Counteractive Control over Temptations: Promoting Resistance through Enhanced Perception

of Conflict and Goal Value

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Abstract

The present research explored people's everyday practice of counteractive control. Experience sampling was used to test our prediction that strong temptations would promote self-control. Participants were 237 Japanese citizens with ages ranging from 18 to 69. Results indicated that perceived temptation prompted stronger resistance and restraint of behaviors, compared to those cases where no conflict was perceived. In addition, multilevel path analysis revealed the underlying process such that (a) a strong desire toward temptation intensified perception of conflict; (b) perceived conflict bolstered the value of goals that were in disagreement with the temptation; and (c) highly valued goals promoted self-control (i.e., stronger resistance and hence less yielding to temptation). (109 words)

Keywords: self-regulation, desire, temptation, conflict, goal

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Temptations are everywhere. At times, their seductions seem to be so strong and

irresistible that they compromise our will to control ourselves. However, is it really the case

that powerful temptations impose devastating effect on our self-control? A series of studies

on counteractive control (e.g., Fishbach, Zhang, & Trope, 2010; Kroese, Adriaanse, Evers, &

De Ridder, 2011; Myrseth, Fishbach, & Trope, 2009; Trope & Fishbach, 2000) tells us

otherwise: Temptations may sometimes bring beneficial impact to self-control processes,

such that it prompts us to execute goal-directed behaviors. The aim of the present study is to

describe the mechanism by which individuals offset the negative impact of temptation

through counteractive control, and to investigate how prevalent this is in people's daily lives.

Specifically, a model of the psychological process that enables us to practice counteractive

control is proposed and empirically tested with data collected through an experience sampling

survey.

Counteractive Control

Temptations have long been considered to undermine goal attainment. Meanwhile,

recent research has suggested that presence of temptations may promote the capacity for

self-control through a mechanism known as *counteractive control* (Trope & Fishbach, 2000).

The basic idea of counteractive control is that temptations trigger a variety of cognitive,

affective, and motivational processes congruent with goal pursuit, thereby enabling

goal-directed behavior.

To successfully counteract temptations, an individual must first identify the presence of a self-control conflict. The above proposal originates from the two-stage model of self-control by Myrseth and Fishbach (2009) asserting that the likelihood of self-control success depends on both identifying self-control conflict (Stage 1) and invoking effective self-control strategies (Stage 2). In Stage 1, an individual identifies (or does not identify) the presence of a conflict between indulging in temptation and pursuing important goals. If and only if the individual identifies a conflict, they will enter Stage 2 in which they exercise self-control strategies to promote goal-pursuit over indulgence in temptation.

Concerning Stage 1, the beneficial effect of conflict identification on self-control has been intensively investigated in a series of studies on conflict monitoring (e.g., Botvinick, Braver, Barch, Carter, & Cohen, 2001). To effectively exercise self-control, the control processes need to detect situations calling for their involvement (Myrseth & Fishbach, 2009). In the process, current levels of conflict are first evaluated, and then the information is passed on to relevant systems which adjust the strength of their influence on processing. As such, identification of conflict plays a crucial role in the self-control process as a trigger to activate the systems which enables the person to resist tempting situations.

As to Stage 2 in which people implement self-control strategies, various alternatives have been proposed as manifestations of counteractive control (for a review, see Myrseth & Fishbach, 2009), such as self-imposed penalties or rewards (Trope & Fishbach, 2000, Studies 1 and 2), devaluation of temptation (Myrseth et al., 2009), and adopting a concrete representation of self-control goals (Gollwitzer & Brandstatter, 1997) but an abstract

representation of temptations (Mischel, Shoda, & Rodriguez, 1989). The strategy that is the

focus of the current study involves the alteration of goal values. The psychological meaning

of future choice situations can be changed by bolstering the value of activities that have

long-term importance. Specifically, people may link attainment of long-term goals to their

general self-standards, which serves as an instigator of self-control, accordingly enabling

them to achieve control over their own behavior. For example, Study 5 by Trope and

Fishbach (2000) demonstrated that priming a social motive (a short-term temptation) in

students who were expecting an upcoming exam was sufficient to elicit counteractive control

by bolstering the value of studying (a long-term goal). These findings imply that bolstering of

goal value is one of the adaptive strategies which enable us to counteract the effect of

temptations.

However, the above studies on counteractive control were administered almost

exclusively in laboratory settings, with a few exceptions of field experiments (e.g., Myrseth

et al., 2009). Therefore, not much is known yet about how prevalently or how effectively the

counteractive mechanism works in people's everyday lives. In addition, previous

investigations are almost exclusively focused on temptations of food (vs. diet goals) and

leisure (vs. academic goals). Although admittedly these two kinds of temptations are

considered to be the most problematic ones amongst all of those in modern societies,

nevertheless, there should be a much longer list of temptations that people face in everyday

life. Theoretically, the mechanism of counteractive control should be generalized to a diverse

range of temptations, although there has not been much accumulation of empirical data to

confirm this assumed generalizability. Accordingly, the central questions of the present study are whether people actually exercise counteractive control strategies in their daily lives, and whether the exertion of these strategies promotes adaptive self-control over everyday temptations.

Investigation into Everyday Self-Control: The Experience Sampling Method

For investigating how psychological mechanisms work in people's everyday lives, the experience sampling method (ESM; Hektner, Schmidt, & Csikszentmihalyi, 2007) provides a powerful tool. Experience sampling (also known as ecological momentary assessment) involves repeated measurement of thoughts, feelings, judgments, and behaviors over a given period of time, which provides context-sensitive and ecologically valid data for explorations of subjective experiences in daily life.

As a good example of the use of ESM in self-control research, Hofmann, Baumeister, Förster, and Vohs (2012) investigated the psychology of everyday temptation, examining a four-component model of the self-control process involving desire strength, conflict, and resistance as predictors of behavior enactment. A sample of 208 German citizens was provided with PDAs (Blackberry pocket personal data assistants) to receive signals at random times during waking hours of a normal week. Each time the beeper went off, they were asked to report on a desire episode within the past half hour (e.g., what the desire was for, how strong it was, whether they felt conflicted about it, whether they resisted it, and whether they enacted the desired behavior). Multilevel analyses on 7,827 reports of desire episodes suggested, among other things, that (a) a strong desire increased the probability of behavior

enactment; (b) perceived conflict between a desire and other important goals triggered

attempts to resist the desire; (c) resistance attempts reduced the likelihood of the desired

behavior to be enacted; (d) personality traits also emerged as important sources of impact,

especially in the early stages of the self-control process (desire strength and conflict).

Our Model of Counteractive Control

With the common goal of investigating self-control processes in daily life, the

current study partially shares its methodology and conceptual framework with Hofmann et al.

(2012). To be specific, we basically replicate their experience sampling protocol with some

technical improvements and new variables added, and their model of motivated behavior is

integrated into our model of counteractive control so as to provide the basic framework of

self-regulation processes. Meanwhile, the major and original contribution of the present study

is the introduction of a new predictor (i.e., goal value)[1] and related pathways of impact into

the model, with the aim of describing the detailed flow of psychological processes underlying

counteractive control. Figure 1 depicts the theoretical model of the current investigation.

In Figure 1, the arrows in fine line indicate the model originally advocated by

Hofmann et al. (2012), which explains the basic process of how desire experience turns into

(or does not turn into) enactment of motivated behavior, involving desire strength, conflict

and resistance as predictors. In line with the original work, the predicting factors were

defined as follows: desire as an event in which an object or activity is associated with

pleasure or relief of discomfort; conflict as the perception that there is some reason not to

enact the desire and thus serves to distinguish unproblematic desires from temptations;

resistance (self-control) as a controlled effort to prevent oneself from enacting the desire. The

bold arrows in Figure 1 designate the unique contribution of the current study. Considering

the findings on counteractive control as reviewed previously, we constructed the current

model for the following reasons: On the premise that an individual must first identify the

presence of a self-control conflict so as to successfully counteract temptations (Myrseth &

Fishbach, 2009), perceived conflict is positioned to be an essential precursor of counteractive

control. Accordingly, a set of predictions are derived. The first prediction is that the

identification of conflict triggers a shift in goal value, following the previous findings from

experimental studies (e.g., Trope & Fishbach, 2000). This effect is depicted in Figure 1 as the

bold arrows connecting conflict and goal value. The second prediction involves promotion of

resistance against temptation through the bolstered value of the opposing goal, which is

pictured as the bold arrow with the positive impact from goal value to resistance. This

assumption is in line with another set of laboratory studies by Fishbach et al. (2010).

However, exertion of counteractive control does not necessarily involve inflation of goal

value, but also can be attained by other forms of self-control strategies (Myrseth & Fishbach,

2009). These other forms of counteractive control should be reflected in the pathway

expressing positive impact of perceived conflict on resistance, indicating that the more

intense the conflict that is experienced, the harder people try to counteract the allurement (by

means other than enhancing goal values). Hence, the notion of a counteractive control

process reported in previous literature is integrated into the model via a combination of 3

arrows connecting conflict, goal value, and resistance in Figure 1.

As our original extension of counteractive control theory, we assume that a strong desire should promote sensitivity of conflict identification, as in the path describing the positive impact of desire strength on conflict in Figure 1. This predicted path stands on the assumption that strong temptation provides a signal for counteractive control. A piece of supporting evidence is obtained by Kroese, Evers, and De Ridder's (2011) study, in which they found that strong temptations could have more beneficial effects on self-regulation processes than weak ones. Their results suggest that the presence of a strong temptation may increase the salience of its incompatibility with important goal(s), which serves as a signal for a situation in need of self-control (which would be subjectively perceived as "a conflict situation"). Therefore, as an extension of counteractive control theory (Trope & Fishbach, 2000), our original prediction is that sensitivity for detecting self-control conflict should be affected by temptation strength, such that intense temptations promote detection of strong conflict between the temptation and important goals (for a related argument, see Kotabe & Hofmann, 2015). The causal relationship is illustrated as a bold arrow connecting desire strength to conflict in Figure 1.

Note that this model demonstrates how the self-control process works in a situation where there is a presence of a temptation that stands in conflict with important goals. In our daily life, there are frequent occasions in which we desire something that does not interfere with our important goals, constituting about half of total desire experiences (Hofmann et al., 2012). In the remaining half of occasions of desire experience, people perceive conflicts with differing degrees, from slight to large ones. The aim of the present study was to investigate

how variation in conflict intensity affects the course of counteractive control and its

behavioral consequences in tempting situations. In this sense, our model and its investigation

had a different focus than that of Hofmann et al. (2012) in that it was primarily interested in

cases where the process of counteractive control was supposed to be activated, although to a

varying degree in each instance. Accordingly, the model was tested with a subset of selected

cases when temptations were present, which contrasted Hofmann et al.'s study (2012) where

temptation/non-temptation cases were both included and analyzed jointly to investigate the

general pattern of self-control.

Offset of the Deteriorating Effect of Temptation.

If desire had only effects that lead to counteractive control, no one would ever give

in to temptation. However, as we all know, this is not the case. There is more of a

psychological battle, where multiple processes might be at play. That is, independently from

the counteractive control process, numerous psychological processes should operate and

interfere with people's ability to resist. One such process is known as motivated reasoning

(Kunda, 1990), in which motivated individuals attenuate their cognitive processing so as to

satisfy their desire. Another possibility is the effect of social models, such that the presence of

others who are already implementing the desired action may boost the strength of desire and

also compromise people's motivation to resist (Hofmann et al., 2002). Hence, we thought it

would be possible to observe such deteriorating effects of temptation on self-control, which

operate independently from the counteractive process in the focus. However, since this is an

exploratory investigation and is independent of our predictions concerning counteractive

control, the above effect is not depicted in our conceptual model as in Figure 1.

We also investigate the possibility that these deteriorating effects may be cancelled

out when the impact of counteractive control is accounted for. Specifically experience of a

strong and problematic desire should intensify the perception of conflict, therefore triggering

exertion of strategies to counteract the temptation which may or may not involve bolstered

goal value, resulting in enhanced capacity of resistance. That is, the indirect effects, through

the counteractive control process should, at least partially, offset the direct and interfering

effect imposed by tempting desires.

Personality Factors and Individual Differences in Counteractive Control

Studies have shown that temptations trigger goal-directed behavior only in

successful but not in unsuccessful self-regulators. For example, it was found that successful

dieters but not unsuccessful dieters showed a facilitated mental association between food

temptations and dieting goals (Fishbach, Friedman, & Kruglanski, 2003; Papies, Stroebe, &

Aarts, 2008). Do any personality factors account for individual differences in the capacity to

exert counteractive control? If so, in which stage of the mental process do they impose their

effects? To address these questions, and also to partial out the effects of these individual

differences from the Level 1 analyses, effects of personality factors and demographic

variables (i.e., gender and age) were included as determinants of the five components of our

conceptual model (external arrows in Figure 1). Doing so allowed us to identify the impact of

personality factors on the mediating components of counteractive control (i.e., conflict and

goal value). The personality factors that our study focused on were trait self-control,

perfectionism, and belief in free will.[2]

Trait Self-Control

Trait self-control is generally understood as the capacity to resist desire. Rigidly following this definition might lead one simply to assume that people with high trait self-control would show signs of stronger counteractive control compared to those who are low in self-control, such as exhibiting more sensitivity to conflict. However, Hofmann et al.'s (2012) results suggest otherwise; trait self-control had a *negative* impact on the degree of conflict. Their results indicate that people who excel in self-control display their ability more by avoiding temptations in the first place than by resisting them. Another possible interpretation is that disagreements between temptations and important goals are resolved unconsciously, since they have developed an automatized routine to control themselves even in tempting situations (i.e., Fishbach et al., 2010; Kroese, Adriaanse, et al., 2011). Therefore, in line with Hofmann et al.'s findings, we expected that trait self-control would be negatively associated with the individual level of perceived conflict. That is, people with high self-control should show *less* exertion of counteractive control, at least at the conscious level of processing.

Perfectionism

In contrast to the well-known and wide-ranging benefits of high trait self-control (Payne, Youngcourt, & Beaubien, 2007; Tangney, Baumeister, & Boone, 2004), perfectionism is known to have both adaptive and maladaptive effects on people's mental and behavioral functioning (Bieling, Israeli, & Antony, 2004; Chang, Watkins, & Banks, 2004; Park,

Heppner, & Lee, 2010). Perfectionism is defined as the tendency to set and pursue

unrealistically high standards and unattainable goals despite the occurrence of adverse

consequences (Frost, Marten, Lahart, & Rosenblate, 1990). Reasonably, people who show

high level of perfectionism should place greater value on their important goals, compared to

their counterparts who do not show signs of perfectionism. Moreover, as already observed in

Hofmann et al.'s (2012) study, perfectionists should experience more intense conflict about

their impulses toward temptations that are incompatible with their aspiration toward glorious

goals, compared to those who are non-perfectionists. Accordingly, our prediction was that

perfectionism would have a positive impact on the perceived value of goals and the level of

conflict, which suggests that people with high perfectionism should show stronger exertion of

counteractive control.

Belief in Free Will

Belief in free will is a degree to which people believe that an individual's actions are

determined by their own will. Along with theoretical debates over free will and determinism

(e.g., Baer, Kaufman, & Baumeister, 2008), there has been empirical research demonstrating

that this belief imposes a wide-ranging impact on how people regulate their own actions (e.g.,

Baumeister, Masicampo, & DeWall, 2009; Baumeister, Sparks, Stillman, & Vohs, 2008;

Stillman et al., 2010; Vohs & Schooler, 2008). Belief in free will rests on the idea that there is

more than one behavior that is possible for an individual in his or her circumstances (e.g.,

Kane, 2002), and thus encourages people to make good choices, perform well, and take

responsibility for their actions. Hence, our prediction in the current study is that people who

believe in free will may embrace stronger aspirations toward self-control goals in the face of

temptations, which may be interpreted as a manifestation of stronger counteractive control,

compared to non-believers in free will.

The Present Study

The present study shares a large part of its experience sampling method with the

previous study by Hofmann et al (2012), with a number of improvements and modifications.

First, the main factors in the model (resistance and enactment) were measured on a

continuous scale rather than categorically (i.e., resisted or not resisted, enacted or not

enacted) to increase precision. Second, we tested the model fit of the overall framework using

multilevel path analysis, rather than through a series of separate multilevel regression

analyses. Third, we included a direct measure of goal value. Fourth, a new personality factor

(i.e., belief in free will) was included as a dispositional predictor. Fifth, data were collected

from Japanese participants, who have a different cultural background, so as to investigate if

we could replicate the previous findings obtained from a German sample. Sixth, signals

asking for a response were emailed to the participants' own smartphones, which is a more

popular way to exchange messages among Japanese citizens (therefore faster and more

reliable responses were expected) than SMS messages on PDAs that were used in the former

study.

The present study recruited a sample of Japanese citizens of divergent age groups,

who owned smartphones. They were signaled 7 times a day so as to report any desire

experience they felt at the moment and within the past half hour. If they indicated a desire,

they reported the strength of the desire, the degree to which the desire was in conflict with

their important goal(s), the subjective value of the goal(s), the degree of resistance against the

desire, and the extent to which they enacted the desired behavior.

Regarding the previous discussion, we hypothesized that: (a) presence of temptation would trigger counteractive control, that is, stronger resistance and lower rate of behavior enactment compared to situations where temptation is absent; (b) the underlying process of counteractive control would involve heightened sensitivity to conflict and bolstering of goal values; (c) exertion of counteractive control processes would cancel out the deterioration effect of strong temptations on self-control; (d) in addition, we tested a number of personality-related hypotheses, as spelled out in more detail above.

Method

Participants

The sample consisted of 237 Japanese citizens (132 females, 97 males, 8 unknown) with ages ranging from 18 to 69 ($M = 30.12$, $SD = 14.80$). Within the sample, 55.7% were university students who were recruited by flyers, either belonging to Kyoto University (19.8%), or to Toyo University (35.9%). The students majored in diverse fields of studies, such as business (14.8%), law (8.9%), economics (6.3%), sociology (3.4%) and miscellaneous other fields (22.3%). The remaining 44.3% were non-student participants recruited from a survey panel owned by a domestic research company (Cross Marketing) with divergent professions and residential areas across the nation. Most of them had either full- or part-time jobs (28.3%), while the rest were unemployed (retired or housekeeping; 16.0%).

Procedure

Overview

From 1 to 5 days prior to the experience sampling period, participants were informed of the general purpose of the study, and received instructions on how to receive signals and make responses on their own smartphones.[3] After agreeing to the consent form, they provided data on a variety of demographic indicators (e.g., gender, age) and dispositional variables.

During the experience sampling period, each participant was randomly signaled 7 times daily for 7 consecutive days between 9 a.m. and 9 p.m. A succession of signals for one participant was sent at least 30 minutes apart. The participants received the signals on their own smartphones via email. The email messages instructed them to make a response as soon as possible, within 2 hours at the latest, after receiving the message. It also contained a web link to an online survey page where participants' responses were made and recorded. As a reminder, an identical message was delivered 15 minutes after each signal. Participants were compensated with 550 JPY (approximately 4.5 USD) for participating in the instruction session, and 50 JPY (approximately 0.4 USD) each for a response completed during the experience sampling session. Therefore, if a participant responded to all of the signals, his or her total compensation added up to 3,000 yen (approximately 25.0 USD). On average, participants completed 76.8% ($SD = 23.9$) of the signals, while 0.5% ($SD = 1.1$) were partially answered, and the remaining 22.7% ($SD = 23.9$) of signals were not responded to.

Experience Sampling Data

The online survey that participants repeatedly answered during the experience sampling period consisted of the following questions (see also Hofmann et al., 2012). At the

beginning of the survey, participants were asked to indicate if they were currently experiencing a desire or whether they had just been experiencing a desire within the last 30 minutes. If they indicated no desire, no more questions about desire episode were asked, and then they were directed to the final part of the survey where questions unrelated to the current study were asked. If they reported experiencing a current or recent desire, a set of questions followed asking about the details of the desire experience. First, a list of 16 domains (food, nonalcoholic drinks, coffee, alcoholic drinks, sleep/rest, sex, media use, social contact, sport, work, leisure/hobbies, expressing anger, smoking, other substances, hygiene related, and other) were provided. Participants selected one of the domains which best described their desire. Next, they assessed the strength of the desire on a scale ranging from 0 (no desire at all) to 6 (very strong), and then the degree to which the given desire conflicted with one or more personal goal(s) on a scale from 0 (no conflict at all) to 6 (very high conflict). In case of goal conflict, they assessed the subjective value of the goal(s) on a scale from 0 (not valuable at all) to 6 (very valuable). At this point, participants indicated how much they had attempted to resist the desire, and how they had enacted the behavior suggested by the desire, both on scales ranging from 0 (not at all) to 6 (very much). However, due to a technical error, in some cases where participants indicated no resistance at all, the next question concerning the enactment of desire was skipped. (The number of these error cases was 41, constituting less than 0.5% of the entire observations, which we assume is so small that it should not affect the overall findings and therefore can be ignored.) They then answered a set of questions unrelated to the present study. The delay in responding to the signal was quite low, with

48.7% of the observations responded to within 15 minutes after the signal. After the

completion of their experience sampling period, they were debriefed and paid for their

participation.

Demographic and Personality Measures

Among the several personality scales measured in the instruction session, the

following were the focus of the present research: *perfectionism* was measured with the

perfectionism subscale of the Eating Disorder Inventory (Garner, Olmstead, & Polivy, 1983;

Japanese translation by Kouketsu, 1997); *belief in free will* was measured with the belief in

free will subscale of the FAD-Plus (Paulhus & Carey, 2011; Japanese translation by Goto,

Ishibashi, Kajimura, Oka, & Kusumi, 2015); *trait self-control* was assessed with the Brief

Self-Control Scale (BSCS, Tangney, Baumeister, & Boone, 2004; Japanese translation by

Ozaki, Kobayashi, Goto, & Kutsuzawa, 2016).

Analytic Procedures.

Except for descriptive raw data calculations, all the other analyses were conducted

using the multilevel analysis software Mplus Ver. 7.31 (Muthén, 2010). Multilevel analysis is

a statistical method for analyzing hierarchically nested data (e.g., persons nested within

groups or observations nested within persons). The present analysis consists of two levels,

with the Level 1 model involving within-person variables, and the Level 2 model containing

between-person variables (i.e., individual differences). As to the Level 1 variables, all the

continuous predictors (strength of desire, value of the goal, conflict, and resistance) were

person-mean centered. Domain of desire was effects-coded in order to allow for a statistical

comparison of each category with the grand mean average. At Level 2, all the personality

predictors (perfectionism, belief in free will, and trait self-control) and age were grand-mean

centered. The categorical predictor *gender* was effect-coded such that males = 1 and females

= -1.

Results

Preliminary analyses

Within the total of 8,497 responses, 36.2% indicated desire experiences (23.3%

current desires, 12.9% recent desires within 30 minutes), while the remaining 63.8%

indicated no experience of desire. The frequencies of each desire domain almost resembled

the previous report by Hofmann et al. (2012)[4], with desires for food (29.2%), sleep/rest

(29.0%), nonalcoholic drinks (7.3%), media use (6.5%), expression of anger (5.6%), social

contact (4.2%), coffee (3.4%), leisure/hobbies (2.8%), smoking (1.6%), other substances

(1.5%), sex (1.2%), sports (1.1%), work (1.1%), alcoholic drinks (0.9%), hygiene-related

activities (0.1%), and category "other" (1.5%). In regard to our definition of temptations as

desires that are in conflict with other important goals, we classified a desire as a temptation

when at least some conflict was experienced (i.e., a conflict score between 1 and 6).

Meanwhile, desire experiences without conflict (i.e., the conflict score was 0) were classified

as nontemptations.[5] The final dataset included a total of 3,066 observations (2,068

temptations and 998 nontemptations). On average, participants reported 9.32 temptations (*SD*

= 8.48, *range* = 1 − 46) and 4.21 nontemptations (*SD* = 5.48, *range* = 0 − 37).

Counteractive Control of Temptations

We used multilevel modeling to test our hypothesis that the presence of temptation should trigger counteractive control, that is, stronger resistance and lower rate of behavior enactment compared to those situations where temptation is absent. To investigate how much impact was imposed by the presence of conflict (in contrast to its absence), conflict rating was categorized into a binary variable such that nontemptation (rating = 0) was recorded as "no conflict = -1" and any other values (ratings = 1–6) were recorded as "conflict = 1". The means for each category and results of t-tests are listed in Table 1. To examine the premise that the strength of desire would be equivalent across temptation and nontemptations, mean desire strength for each category was compared. Average score of desire strength was slightly higher for nontemptations than temptations, and the difference was only marginal ($p = .098$), which is in line with our premise and replicates earlier findings (Hofmann et al., 2012). Another set of multilevel analyses revealed that presence of conflict imposed a positive effect on resistance with a significant gain of 1.81 units, whereas a negative effect on behavior enactment with a significant loss of 0.78 units, both on the 7-point scales. Taken together, these results indicate that when people realize that there is a conflict between desire and goals, they exert self-control and therefore their behavior is restrained, in line with our proposal of counteractive control process triggered by conflict perception. (Table 1 about here)

Mechanism of Counteractive Control

To take a closer look into how the counteractive control process works, a multilevel path analysis was conducted to test our model (Figure 1) selectively on the temptation cases, $n = 2,068$. Unlike previous analyses where conflict variable was transformed into a

dichotomous measure (i.e., temptation/non-temptation), an untransformed measure of conflict

ranging from 1 to 6 was used in this analysis to investigate whether the relative strength of

temptations affected the activation and functioning of the counteractive control process.

The Level 1 (within-person) variables are configured as in Figure 1, along with all

the Level 2 (between-person) variables as predictors of each Level 1 variable. The model fit

indices showed a good of fit of the model to the data (CFI = .985, RMSEA = .044, SRMR

= .025). Supplementary analyses showed that controlling for desire and goal domain in the

multilevel analyses did not increase model fit nor affect any of the statistical conclusions

drawn; hence, we report the data without these controls.

Unstandardized coefficients of Level 1 variables are summarized in Figure 2. Desire

strength had positive impacts, both on behavior enactment as well as on conflict, indicating

that temptations motivate behavior (as any other desire), while at the same time eliciting

conflict—speaking to the ambivalent nature of temptation. Conflict promotes resistance, both

directly and indirectly through the bolstering of goal value. The degree of resistance was

negatively related to behavior enactment, indicating that temptation was not likely to be

turned into action when strongly resisted. The overall pattern supports our conceptual model

of counteractive control, and also replicates the general pattern obtained in Hofmann et al.'s

(2012) study.

Effects of Personality Traits

Within the multilevel path analysis on temptation cases as in Figure 2, all the Level 2

variables (personality and demographic factors) were modeled as predictors of each Level 1

variable.[6] Average scores for trait self-control, perfectionism, and belief in free will were 2.84

($SD = 0.61$, *range* = $1 - 5$, Cronbach's α = .81), 3.07 ($SD = 0.94$, *range* = $1 - 6$, Cronbach's α

= .77), 3.63 ($SD = 0.55$, *range* = $1 - 5$, Cronbach's α = .67), respectively. Correlations

between all the possible pairs between these personality trait scores were; -.052 ($p = .441$) for

trait self-control and perfectionism; .112 ($p = .098$) for trait self-control and belief in free

will; and .139 ($p = .039$) for perfectionism and belief in free will. Unstandardized coefficients

for Level 2 variables are listed in Table 2. (Table 2 about here)

As predicted, trait self-control had a negative and significant impact on conflict.

Perfectionism also showed a pattern in accordance with our prediction, promoting perceived

value of goals and level of conflicts. Our predictions for belief in free will were supported as

well, showing a positive association with goal value. Unexpectedly, belief in free will was

also positively related to desire strength. Another set of unexpected effects was found for

demographic variables. Age had a positive impact on behavior enactment, indicating older

persons were more likely to yield to temptations; and gender showed a significant effect on

goal value, such that males place higher value on opposing goal(s) compared to females.

Although there may be a number of possible explanations for these age and gender effects,

these are outside of the scope of the current study and will not be discussed further.

As for the impacts on desire enactment, most of the personality factors (except for

gender) showed no direct effects. We also examined whether these personality variables

indirectly affected enactment via other situational variables in our model (i.e., desire strength,

goal value, conflict, and resistance). However, none of the mediation analyses revealed

significant indirect effect by any of the personality factors ($ps > .2$)

Offsetting Effect of Counteractive Control

To examine our assumption that the counteractive control process cancels out the deteriorating effect of desire strength on resistance (i.e., self-control), multilevel mediation analyses were conducted. First, we tested a mediational model containing resistance as a dependent variable, strength of desire as an independent variable, and conflict and goal value as mediating variables. There were two indirect effects contained in the model: the one mediated by conflict only, and the other one mediated by conflict and then goal value. Both of the indirect pathways (i.e., the product of the effects composing the indirect effect) were significant ($B_{conflict}$ = .103, 95% CI [.068, .138], $p < .001$; $B_{conflict\text{-}goal}$ = .009, 95% CI [.003, .015], $p = .003$). Accounting for the positive indirect effects resulted in a substantial change in the direct effect of desire strength from nonsignificant (B_{desire} =.061, 95% CI [-.041, .162], $p = .25$) to marginally negative (B_{desire} = -.076, 95% CI [-.166, .014], $p = .10$), with the residual (direct) effect being statistically significant, $t = 1.97$, $p < .01$. This pattern of results suggests that the negative direct impact of desire strength on resistance may be cancelled out by the positive indirect effects, supporting our proposal that the process of counteractive control through conflict identification and value shift offset the deteriorating effect of desire strength on self-control.

In addition, to test whether the effect of counteractive control extends not only to resistance but also to behavior enactment, a mediational model which has behavior enactment as a dependent variable was examined. Conflict, goal value, and resistance served as

mediating variables, with desire strength as an independent variable. Both of the indirect

pathways were significant ($B_{conflict\text{-}resistance}$ = -.053, 95% CI [-.073, -.033], p < .001;

$B_{conflict\text{-}goal\text{-}resistance}$ = -.005, 95% CI [-.009, -.001], p = .003), indicating that the effect of

counteractive control extends to behavior enactment as well.[7]

Supplemental Analyses

As stated above, we have already attained supporting evidence for our assumption

that as the strength of temptation increases, counteractive control efforts would also increase,

which has also been observed in previous studies (e.g., Kroese, Evers, & De Ridder, 2011).

However, previous research has also pointed out that the effect of temptation strength on

counteractive control may not be monotonic. If the strength of temptations reached an

extreme level where people feel unable to exert self-control, control efforts may decrease as

people disengage from self-control and acquiesce in self-control failure (for a similar analysis,

see Baumeister & Heatherton, 1996). Therefore, compared to temptations with too low or

high intensity, moderate temptations should elicit relatively high levels of self-control efforts.

Consequently, the level of self-control efforts should be an inverted U-shaped function of the

strength of temptation (Trope & Fishbach, 2000, Study 4). To test this possibility, a regression

analysis to predict the level of resistance was conducted on the temptation cases, including a

quadratic term of desire strength as well as its primary term as the predictors. As a result, the

effect of the quadratic term was not significant (p = .87), indicating that the presumed

U-shaped relationship between temptation strength and resistance was not observed in the

current investigation.

Discussion

Our results support the idea that counteractive control is in action in people's everyday lives. People showed stronger resistance to desire when there was a perceived conflict with their important goals, compared to situations where there was no such conflict. This pattern is in line with our prediction and also with previous literature (e.g., Myrseth & Fishbach, 2009) arguing that identification of conflict is necessary to activate the mental mechanism of self-control. In addition, our conceptual model of counteractive control was supported by the results of multilevel path analysis, showing a good fit to the collected data. Desire strength had a positive impact on the degree of conflict, indicating that the presence of a strong temptation serves as a signal to detect conflict situations, as suggested by Kroese, Evers, et al. (2011). Perceived conflict, in turn, promoted resistance, both directly and indirectly through the bolstering of goal value, suggesting a counteractive control process at work. Taken together, these results are consistent with the hypothesis that the underlying process of counteractive control involves enhanced sensitivity to conflict and bolstering of goal values.

Importantly, the path bypassing the mediation of goal value (i.e. the direct effect of conflict on resistance) was also reliable. This suggests that self-control strategies other than bolstering of goal value may be at play. Possible such alternatives include devaluation of temptation (Myrseth et al., 2009), adopting a concrete representation of goals (Gollwitzer & Brandstatter, 1997), or an abstract representation of temptations (Mischel et al., 1989). Future research may include variables such as value and abstractness of temptations and goals, so as

to investigate these possible mediating processes and compare the relative contributions to

the exercise of counteractive control.

Note that our findings were not restricted by the content of temptations. The

qualitative differences in desire targets did not impose any significant effect on the five

factors contained in our model of counteractive control. Accordingly, we conclude that the

mechanism of counteractive control is prevalent across different self-control situations, which

in turn attests to the generalizability of the counteractive control theory (Trope & Fishbach,

2000). Considering that the model of counteractive control had primarily been tested with a

limited variety of temptations (e.g., food, leisure) in former studies and in relatively artificial

laboratory settings only, the current investigation contributes to the literature by showing that

the model is widely applicable to numerous kinds of daily temptations in people's everyday

environments, adding ecological validity.

Offset of the Deteriorating Effect of Temptation by Counteractive Self-Control

The deteriorating effect of desire strength was cancelled out by the counteractive

control process involving heightened sensitivity in conflict identification and shifts in

perceived goal value. Our findings are in concert with previous laboratory studies that

revealed bolstering of goal value (Fishbach et al., 2010; Trope & Fishbach, 2000). A novel

feature of our study in this research context is that it not only compares the temptation and

nontemptation cases, but also includes the strength of temptation as a continuous variable

predicting self-control. Our results indicate that people exert effortful resistance in situations

with perceived conflict compared to ones without conflict, and as the strength of the

temptation grows stronger, they exert more effort to resist indulging. A possibility that

extreme levels of temptation might discourage people from exercising self-control was

examined but not observed. It might be the case that our experience sampling data did not

include enough cases of extreme conflict. As an example, the previous study (Study 4, Trope

& Fishbach, 2000) demonstrated a discouraging effect when participants were asked to make

a commitment to take a medical examination at 3 a.m. (which presumably prompted very

strong temptation to revoke the commitment). If we were to sample enough cases of such

extreme temptations, we might be able to find the assumed U-shaped function of temptation

strength on resistance, but this inference awaits future examination.

Enhanced Sensitivity to Self-Control Conflict

The self-control process containing four elements (desire strength, conflict,

resistance, and enactment) found in the present study almost replicated the previous findings

reported by Hofmann et al. (2012). This conceptual replication in another country provides

interesting baseline comparisons that may open up new questions for intercultural research on

self-control, although this is beyond the scope of the current study. At the same time, there

are some differences in the significance of the pathways. Specifically, Hofmann et al. argued

that "conflict should be independent from desire strength and depend on people's

commitment to self-regulatory goals (i.e., goal importance)" (p. 1319), and the data reported

here supports that argument by showing that desire strength was unrelated to conflict and did

not reliably predict resistance. A supplementary analysis not reported above also revealed that

the effect of desire strength on *continuous* conflict scores (ranging from 0 to 6) was not

significant, $B = .069$, $p = .14$, in accordance with the findings from Hofmann et al.'s (2012)

study. In sum, our analyses replicate the idea that knowing about a person's level of desire

strength (in the absence of anything else), does not generally allow one to predict that

person's conflict state, as both unproblematic and problematic desires can be weak or strong.

However, here we also asked an additional, more specific and theoretically relevant

question for the subset of temptation cases, our assumption being that strong temptations, as

compared to weaker temptations, may elicit a stronger perception of conflict between the

temptation and important goals. To examine this assumption, we scrutinized the relationship

between desire strength and the subsequent self-control process within the subset of

temptations. Our research is unique in that it demonstrated that the stronger a temptation was,

the more conflict people perceived. To the best of our knowledge, this is the first evidence of

enhanced sensitivity of conflict perception in the face of strong temptation. Presumably, it

may constitute a part of the configuration of adaptive mental processes, which enable us to

exercise better self-control when in severe danger of indulgence. Our next challenge will be

to run some laboratory experiments to confirm this effect in more controlled settings, and to

better understand who shows the more adaptive counteractive control process and who does

not.

Personality and Counteractive Control

High trait self-control was related to less perceived conflict. There are two possible

interpretations to this pattern, such that (a) good self-controllers preemptively avoid

encountering alluring objects or situations, so that they have less frequent chance to feel

conflicted, and/or (b) they resolve the conflict between temptation and important goals by unconscious processes learned through the habituated routine of controlling themselves. As to the current study, we believe the latter interpretation is more plausible. Our analyses on the effect of personality traits were run on the temptation cases only (i.e., conflict experience of any degree is reported), which means that it excludes the situation in which conflict was successfully avoided (as suggested by the former account). Rather, the latter interpretation provides a stronger account, such that the manifestation of an unconscious conflict-resolving process by individuals who routinely exercise successful self-control even in tempting situations. In other words, those who are proficient in self-control experience less degree of conflict at the conscious level (as assessed in experience sampling phase), since the conflict is likely to be resolved before they become aware of it. However, it is important to note that trait self-control had no direct nor indirect effect on the outcome of self-control, that is, behavior enactment. This pattern is interesting in that it indicates people's self-perception of their ability to control oneself does not necessarily relate to their actual success/failure of resisting temptations in daily situations. This result was consistent with diverse interpretations, including the possibility that people are often inaccurate in perceiving their personality and/or mental status. Meanwhile, it may also be the case that people evaluate their level of self-control on a motivational basis such as how much effort they have invested (and are willing to invest) in resisting temptations, rather than on an experiential basis such as the recalled frequency of actual success (or failure) of their resistance. Although our data does not provide enough evidence to conclude this, it raises important questions concerning the

relationship between personality measures and its manifestation in everyday situations, which requires further investigation.

Perfectionism was positively associated with value of goals and level of conflicts. High valuation of goals is in accordance with the definition of perfectionism as a tendency to set high standards, often times to an extreme extent. Intensified conflict suggests that people with high perfectionism greatly suffer uneasiness in the presence of temptation. These patterns in concert suggest that people with strong perfectionism may be strongly motivated toward counteractive control since their heightened awareness of valued goals and conflict should serve as strong instigators of self-control. However, despite their possible instigation toward counteractive control, it does not seem to result in better self-control, at least in a form of inhibiting desired (but problematic) behavior, as was shown in mediation analyses that revealed no indirect effect on behavior enactment via goal value nor conflict. This pattern is in accordance with the notion that people who are perfectionists do not always outperform others, and may even show maladaptive behaviors under some circumstances (e.g., Park et al., 2010).

Belief in free will was positively associated with goal value, and also with desire strength. These patterns suggest that people who believe in the effectiveness of free will perceive the presence of temptation and opposing goals, both reflecting "what they want." Thus, this belief may impose a mixed and complex effect on counteractive control, partially distorting self-restraint by strong impulse toward temptations, and at the same time partially promoting self-control through bolstered goal value. These effects in opposite directions may

have cancelled out each other, which may explain the absence of indirect effect on behavior

enactment by this personality factor.

In summary, personality factors of interest showed their effects on the earlier stages

of self-control; however, these effects did not seem to substantially affect the latter stages

including the self-control outcome (i.e., enacting desire), which is consistent with previous

findings by Hofmann et al. (2012). Although the personality traits were not directly related to

behavioral outcomes, they nonetheless affected the underlying processes involved in people's

daily attempt to control themselves. Just as it is important to identify the determinants of

behavioral consequences, it is also crucial to investigate their antecedents to better understand

the complex mechanisms involved in self-control.

Limitations

It has been assumed that the default response to temptation is mostly impulsive and

driven by affect (i.e., giving in to short-term pleasure), and that in order to give the long-term

goal a chance to overrule this impulse, conscious cognitive processes are required (e.g.,

Metcalfe & Mischel, 1999). Thus the focus of the current work is on conscious, effortful

forms of self-control. Accordingly, we used experience-sampling method, which should be

strongly affected by the controlled process rather than the automatic one. However, the

mechanism of counteractive control may not necessarily be processed consciously. Rather,

previous studies indicate that at least a part of the process functions unconsciously (i.e.,

Fishbach et al., 2010; Kroese, Adriaanse, et al., 2011). The phenomenon of temptations

directly triggering defensive mechanisms would be very adaptive and has been found to be

related to self-control success (Fishbach et al., 2003; Papies, Stroebe, & Aarts, 2008).

Therefore, it is natural to assume that our model depicts only a partial process of the entire

mechanism of counteractive control, which may be regarded as the first limitation of our

study. Nevertheless, our findings pertaining conscious process of self-control is important,

since intentional/effortful control over temptation is no less crucial than

unintentional/effortless one (Hofmann, Friese, & Strack, 2009; Metcalfe & Mischel, 1999),

and exert substantial effects on people's actual behavior (Gollwitzer & Brandstatter, 1997;

Koole & van't Spijker, 2000; Muraven & Baumeister, 2000).

      As the second limitation, we should point out that there are a couple of possible

alternative explanations to our findings. The first one is that goal value may be an antecedent

of conflict perception, rather than its consequence as illustrated in our model. Theoretically,

the above explanation is plausible, since people should be more sensitive to the presence of

self-control conflict when their goals are more valuable, so as to protect their goal-pursuit

when goal progress is threatened (for a related argument, see Hofmann, Friese, & Strack,

2009). Assuming that multiple processes may be involved in self-control against temptations,

it is natural to assume that the relationship between conflict and goal value is bidirectional.

Nonetheless, our findings and conclusions are in accordance with the relationship between

the two factors suggested by experimental studies, replicated here with more ecologically

valid methods, and provide additional first insights into the possible mediating processes of

that link. A second alternative explanation concerns another way of interpreting the conflict

variable: that measured conflict may primarily reflect the summed strength of desire and goal

value (for a related discussion on conflict, see van Harreveld, Nohlen, & Schneider, 2015). This account can also explain our data pattern showing that stronger desire and higher goal value both contributed to intensified experience of conflict, instead of the assumption in our model that these variables prompted counteractive control. Our study does not allow discerning what account is more plausible; however, it is worth noting that this alternative explanation does not preclude the possibility that the process of counteractive control was also present and actively functioning and that our model can partially explain our data.

A final limitation concerns the way conflict was measured. To recall, participants were asked to indicate, "the degree that the given desire conflicted with one or more personal goal(s)." As such, this measurement allowed participants to consider multiple goals in conflict with the desire in question, which adds ambiguity in how the participants interpreted the question and provided their answers accordingly. For example, some of the participants might have taken it as the averaged levels of conflict across multiple goals, while others might have answered the aggregated sums. The same applies to the measurement of resistance, in that it allows ambiguity in interpretation. Some may have only reported active forms of resistance such as avoiding tempting situations or suppressing undesirable thoughts, while others may have also included more subtle and receptive forms as well (e.g., accepting these desires). Issues concerning the measurements of conflict and resistance require careful interpretation of the results and should be thoroughly investigated endorsing methodological improvements in future research. Additionally, considering future investigations, it might also be interesting to measure the value of different goals across time and see if the presence of

temptation is related to an elevation in goal value to better follow the process of counteractive control.

Concluding Remarks

The two main questions of the present study were (a) whether people actually exercise counteractive control in their daily lives, and (b) how the underlying psychological mechanism operates. As to the first question, the current study provides a piece of supporting evidence for counteractive control processes being at play in people's everyday lives. As to the second question, the basic predictions from our counteractive control model concerning perceived conflict and bolstFered goal value were confirmed. In addition, variety of personality factors were found to influence the process of counteractive control, especially in the earlier part of it (i.e., goal value and conflict), but not necessarily have direct/indirect effects on the later part (i.e., resistance and enactment). We thus believe that the current study provides important additional insights into the existence and underlying mechanisms of counteractive control processes in people's natural, temptation-rich environments.

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Footnotes

1. There is a short mention of goal importance (which may be closely related to the concept of goal value) as a predictor of conflict in the article by Hofmann et al. (2012). However, the factor was not a focus of their study nor was it included in their model.

2. Along with these, other personality traits (e.g., regulatory focus (Higgins et al., 2001), satisfaction with life scale (Diener, Emmons, Larsen, & Griffin, 1985), cultural self-construal (Singelis, 1994), psychological entitlement (Campbell, Bonacci, Shelton, Exline, & Bushman, 2004), BIS/BAS (Carver & White, 1994), mindfulness (R. A. Baer et al., 2008)) were also measured for exploratory reasons, which are not reported in this paper.

3. For all assessments, participants were assured that their responses would remain confidential. Participants were also permitted to withdraw from the survey at any time. This study was approved by the Ethics Committee in the Graduate School of Education, Kyoto University (approval number: CPE-51) and the Ethics Committee of Toyo University (approval number: July2014-1).

4. Except for the frequency of desire for sleep being extremely high compared to the German samples (10.3%), probably due to Japanese citizens' shorter sleep time compared to most the Western countries (Organisation for Economic Co-operation and Development, 2011).

5. Desires with no conflict (conflict score = 0) constituted as much as 32% of the reported desires, while the distribution of the remaining cases were 7%, 9%, 14%, 17%, 11%, 9%, respectively for conflict scores from 1 to 6.

6. We also tested a model which included the personality traits as moderating factors for each path in Level 1, but none of the moderating effects was significant (p's > .2).

7. Considering these coefficients in this paragraph show rather small values for indirect

effects, one may question the validity of the effect of counteractive control on resistance and enactment. One possible explanation is that the effect size obtained from the experience-sampling method may be smaller than the ones obtained in experimental studies, due to the uncontrolled environments of the former (meaning that these are full of disturbing factors), a limitation that is multiplied when we try to look into mediation processes involving multiple paths. Nonetheless, we consider these small but detectable indirect effects as a promising sign for the presence (and effectiveness) of counteractive control process in everyday lives.

Table 1.

Results of Multilevel Analyses on the Means of Within-Person Variables for Temptations and

Nontemptations

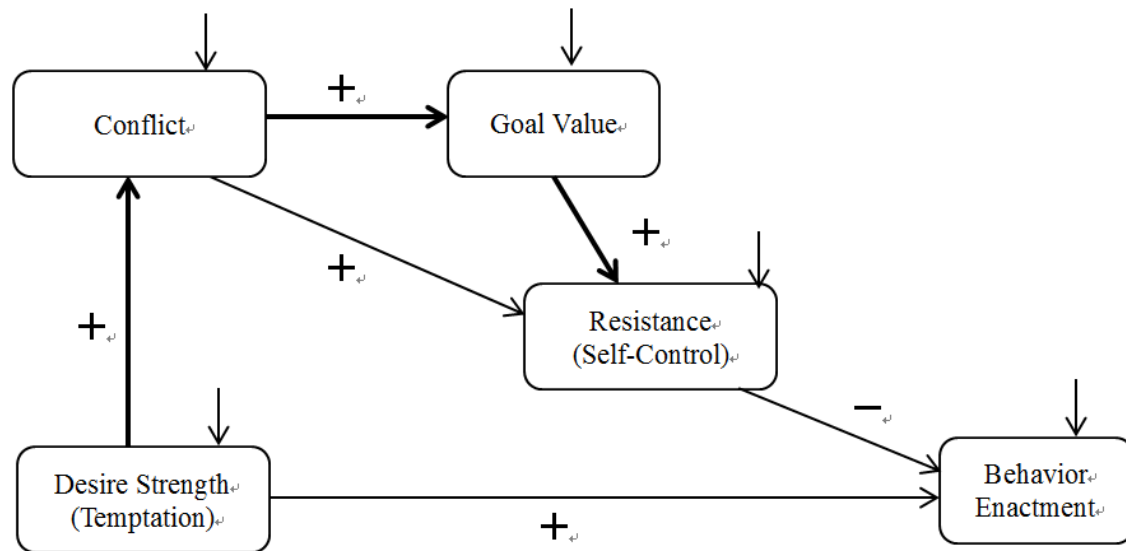|	*Temptations*		*Nontemptations*				
	M	*SD*	*M*	*SD*	*t*	*p*	*Cohen's d*
Desire strength	4.474	0.927	4.613	1.630	1.657	.098	0.120
Conflict	3.646	−	−	−	−	−	−
Goal value	4.376	−	−	−	−	−	−
Resistance	3.156	1.161	1.346	2.585	13.829	<.001	1.031
Behavior enactment	2.547	1.343	3.329	1.621	4.661	<.001	0.525

Note. The scale ranges were all 0 – 6. For nontemptations, the degree of conflict was zero by

definition, and since there was no conflict between desire and goal(s), the goal value was not

asked.

Table 2.

Prediction of situational variables (Level 1) by personality predictors (Level 2) in the multilevel

path analysis on temptation cases.

Personality variables	Situational variables (Level 1)									
	Desire strength		Goal value		Conflict		Resistance		Enactment	
(Level 2)	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*
Trait Self-Control	-.159	.097	-.144	.193	-.402	.002	-.151	.222	.132	.301
Perfectionism	.108	.095	.278	<.001	.177	.028	.062	.493	-.037	.683
Belief in Free Will	.332	.002	.312	.008	.103	.447	.242	.099	-.116	.467
Age	.003	.393	-.004	.362	-.001	.899	-.004	.465	.357	<.001
Gender	.047	.652	.503	<.001	.058	.681	-.110	.456	-.147	.362

*Note. B*s indicate standardized regression coefficients. Gender was coded as 1 = male and -1

= female.

Figure 1. The conceptual model of counteractive control over temptation. The pathway in

fine lines depicts the process of motivated behavior originally proposed by Hofmann et al.,

(2012), including desire strength, conflict, resistance (use of self-control) as predictors of

behavior enactment. The pathway in bold lines represents the main proposal of the current

study, describing the mental process of counteractive control involving bolstered perception

of conflict and goal value when temptations are encountered. External arrows indicate that

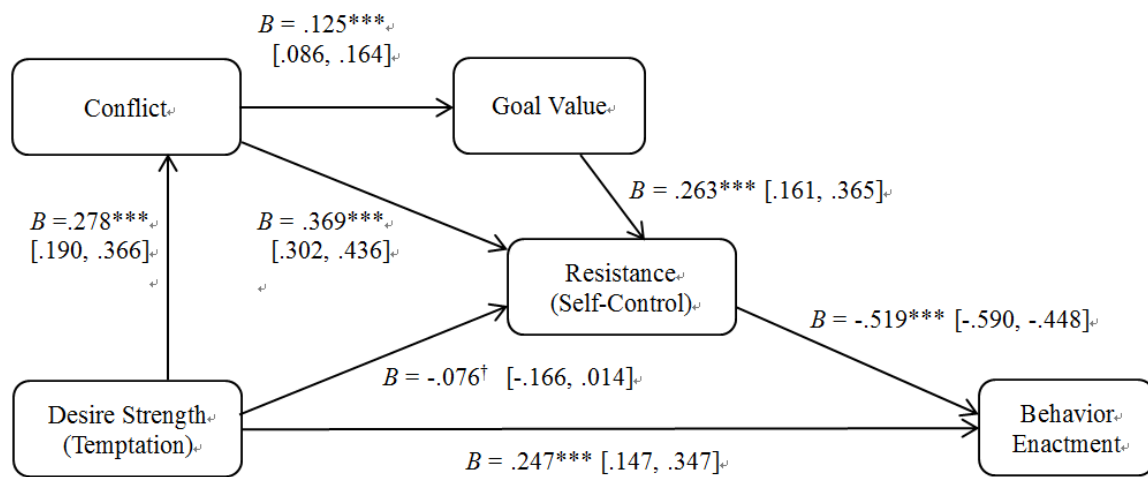each step in the model may be moderated by demographic and personality factors.

Figure 2. Results of multilevel analyses showing the effect of desire strength on resistance

and behavior enactment. All *B*s are unstandardized coefficients. Values in square brackets are

95% CIs. $^{\dagger}p = 10.$ *** $p < .001.$