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Depletion makes the heart grow less helpful: Helping as a function of self-regulatory energy and

genetic relatedness

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Abstract

Often people are faced with conflict between prosocial motivations for helping and selfish impulses that favor not helping. Three studies tested the hypothesis that self-regulation is useful for managing such motivational conflicts. In each study, depleted self-regulatory energy reduced willingness to help others. Participants who broke a habit, relative to participants who followed a habit, later reported reduced willingness to help in hypothetical scenarios (e.g., donating food or money) (Studies 1 & 3). Controlling attention while watching a video, relative to watching it normally, reduced volunteering efforts to help a victim of a recent tragedy – but drinking a glucose drink undid this effect (Study 2). Depleted energy reduced helping toward strangers, but it did not reduce helping toward family members (Study 3). Helping requires self-regulatory energy to manage conflict between selfish and prosocial motivations – a metabolically expensive process – and thus depleted energy reduces helping and increased energy (glucose) increases helping.

Keywords: self-regulation, self-control, glucose, helping, prosocial behavior

Depletion Makes the Heart Grow Less Helpful: Helping as a Function of Self-Regulatory Energy

and Genetic Relatedness

The variety of human helping is quite impressive: from donating money, to volunteering time for altruistic causes, to entering icy waters or burning buildings to rescue victims. Helpfulness is socially and personally desirable. Society praises and admires large and small acts of helping. People have values that support helping others. Yet people do not always choose to help.

Social psychologists have identified many factors that promote helping, such as empathy, bad moods, reciprocation norms, in-group favoritism, perceptions of self-other overlap, the desire for social approval, and personality variables such as agreeableness (Batson, 1991; Cialdini, Darby, & Vincent, 1973; Fisher, 1963; Frey & Gaertner, 1986; Graziano, Habashi, Sheese, & Tobin, 2007; Isen & Levin, 1972; Latane & Darley, 1970; Manucia, Baumann, & Cialdini, 1984; Moss & Page, 1972; Wike & Lanzetta, 1970; Wegner & Crano, 1975; West, Whitney, & Schandler, 1975). If so many factors promote helping, then why don't people help?

In this paper, we suggest that failure to help could often be the normal, default response, especially when helping involves some cost to the self such as an expenditure of the self's energy time, money, or other precious resources. To help others, people may overcome a natural impulse toward selfishness and self-interest — but overcoming it may require advanced psychological processes, such as self-regulation. The prospect of helping thus presents an important case of motivational conflict, in which prosocial desires to help must compete against self-interested motives to refrain from helping.

Our hypothesis, therefore, is that helping can depend on self-regulation, which refers to the capacity to override some responses so as to enable others. Self-regulation is particularly

useful for overcoming socially undesirable impulses so as to behave in ways (such as helping others) that are consistent with social and personal ideals. The present studies manipulated levels of self-regulatory energy, based on the assumption that self-regulation consumes a limited energy resource. When this resource is close to full capacity, then helping should be substantial, insofar as people can override selfish inclinations and perform helpful acts. When the resource is depleted, in contrast, people should be less able to override their selfish inclinations and therefore helping will be reduced.

Motivational Conflicts and Helping

People have motivational inclinations that favor helping and others that favor not helping. On the positive side, multiple prosocial impulses drive people to help. These may include relatively selfless factors such as empathic concern and the desire to enhance other people's welfare (e.g., Batson, Duncan, Ackerman, Buckley, & Birch, 1981) and they may also include relatively selfish factors such as the desire to enhance one's own emotions or to gain social acceptance and approval (e.g., Baumeister, 2005; Cialdini et al., 1973; Cialdini & Kenrick, 1976). Most cultural systems also promote helping. Religions, morals, and social groups esteem and praise individuals for acts of helping, thereby providing another reason to help. For example, organizations frequently publish the names of financial donors in some way, presumably as a means of showing others that helping is desirable.

Opposing those prosocial motives is a host of self-interested tendencies. Helping can involve significant risks and costs to the self, ranging from potential embarrassment to injury and death (Latané & Darley, 1970; Garcia & Harrison, 2007). Giving time or money to aid someone else sacrifices resources that could be used to benefit the self. Life is a natural process that consumes energy across time, and so in a sense expending energy to help others involves

relinquishing some portion of one's life. Many animals cannot store food, for example, and so to share food instead of consuming it could expose an animal to the risk of starvation. Natural selection favors traits and behaviors that bring direct benefits to the individual, which implies that many innate dispositions would be ruthlessly selfish (see Lorenz, 1966; Cialdini, 1991). The power of these countervailing motivations is attested by findings indicating that as the cost of helping increases, helping decreases (Graziano et al., 2007; Penner, Fritzsche, Craiger, & Freifeld, 1995). Even the self-interested benefits of helping (e.g., reciprocation; social acceptance) often are not very direct or immediate and so self-interested impulses may lead people to refrain from helping by default. From this perspective, helping should occur primarily when people are able to override their initial self-interested impulses.

The view of organisms as naturally selfish has, however, been refined based on the insight that natural selection favors traits that promote the survival and transmission of one's genes. Inclusive fitness theory (Hamilton, 1964) holds that because animals share a large proportion of genes with kin, helping kin may be genetically self-serving even if the cost to the individual is high. Indeed, across many species, instances abound in which organisms are more willing to incur significant costs by helping kin than by helping non-kin. When threatened by a predator, for example, ground squirrels respond very differently when they are around kin versus non-kin (Dunford, 1977). When kin are nearby, squirrels typically sound an alarm call, which alerts their kin to the presence of danger. By calling attention to themselves, however, they increase their own individual risk. In contrast, ground squirrels typically freeze when in close proximity to non-kin, thereby reducing the likelihood that the predator will spot them but leaving other nearby squirrels open to attack.

The emphasis on kin relations tempering natural selfishness has become known popularly

under the rubric of the "selfish gene" (Dawkins, 1976). Genetic selfishness would support helping family members, even while it may oppose helping strangers. Insofar as human motivations are a product of evolution, therefore, people may be naturally inclined to help family members more than strangers (Maner & Gailliot, 2007). Multiple findings confirm that people express more willingness to help (Burnstein, Crandall, & Kitayama, 1994; Stewart-Williams, 2007) and behave more helpfully (Madsen, Tunney, Fieldman, Plotkin, et al., 2007) toward relatives compared to strangers. As the costs of helping increase, helpfulness toward kin increases but helpfulness toward non-kin does not (Stewart-Williams, 2007). These findings are consistent with the view that people have natural inclinations that lead them to help kin.

Thus, helping family members may involve less motivational conflict than helping strangers, insofar as genetic selfishness would support helping kin. As a result, helping family members may not require the expenditure of much psychological energy. In contrast, helping strangers, compared to helping family members, should be marked by more severe motivational conflict and possibly depend on inner processes to overcome the natural, selfish reluctance to help. When the energy that promotes these inner processes becomes depleted, people may become relatively unwilling to help strangers. The next section will examine these inner processes that enable people to overcome selfish impulses.

Self-Regulation

Self-regulation refers to the capacity to alter the self and its responses to bring them into line with various standards, such as goals and ideals. It is particularly useful for managing motivational conflicts (Baumeister & Vohs, 2007). Indeed, self-regulation may have evolved to manage clashes between natural impulses and cultural demands. Cultures support acts of helping because they bring benefits to the social system, and so nearly all known cultures have celebrated

the virtue of helpfulness and often condemned selfishness. Insofar as natural or genetic selfishness opposes helping, it may be necessary to employ self-regulation to overcome selfish impulses and promote helping. We have suggested that more self-regulatory effort would be needed to help strangers than to help family members.

A growing body of evidence suggests that people have a limited capacity for self-regulation. Engaging in one self-regulatory activity depletes a common energy resource, leading people to perform worse on subsequent self-regulatory activities (for reviews, see Baumeister, Gailliot, DeWall, & Oaten, 2006; Muraven & Baumeister, 2000). The implication is that a common resource is needed for both tasks and therefore performance on the second task is impaired when that resource has been depleted by the first task. The state of reduced self-regulatory resources has been dubbed ego depletion (Baumeister, Bratslavsky, Muraven & Tice, 1998).

The limited strength model of self-regulation proposes that ego depletion influences responding only on tasks that require active volition of the self. Some responses require very little active volition and hence should not be affected by ego depletion. In support of this prediction, Schmeichel, Vohs, and Baumeister (2003) showed that whereas depletion impaired logical reasoning, it did not disrupt the capacity for participants to memorize and recall nonsense syllables or to recall information learned through prior experience and education. This finding suggests that resource depletion causes decrements on activities that require active initiative or control over the self but not on automatic and effortless responses. If certain types of helping are relatively automatic and effortless, then people should remain helpful even when they have already expended self-regulatory energy elsewhere.

Although early studies treated the energy used in self-regulation metaphorically, recent

work has linked it to blood glucose. Glucose is a chemical in the bloodstream, made from nutritious intake and converted into neurotransmitters so as to constitute fuel for brain processes. All brain activities consume glucose, but some consume far more than others. Self-regulation may be among the most metabolically expensive activities, because it requires one process to override another (for review, see Gailliot & Baumeister, 2007). When there is a conflict between impelling and inhibiting mental processes, as is the case with self-regulation, the brain uses more glucose compared to when there is no conflict between mental processes (Laughlin, 2004). Self-regulation depletes glucose faster than it is replenished (Fairclough & Houston, 2004), thereby leaving people less able to exert further self-regulation. Managing conflict between selfish and prosocial motivations likely involves self-regulation and therefore might reduce blood glucose levels.

Laboratory studies have confirmed that acts of self-regulation cause blood glucose levels to drop, and these drops predict behavioral impairments in subsequent self-regulation (Gailliot, Baumeister, DeWall, Maner, Plant, Brewer, Tice, & Schmeichel, 2007). In particular, these studies found that replenishing blood glucose with a sugary drink of lemonade counteracted ego depletion, in the sense that prior acts of self-control did not produce the subsequent behavioral decrements if people ingested enough lemonade to replenish their blood glucose. Study 2 in the present investigation adapted the lemonade manipulation to investigate its effects on helping. If self-regulation is needed to manage conflict between selfish and prosocial motivations, then providing people with a boost of glucose might offset the negative effects of ego depletion on helping.

Present Research

We conducted three experiments to test the hypothesis that depletion of self-regulatory energy reduces helpfulness, especially toward strangers. In each study, participants first completed either a self-regulatory task or a task that did not require self-regulation. Later, they either reported their willingness to help in response to hypothetical scenarios (Studies 1 & 3) or volunteered to help the victim of a recent tragedy (Study 2). We predicted that participants who completed the self-regulatory task would express less willingness to help than participants who completed the non-self-regulatory task. Study 2 tested whether this effect would be reduced or even eliminated by a glucose drink. Study 3 compared helping intentions toward kin versus strangers.

Study 1

Study 1 tested the hypothesis that willingness to help would be reduced by acts of self-regulation, based on the idea that using self-control depletes a limited resource that manages conflict between motives for helping and self-interested impulses that prevent people from helping. To deplete self-regulatory resources, we borrowed a procedure from Baumeister et al. (1998) in which participants first established a habit and then were forced to break it. Breaking a habit requires overriding an ingrained response pattern and the action impulses to which it gives rise, and overriding responses is a crucial aspect of self-control (e.g., Baumeister, Heatherton, & Tice, 1994; Baumeister et al., 1998). In this case, all participants first formed the habit of crossing out every "e" in a passage of text and then were presented with another passage of text. Some participants had to continue crossing out "e" on the second passage but with added rules that required them to inhibit the incipient impulse in many cases, whereas other participants completed the second passage using the habitual response formed during the first passage.

After the depleting task, participants responded to a series of hypothetical helping

scenarios. We expected that people would need to overcome selfish impulses in order to become willing to help. Therefore, we predicted that when self-regulatory resources had been depleted by the initial task, participants would express lower levels of helpfulness.

Method

       Participants. Nineteen undergraduates (12 women) participated and received credit toward a course requirement. They were randomly assigned to a self-control depletion condition or no depletion condition.

       Procedure. Participants were told the study was investigating different aspects of personality. Participants began by completing a task that required them to cross out letters on a page of journal text. On the first page, all participants were instructed to cross out every occurrence of the letter *e*. The page contained a high number (337) of *e*s and so participants established a well-practiced routine of crossing out *e*s. For the second page of text, participants were given different instructions depending on the condition to which they had been assigned. Participants assigned to the no-depletion condition were asked to follow the same rule as before by crossing out all occurrences of the letter *e*. This task required a high number of responses and so was quite monotonous but did not involve self-control. Participants in the depletion condition, in contrast, were asked to change their behavior in accordance with new rules. Specifically, participants in the depletion condition were instructed to cross out all occurrences of the letter *e* except for *e*s that were followed by a vowel or *e*s that appeared in a word with a vowel appearing two letters before the *e*. The depletion task thus required far fewer responses than the control task, and in that sense it was less monotonous — but it required participants to override incipient responses, and so it required self-control.

       Next, participants completed the Brief Mood Introspection Scale (BMIS), which contains

subscales that measure current mood valence (pleasant-unpleasant) and arousal (aroused-calm) (Mayer & Gaschke, 1988). Last, participants read six hypothetical scenarios in which they had the opportunity to help strangers, namely giving money to a homeless person, donating money to a fund for children with terminal illnesses, offering a ride to an unknown classmate whose car had broken down, giving directions to a lost stranger, allowing a fellow classmate to use one's cell phone, and giving food to a homeless person. Participants indicated the likelihood of their helping based on how they would behave in each situation at the present moment using a scale from 1 (*not at all likely*) to 9 (*very likely*). Responses to the six scenarios were averaged to form the dependent measure of helping.

Results and Discussion

   Likelihood of helping. Gender was marginally ($p = .09$) related to helping, such that male participants were more willing to help than females. We therefore controlled for gender in the analysis. (Gender did not interact with depletion condition.)

   An analysis of covariance (ANCOVA), with gender as a covariate, confirmed the hypothesis that depletion would decrease willingness to help. Participants in the depletion condition ($M = 4.17$, $SD = 1.50$) indicated that they would be less likely to help than did participants in the no depletion condition ($M = 5.52$, $SD = 1.08$), $F(1, 16) = 5.07$, $p < .05$, $d = 1.12$. Thus, completing an initial task that required self-control, and therefore consumed self-regulatory energy, decreased self-reported likelihood of helping others in need.

   Mood and arousal. To test whether the effect of depletion on helping was due to differences in mood, we conducted analyses that compared mood valence and arousal scores between participants in the depletion and no depletion conditions. Depleted and non-depleted participants did not differ in mood valence or arousal, both ts < 1.16, *ns*, and neither mood

valence nor arousal was significantly related to helping, both rs < .23, *ns*. Thus, the effect of depletion on helping was not attributable to mood valence or arousal.

<div align="center">Study 2</div>

Study 1 found that a prior act of self-regulation reduced self-reported willingness to help. We hypothesized that this effect would reflect a decrease in glucose, which serves as a biological substrate underlying self-control. Study 2 provided a more direct test of this hypothesis by examining whether, following a task that reduced self-control, a glucose drink would restore the willingness to help. The expectation was that the initial act of self-regulation would deplete supplies of glucose in the bloodstream. Drinking lemonade with sugar would restore glucose to its normal level and, along with it, participants' level of helpfulness.

Study 2 also used a measure of helping that more closely approximated actual helping behavior compared to what was used in Study 1. Participants were asked to commit themselves to devote hours to help a needy individual. Promising actual help is potentially more real and costly than expressing willingness to help in response to the hypothetical scenarios used in the previous study.

Participants performed either a self-control task or a neutral task and then were given the opportunity to volunteer time to help a woman who was struggling to cope with personal and family problems. Participants also consumed a drink containing either glucose or a sugar substitute. We predicted that participants who exerted self-control would volunteer to help for fewer hours compared to participants who did not exert self-control, but that having participants consume a glucose drink would reduce this effect.

Method

Participants. Participants were fifty-nine undergraduates (37 women, 1 unreported). Data from one female participant were lost due to equipment malfunction. Participants were randomly assigned to self-control and glucose conditions.

Procedure. Participants were told the study was investigating taste preferences and attention. First, participants consumed either a glucose or placebo 14 ounce drink and were blind as to which drink they consumed. The glucose drink was sweetened with sugar and contained approximately 140 calories, whereas the placebo was sweetened with a sugar substitute (Splenda) and contained 0 calories. Participants then completed a three-item measure of liking for the drink ($\alpha = .89$; e.g., "How pleasant was it for you while drinking the beverage?") that has been used in prior work (Gailliot et al., 2007).

Next, participants watched a 6 minute video (without sound) of a woman talking. In the bottom corner of the screen, words (e.g., hair, hat, pulse) appeared individually for 10 seconds. Participants in the depletion condition were instructed to focus their attention only on the woman's face and to refrain from looking at the words. If they happened to look at the words, they were to re-focus their attention on the woman as quickly as possible. Attention automatically orients toward novel stimuli appearing in the environment (e.g., Shiffrin & Schneider, 1977), and so the task required these participants to exert self-control by overriding pre-potent orienting of attention to the words and maintain attention instead only on the woman. Participants in the no-depletion condition were instructed to watch the video as they would normally, as if they were sitting at home watching television. This self-regulatory depletion manipulation has been used in several previous investigations (e.g., DeWall, Baumeister, Stillman, & Gailliot, 2007; Schmeichel et al., 2003).

The rest of the procedure was adapted from Batson, Sager, Garst, Kang, Rubchinsky, and

Dawson (1997) and Maner, Luce, Neuberg, Cialdini, Brown, and Sagarin (2002) to assess helping behavior. Participants rolled a die, ostensibly to determine which of six radio broadcasts they would hear. This procedure was rigged so that all participants listened to an interview in which a young woman named Katie Banks described how her parents were recently killed, leaving only herself to care for her younger siblings. She stated that she would have to drop out of college unless she could find help raising money or caring for her siblings. After listening to the interview, participants completed measures ostensibly tapping into their cognitive and affective reactions to the interview.

Participants were then told that the study had ended. They were given a bogus debriefing and received credit for the experiment. Before they left, the experimenter explained that Dr. Edmunds – the professor supervising the study – had requested that all participants who heard Katie's interview be asked to volunteer to help her. Toward this end, participants received letters from Dr. Edmunds and Katie offering participants the opportunity to help Katie by volunteering time to complete various tasks (e.g., stuffing envelopes). Participants received a bogus volunteer form on which they indicated the number of hours they were willing to help, ranging from *0* to *9 or more*. The number of hours participants indicated served as the dependent measure of helping.

Results and Discussion

Helping. We coded helping in two ways. The total number of hours participants volunteered to help served as a continuous measure; the proportion of participants who volunteered any time served as a dichotomous measure of helping (0=did not volunteer to help, 1=volunteered to help). The continuous and dichotomous forms of the helping measure were highly correlated $r = .74$, $p < .001$. We focus primarily on the results using helping as a continuous measure because it provided a more rich and accurate reflection of participants'

willingness to help compared to simply whether or not participants decided to help.

A 2 (Depletion condition) X 2 (Glucose condition) ANOVA on the continuous measure of helping indicated a significant interaction between self-control condition and glucose condition, $F(1, 55) = 6.64$, $p = .01$ (see Figure 1). In the placebo condition, participants in the attention control condition volunteered for fewer hours than did participants in the watch normally condition, $F(1, 26) = 5.72$, $p < .05$, $d = .96$. Thus, an initial act of self-control reduced volunteering to help, consistent with the findings of Study 1 and with the broad hypothesis that depletion reduces helping. In the glucose condition, however, there was no difference between participants in the attention control and watch normally conditions in the number of hours for which they volunteered, $t(29) = 1.70$, $p = .10$. Receiving a glucose drink thus eliminated the detrimental effect of prior self-regulatory exertion on helping.

Moreover, among participants in the attention control condition, those in the glucose condition volunteered for significantly more hours than did those in the placebo condition, $t(24) = 2.62$, $p < .05$. Among participants in the watch normally condition, this difference was not significant, $t < 1$, ns. Thus, glucose increased helping only among participants who had exerted self-control, and whose resources were therefore presumably depleted. The difference between the attention control-placebo group and the watch normally-glucose group was not significant, $t < 1.08$, ns.

We found similar results when we analyzed helping as a dichotomous measure. Results from a logistic regression revealed the same interaction between self-control condition and glucose condition, $B = .61$, $SE = .28$, Wald $= 4.74$, $p < .03$.

These results support the hypothesis that exerting self-control reduces subsequent willingness to help by reducing self-regulatory energy and this effect is eliminated when energy

is restored with a glucose drink. The implication is that exerting self-control causes a reduction in glucose, and therefore replenishing glucose increases helping. When individuals have not previously exerted self-control, they already have a sufficient amount of glucose to enable helping, and so additional glucose does not increase helping.

Liking for the Drink. A priori, it seemed possible that lemonade sweetened with sugar might be more (or less) tasty than lemonade sweetened with a sugar substitute, and that differential enjoyment of the drinks might contribute to willingness to help. Liking did not differ, however, as a function of self-control or glucose condition, all Fs < 1.40, *ns*, and it was not related to the number of hours for which participants volunteered, $r = -.03$, *ns*. Thus, the effects of self-control exertion and glucose on helping were not attributable to differential liking for the drinks.

<div align="center">Study 3</div>

Study 3 sought to replicate and extend the effects of self-regulatory depletion on helpfulness by testing the hypothesis that helping among kin would be relatively more immune to the effects of depletion than would helping among strangers. Depletion was manipulated in the same manner as in Study 1. The helpfulness measure was adapted from Cialdini, Brown, Lewis, Luce, and Neuberg (1997): Participants reported their willingness to help someone who was in danger of being evicted from his or her residence. Some participants completed this hypothetical scenario imagining that it was a family member who needed help, whereas others completed it with respect to a stranger needing help. Based on evidence that willingness to help family members, compared to helping strangers, is more automatic and deeply ingrained in biology (e.g., Burnstein et al., 1994; Madsen et al., 2007; Stewart-Williams, 2007), we predicted that depletion would reduce helping toward strangers but not toward family members.

Method

  Participants and procedure. Two-hundred and ninety-one undergraduates (157 women) participated in exchange for extra credit. First, participants completed a brief version of the crossing out *e*s task used in Study 1. More specifically, the first page of text contained 140 *e*s and the second page of text contained 167 *e*s. The rest of the manipulation of self-regulatory depletion was the same as Study 1. After the *e*s task, participants completed a check of the depletion manipulation by indicating the extent to which the *e*s task had required them to break a habit, using a scale from 1 (*not at all*) to 9 (*a lot*). They then completed the BMIS.

  After completing the BMIS, participants were asked to develop a mental image of either a person in the room whom they did not know (stranger condition) or a family member (family condition). They then responded to a hypothetical scenario that assessed their willingness to help the target individual if he or she had been unable to pay his or her bills and had been evicted from his or her apartment. Participants were to indicate, on a 7-point scale, what they would do to help him or her, with higher points on the scale representing more labor-intensive forms of helping. Specifically, participants' options were to: (1) do nothing, (2) give him or her an apartment guide, (3) help him or her find a new place to live by driving him or her around for a few hours, (4) offer to have him or her come to stay with the participant for a couple of days (provided the participant had space), (5) offer to have him or her come stay with the participant for a week (provided the participant had space), (6) offer to have him or her come stay with the participant until he or she found a new place (provided the participant had space), (7) offer to have him or her come live with the participant rent-free (provided the participant had space). Participants were then thanked and debriefed.

Results and Discussion

Manipulation check. Participants in the depletion condition ($M = 5.00$, $SD = 2.17$) indicated that the crossing out *e*s task required them to break a habit to a greater extent than did participants in the no-depletion condition ($M = 3.24$, $SD = 2.05$), $F(1, 285) = 47.74$, $p < .001$, $d = .83$. This suggests that the *e*s task was successful in requiring different levels of self-regulatory exertion.

Helping. A 2 (depletion condition: depletion vs. no-depletion) X 2 (helping condition: stranger vs. family member) Analysis of Variance (ANOVA) on participants' willingness to help revealed the predicted interaction between prior self-control (depletion) and target of helping, $F (1, 287) = 5.72$, $p < .05$ (see Figure 2). There was also a significant main effect of helping condition, $F (1, 287) = 352.69$, $p < .001$, $d = 2.22$, such that participants reported more willingness to help a family member than a stranger. The main effect of depletion condition was not significant, $F (1, 287) = 2.01$, *ns*.

Tests of simple effects indicated that, in the stranger condition, depleted participants were significantly less willing to help than were non-depleted participants, $F (1, 132) = 3.21$, $p < .05$, $d = .37$. Thus, as in Study 1, self-regulatory depletion reduced willingness to help strangers. In contrast, depleted and non-depleted participants did not differ in their willingness to help a family member, $F < 1$, *ns*. Thus, depletion failed to reduce willingness to help family even though the baseline helpfulness toward family was higher, which speaks against the possibility that a floor effect contributed to the results.

Mood valence and arousal. The obtained pattern of results was not attributable to mood valence or arousal. There were no differences between depletion and no depletion conditions in terms of either mood valence or arousal, both *F*s < 1, ns.

General Discussion

We began by proposing that helping situations often invoke a motivational conflict. Whereas some motives may make a person wish to help others, more impulsive self-interested desires may lead the person to balk at the costs and risks involved. Self-regulation is the inner process that enables humans to override short-term and selfish inclinations to bring behavior in line with more desirable long-term goals and ideals, such as behaving prosocially toward others. Therefore, helping may depend on the amount of self-regulatory energy people have to manage conflict between motivations that promote helping and initial impulses that prevent helping.

Across three studies, we found that an initial act of effortful self-control led to subsequent decrements in helpfulness, even though the helping bore no connection to the prior act of self-control. These findings fit the view that helping draws on the same resource that is used for self-control. The current findings are consistent with the theory that human helpfulness and perhaps other prosocial behaviors require exertions by the self, presumably to overcome natural inclinations toward selfish and lazy actions. The same resource needed to overcome such inclinations draws on the common resource needed for others acts involving self-regulation. When this resource is depleted from prior exertion, people become less willing to help others.

The motivational conflict and limited resource explanation of helpfulness gained plausibility from two other findings in the present investigation. First, ego depletion reduced willingness to help strangers but not family members. Evolutionary biologists have suggested that genetic self-interest extends to family members (e.g., Dawkins, 1976; Hamilton, 1964), and so the motivational conflict between self-interest and helping may be less severe with regard to helping family than helping strangers. On that basis, we reasoned that the self's limited resources would be needed to prompt helping strangers but would be less needed to support helping family. We found a higher baseline rate of helpfulness toward family than toward strangers, which

should have made it easier to detect a reduction of helpfulness toward family. Despite this elevated level of helpfulness toward family, we found that depletion reduced helpfulness only toward strangers.

Second, we found that the effects of ego depletion on helpfulness were offset by a boost of glucose. Recent work suggests that blood glucose is an important part of the limited resource that is used for self-regulation, decision making, and other effortful self activities (Gailliot et al., 2007; Gailliot & Baumeister, 2007; Masicampo & Baumeister, 2008). In Study 2, we found again that depletion reduced helpfulness, but this effect was eliminated by drinking a glass of lemonade that had been sweetened with sugar (which provides a quick boost in glucose). Lemonade made with a sugar substitute, which provided no glucose, had no effect on prosocial responding. The two drinks tasted about the same and were equally appealing to participants, but only the one that boosted glucose had a positive effect on helping.

The implication from the current findings is that willingness to help strangers depends on the helper's current level of available self-regulatory resources (but willingness to help family members does not to the same extent). When inner resources are plentiful, people can override initial selfish inclinations and express willingness to help others. When inner resources have been depleted, people are less able to restrain their selfish impulses and therefore will express less willingness to help strangers.

Limitations and Future Directions

The results from the three studies provided consistent evidence supporting our conceptual framework of self-regulation as managing conflict between alternative motivations. There are, however, several limitations to these studies that provide useful avenues for further investigation. For example, we did not identify exactly which motives might have led people to help in these

studies (particularly in the non-depleted conditions). Consequently, the studies do not speak to which specific motives for helping require self-regulation to pursue. Many different motives for helping have been proposed in the helping literature, from the desire to enhance another person's welfare to the desire enhance one's self-esteem, one's level of social acceptance, or one's mood. Some motives for helping may require more self-regulation to pursue than others, and future research would benefit from examining this issue more closely.

In a related vein, some motivations for helping (e.g., the desire to gain social approval) involve self-presentational functions. Consequently, some of the effects in these studies may have been attributable to depleted participants having less ability than non-depleted participants to engage in self-presentational strategies. Indeed, prosocial behavior and presenting oneself to others in a desirable light often are closely interlinked. Non-habitual patterns of both helping and self-presentation, for example, involve greater motivational conflict and hence require more self-regulatory energy than do habitual patterns of helping and self-presentation (Vohs, Baumeister, & Ciarocco, 2005). Further research might profitably explore the role of self-regulation in self-presentational versus non-self-presentational forms of helping.

Another limitation to the current investigation is that we only compared helping intentions toward strangers and family members. There are many other types of individuals toward whom people offer help, such as close friends, acquaintances, colleagues, and so on. Many of these individuals may take an intermediary position between strangers and family, with respect to the level of helping they typically receive (Stewart-Williams, 2007). In turn, it is possible that self-regulatory depletion would affect helping toward these types of individuals, though perhaps not as much as for strangers. Further research would benefit from testing this hypothesis.

Previous evidence suggests that costs to the helper can dramatically affect helping levels (e.g., Dovidio, Piliavin, Gaertner, Schroeder, & Clark, 1991). Nevertheless, the current studies did not systematically vary the costs of helping and so we do not know whether helping costs interact with self-regulation to affect helping. We suspect that self-regulation is needed to produce helping especially when costs to the helper are high, though further research is needed to test this hypothesis directly.

Another potential limitation to the current studies, which applies to many studies in the helping literature, was a lack of observation of actual helping behavior. Actual helping behavior was measured in only one (Study 2) of the three studies we conducted (and in that case helping was more of a promise to be helpful than actually behaving helpfully). As noted above, self-reports of helping may be inflated by efforts to present oneself in socially desirable ways, and the greater reported willingness to help family than strangers could be partly due to this motivation. The findings across our different studies were quite similar, however, which supports prior evidence showing convergence between responses to scenarios and actual responses (Robinson & Clore, 2001). The consistency of our findings using scenarios and actual helping suggests a robust relationship between self-regulation and helpings. Still, in general future research would benefit from measuring actual helping. Our results are best described as studying reported willingness to help.

Last, Study 2's findings regarding the impact of lemonade are consistent with a network of theoretical assumptions about the role of glucose in the physiology of self-control, but those assumptions were not tested directly in the present research. We did not include physiological measures (e.g., of blood glucose levels). We also do not claim that blood glucose is the sole physiological basis for self-regulation. Although it has been linked to such processes (see

Gailliot & Baumeister, 2007, for review), alternative sources of fuel (e.g., brain glycogen; Gailliot, in press) may occasionally be used. Still, such considerations would not substantially alter the interpretation of the present findings.

Concluding Remarks

Helpfulness is one of humankind's most admirable traits. The human willingness to accept risks and costs to help even complete strangers is biologically rare and therefore probably owes much to distinctively human mental traits. Self-regulation is a uniquely human trait that is useful for managing motivational conflicts (Baumeister & Vohs, 2007). By managing conflict between selfish and prosocial motivations, self-regulation increases the chances that a person will respond in accordance with socially desirable ideals of behaving prosocially. The present studies showed a link between self-regulatory capacity and willingness to help, one that was moderated by glucose ingestion and relationship to the recipient of help. A somewhat cynical interpretation could assert that human virtue depends on a full stomach. A more positive spin, however, would focus on the fact that people have enough prosocial motivation to override selfish impulses and that there is sometimes enough self-regulatory capability to make people willing to help even those to whom they have no relation and from whom they can expect little or nothing in return.

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Figure Captions

Figure 1. Helping as a function of depletion and glucose-drink conditions (Study 2).

Figure 2. Willingness to help as a function of depletion condition and recipient of help (Study 3).