more motivational than cognitive in nature. One classic, highly motivational variable in confirmatory information processing and selective exposure research is commitment, which represents increased motivational binding as well as affective attachment toward a specific decision, attitude, or standpoint (Festinger, 1964; Kiesler, 1971). Increased commitment to a standpoint has been found to be associated with increased dissonance arousal and enhanced tendencies to defend one's own standpoint (Frey, 1986). Accordingly, previous research has consistently shown that elevated commitment to a specific standpoint increases confirmatory information processing (e.g., Brock & Balloun, 1967; Frey & Stahlberg, 1986; Schwarz, Frey, & Kumpf, 1980; Sweeney & Gruber, 1984). We propose that states of reduced self-regulatory resources (ego depletion) go along with increased feelings of affective commitment toward one's own standpoint. Because of the weakened self, individuals in a state of ego depletion might cling more strongly to their standpoints and positions to immunize themselves against attacks of inconsistent evidence and information coming from external sources. This process should be a rather functional one because ego depleted individuals should be less able to actively and effectively defend their own positions.

In short, in the last experiment we tested whether commitment to one's own standpoint mediates the effect of reduced self-regulation resources on confirmatory tendencies in information processing. We expected individuals with reduced self-regulation resources to experience an increased sense of commitment to their standpoint in order to protect their weakened and exhausted selves. Hence, individuals with reduced self-regulation resources should be more committed to their own standpoint, which in turn should increase confirmatory tendencies in information processing.

Method

Participants and design. Forty-eight people (35 females and 13 males) participated (ages ranging between 20 years and 54 years; $M = 35.12$, $SD = 9.76$). Participants were recruited from both LMU and a pedestrian zone near the university campus. Of the participants, 14 were students and 34 were nonstudents (17 employees, 17 self-employed). The experiment was based on a one-factorial design with two experimental between-subjects conditions (low depletion of self-regulation resources vs. high depletion of self-regulation resources).

Material and procedure. Material and procedure in Study 4 were similar to those in Study 1, except that we used an alternative depletion manipulation—an emotion control task, which has been successfully used by Baumeister et al. (1998), Fischer et al. (2007), and Schmeichel et al. (2003). When participants arrived at the laboratory, they were informed that the present research would involve investigation of the association between experience of emotions and decision making. The first part of the investigation involved watching an amusing animated cartoon, whereas the second part involved making a decision. In the high depletion condition, participants were instructed to try not to experience, feel, or show any emotions while watching the cartoon (suppress emotions condition; cf. Baumeister et al., 1998). To control whether participants followed this instruction, the experimenter said that they would be videotaped while they watched the cartoon (which was actually not the case). In contrast, in the low depletion condition, participants were instructed to freely express their emotions while watching the cartoon. To avoid possible confounding effects in the experimental design, participants in the no suppression condition were also told that they would be videotaped (cf. Schmeichel et al., 2003). Following these instructions, all participants watched a 5 min video clip from the U.S. cartoon series *The Simpsons*. This episode included no political content (Homer Simpson and his daughter purchased a spa and, while doing so, dreamed about their future).

Subsequently, on a measure derived from typical measures of commitment in selective exposure research (e.g., Jonas et al., 2001) participants were asked, on a scale from 0 (*not at all*) to 10 (*extremely*), (a) "to what extent they feel committed to their current political affiliation," (b) "to what extent they would suffer if their political affiliation was attacked," and (c) "to what extent they are sure about the validity of their political affiliation." Because these three items were highly correlated (rs ranging between .70 and .72) they were collapsed into a scale of commitment ($\alpha = .87$). Afterward, as in Study 1, participants indicated whether they would vote for the SPD or the CDU/CSU and subsequently received 6 standpoint-consistent and 6 standpoint-inconsistent pieces of information, which they were asked to evaluate (credibility and importance) and select (information search). Participants were asked to indicate which articles they wanted to read in more detail, and they were allowed to select freely among the available pieces of information (i.e., they could select between no information and 12 pieces of information). On completing the experiment, participants were debriefed, thanked for their participation, and dismissed.

Results

Confirmatory information processing. We computed difference values for information evaluation and search by subtracting the corresponding values for standpoint-inconsistent information from the values for standpoint-consistent information. Overall, both a significant evaluation bias ($M = 3.15$, $SD = 3.33$), $t(47) = 6.56$, $p < .001$, and a confirmation bias in information search ($M = 1.31$, $SD = 2.23$), $t(47) = 4.07$, $p < .001$, occurred. For the following analyses, we transformed both difference values into z values. Because they were highly correlated ($r = .82$, $p < .001$), they were collapsed into an overall index of confirmatory information processing.

A one-way ANOVA with depletion of self-regulation resources as the independent variable (low vs. high) and confirmatory information processing as the dependent variable yielded a significant effect, $F(1, 46) = 8.82$, $p = .01$, $\eta^2 = .16$, indicating that participants with reduced self-regulation resources ($M = 0.38$, $SD = 0.97$) exhibited a more pronounced confirmatory informa-

tion processing tendency than did nondepleted participants ($M = -0.38$, $SD = 0.78$).

Commitment. Participants with reduced self-regulation resources ($M = 7.30$, $SD = 1.86$) reported a stronger commitment to their political standpoint than did nondepleted participants ($M = 5.50$, $SD = 2.14$), $F(1, 45) = 9.48$, $p < .01$, $\eta^2 = .17$.

Mediational analyses. In the following analysis, adhering to the principles set forth by Baron and Kenny (1986), we tested whether commitment mediates the effect of depleted self-regulation resources on confirmatory information processing. First of all, the depletion factor (contrast coded; high depletion: 1, low depletion: −1) significantly predicted the expected mediator, commitment ($\beta = .42$), $t(45) = 3.08$, $p < .01$. Next, commitment also significantly predicted confirmatory information processing ($\beta = .58$), $t(45) = 4.79$, $p < .001$. When both depletion of self-regulation resources and commitment were used as predictors for confirmatory information processing, the overall regression was significant ($R^2 = .38$), $F(2, 44) = 13.21$, $p < .001$. The commitment variable received a significant regression weight ($\beta = .49$), $t(44) = 3.75$, $p = .001$, whereas the regression weight of depletion of self-regulation resources was no longer significant ($\beta = .21$), $t(44) = 1.63$, $p > .11$. The Sobel test was significant ($Z = 2.37$, $p = .02$). In sum, commitment was found to mediate the impact that depleted self-regulation resources have on confirmatory information processing.

Check for interfering effects. Of the participants, 23 were CDU/CSU voters (11 in the low and 12 in the high depletion condition) and 25 were SPD voters (13 in the low and 12 in the high depletion condition). As a check for interfering effects of party preference, sex, and age, a 2 (depletion of self-regulation resources) × 2 (party preference) × 2 (sex) ANCOVA with confirmatory information processing as the dependent variable and age as a covariate was performed. As in Study 1, we found a significant main effect for party preference, $F(1, 39) = 30.25$, $p < .001$, $\eta^2 = .44$, indicating that conservative (CDU/CSU) voters ($M = 0.58$, $SD = 0.89$) exhibited stronger confirmatory information processing tendencies than did liberal (SPD) voters ($M = -0.53$, $SD = 0.66$). However, party preference did not interact with the depletion manipulation ($F < 1$). Moreover, no significant effects were found for either gender or age (Fs < 2.62, ps > 11).

Discussion

Study 4 replicated the findings of the previous three studies with an alternative manipulation of self-regulation resources based on emotion control. Again, individuals with reduced self-regulation resources were more inclined to confirmatory information processing than were nondepleted individuals. In addition, Study 4 elucidated the nature of the underlying psychological processes: Depleted self-regulation resources increase individuals' commitment to their own standpoint and thus promote confirmatory information processing. In this regard, it appears that the link between depletion of self-regulation resources and confirmatory information processes has a motivational component: Individuals with depleted self-regulation resources exhibit stronger confirmatory information processing tendencies because they cling more to their standpoint.

General Discussion

Recent studies have shown that regulation resources are a limited resource, similar to energy (Baumeister & Heatherton, 1996; Baumeister et al., 1998; Schmeichel et al., 2003; for an overview, see Muraven & Baumeister, 2000), which is required for a variety of tasks, such as decision making, self-presentation, mental health promotion, or intellectual performance (e.g., Fischer et al., 2007; Schmeichel et al., 2003; Vohs et al., 2005). Deriving from these findings, we argued that self-regulation is also essential when people evaluate and search for new information to validate their decisions or standpoints. More specifically, it was hypothesized in particular that the unbiased processing of standpoint-consistent and standpoint-inconsistent information requires considerable amounts of self-regulation because standpoint-inconsistent (compared with standpoint-consistent) information implies unfavorable conclusions that threaten the self-concept (e.g., Pyszczynski & Greenberg, 1987), requires more processing effort (Ditto & Lopez, 1992; Ditto et al., 1998), and arouses the aversive motivational state of dissonance (Frey, 1986). Besides avoiding standpoint-inconsistent information, individuals with reduced self-regulation resources should also be favorably disposed toward standpoint-consistent information because of its general positive implications for the exhausted, impaired self (e.g., Frey, 1986). Combining these arguments, individuals with reduced self-regulation resources were expected to exhibit a stronger tendency for confirmatory information processing than were nondepleted individuals.

The present four studies consistently supported this line of reasoning: Participants with depleted self-regulation resources exhibited stronger confirmatory information processing tendencies than did nondepleted participants. This pattern of results was consistently found across four different manipulations of self-regulation resources (i.e., an attention control task, a concentration task, a thought-suppression task, and an emotion control task), which supports the generalizability of the effect. We also found that the effect of reduced self-regulation resources on confirmatory information processing is not likely to be due to processes of ego threat (Studies 2 and 3), cognitive load (Study 3), or mood (Study 3). Finally, Study 4 revealed that the impact of reduced self-regulation resources on confirmatory information processing was mediated by differences that resulted from subjective commitment to one's own standpoint: Individuals with depleted self-regulation resources clung more to their standpoint (i.e., showed more commitment), which in turn resulted in higher levels of confirmatory information processing. Although mediational analyses are correlational and are thus still problematic when one tries to interpret them causally, for the present research they provide a better sense of the psychological processes involved in the effect of regulation resource depletion on confirmatory information processing. In summary, the present research revealed that the unbiased processing of standpoint-relevant information depends on the availability of regulation resources: When individuals suffer from depletion of self-regulation resources, they are more inclined to show confirmatory information processing.

The present results support the assumption that self-regulation and unbiased information processing are based on a similar limited resource, which can be depleted by preceding self-regulatory activities. Thus, the present research extends our knowledge of the effect of self-regulation on information processing. In previous

research it was found that higher intellectual performance, self-presentation, and decision making draw on the limited resource of self-regulation (e.g., Baumeister et al., 1998; Schmeichel et al., 2003; Vohs et al., 2005), whereas the present research reveals that self-regulation also plays a role in the (un)biased processing of standpoint-relevant information. Moreover, the present studies broaden the understanding of the dynamic self and its impact on information processing: Previous research on confirmatory information processing predominantly manipulated self-relevant psychological states by qualitatively changing self-relevant states, for example, by attacking the self (Frey, 1981; Jonas et al., 2006) or by inducing negative self-relevant mood states (Jonas et al., 2006). To the best of our knowledge, none of the previous research varied the quantitative regulation functioning of the self and, as a function, measured tendencies for confirmatory information processing. In sum, the present studies add new theoretical insights and results to the literature on self-regulation and limited resources perspective, as well as the literature on confirmatory information processing and search.

Study 3 showed that (compared with cognitive load) depletion of self-regulation resources has the opposite effect on information processing and is thus likely to be a qualitatively different process than cognitive load. Within the same experimental context, participants with depleted self-regulation resources exhibited an increased tendency for confirmatory information search, whereas participants in the cognitive load condition were relatively balanced in their processing of standpoint-relevant information (as has also been suggested by previous research; e.g., Ditto & Lopez, 1992; Ditto et al., 1998; Fischer et al., 2005). The following line of argumentation could integrate both differential findings: Experiments on the effect of cognitive load and quality of information processing introduce load manipulation and relevant information at the same time (see, for example, Ditto et al., 1998, Study 2; Fischer et al., 2005, Study 4; Petty, Wells, & Brock, 1976, Study 2), whereas attention or emotion control as a way of manipulating self-regulation resources preceded the presentation of information. If information processing occurs while a second task is attempted (cognitive load), people's ability to evaluate new information is impaired. As a consequence, inconsistent information is not tested more critically than is consistent information, which may even result in a decreased bias in information evaluation and search (Fischer et al., 2005). In contrast, if attention load precedes information processing (which might be induced by depletion manipulations carried out before information evaluation and search), the motivation to deal with standpoint-consistent and standpoint-inconsistent information in a balanced way is reduced beforehand, which may result in an increased confirmation bias. In sum, we think that the effect of depleted self-regulation resources on external information processing is more motivational in nature, whereas the effect of cognitive load has more cognitive roots. That is, depletion manipulations impair and weaken the self and thus reduce the a priori motivation to deal with decision-relevant information in a balanced way, whereas cognitive load manipulations reduce the cognitive ability to counterargue and thus devalue inconsistent information while information evaluation and search is carried out. The first process leads to increased confirmatory information processing (in order to a priori protect the depleted self), whereas the latter leads to reduced confirmatory information processing (because counterargument and devaluation of standpoint-inconsistent information cannot be carried out effectively, and thus, the subjective quality advantage of consistent over inconsistent information vanishes).

We do not think that the effect of depleted regulation resources on information processing is limited to evaluation of and search for new information. Rather, we assume that reduced resources of self-regulation affect information processing in a more general way. Future research to investigate whether the present results can be replicated in alternative information processing contexts would be beneficial. To give just two examples, it has been shown that people's stereotypes influence their interpretation of new evidence; Darley and Gross (1983) have shown that information on a target person is interpreted in a way that is consistent with the perceiver's initial expectations about that person. One might expect this tendency to be augmented when the perceiver suffers from reduced self-regulation resources, which foster a (perhaps incorrectly) rigid stereotype. Moreover, the potential effect of depleted regulation resources on hypothesis testing in a pure context could be examined by use of a reasoning task such as the one used by Wason and Johnson-Laird (1972). We would expect depleted (as opposed to nondepleted) participants to seek more consistent information while neglecting inconsistent information. However, these expectations are rather speculative and need to be backed up empirically.

One shortcoming of our research involves the precise mechanism by which reduced self-regulation resources affect information processing. Baumeister and Muraven and colleagues (e.g., Muraven & Baumeister, 2000) have argued that self-control works similarly to physical muscle and thus represents a limited resource. Accordingly, recent evidence has revealed that self-control relies on glucose as a limited energy source (Gailliot et al., 2006). In keeping with these assumptions, previous research (e.g., Webb & Sheeran, 2003) revealed that highly depleted participants were more fatigued than were nondepleted participants. However, other researchers (Martijn, Tenbült, Merckelbach, Dreezens, & de Vries, 2002) suggested that the temporary depletion of self-regulation capacity after an initial act of self-control might simply be due to people's implicit expectation that self-regulation consumes energy. If this expectation gets challenged, depletion of self-control no longer impairs subsequent performance. The present studies' most important result—that depletion leads to increased confirmatory information processing—does not involve a typical performance measure as found in the studies by Martijn and colleagues (Martijn et al., 2002). Hence, it is unlikely that the effect of depletion on information processing is due to participants' expectations (because information evaluation and search is not obviously connected to performance such as, e.g., intelligence or speed tests are). Nevertheless, future research that further clarifies the underlying processes of depletion on information processing would be of benefit. To this end, expectations of the impact of depletion on information processing should be assessed or manipulated and the association between these expectations and confirmatory information processing should be examined.

Finally, from a practical perspective, our results have important implications for decision making. As all the studies in the present research (as well as abundant evidence from previous investigations) have revealed, people generally prefer consistent to inconsistent information, which often leads to suboptimal decisions (Kray & Galinsky 2003). For example, Greitemeyer and Schulz-

Hardt (2003) have reported that the tendency to evaluate standpoint-consistent information more positively than standpoint-inconsistent information leads to a maintenance of individual suboptimal preferences. Not only individual but also group decision making is characterized by ignoring undesirable information (Greitemeyer, Schulz-Hardt, Brodbeck, & Frey, 2006). Our results point to a potential threat to effective individual and group decision making. People who are in a state of depleted self-regulation resources are also less likely to exhibit balanced information processing. Therefore, in order to foster effective decision making, decision makers with sufficient available self-regulation resources need to be included.

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