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Construal level as a moderator of the role of affective and cognitive attitudes in the prediction of health-risk behavioral intentions

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Abstract

In two preliminary control checks it was shown that affective attitudes presented greater abstraction than cognitive attitudes. Three further studies explored how construal level moderated the role of affective and cognitive attitudes in predicting one health-promoting behavior (*exercising*) and two risk behaviors (*sleep debt* and *binge drinking*). There was a stronger influence of affective attitudes both when participants were in abstract (vs. concrete) mindsets induced by a priming task in Studies 1a and 1b, and when behavioral intentions were formed for the distant (vs. near) future in Study 2. In the case of concrete mindsets the results were inconclusive; the interaction between construal level and cognitive attitudes was only marginally significant in Study 1b. The present research supports the assertion that in abstract mindsets (vs. concrete mindsets) people use more affective attitudes to construe their behavioral intentions. Practical implications for health promotion are discussed in the framework of Construal Level Theory.

Keywords: affective attitudes, cognitive attitudes, construal level, health-risk behavioral intentions

Construal level as a moderator of the role of affective and cognitive attitudes in the prediction of health-risk behavioral intentions.

Many cases of health-promoting and health-risk behaviors present intercomponent ambivalence, a kind of “heart vs. mind conflict” which reduces the predictive power of psychological models such as the Theory of Planned Behavior (Conner & Sparks, 2002). Conner, Povey, Sparks, James and Shepherd (1998) studied 12 health-risk behaviors very common in young people, and found drinking alcohol (the most ambivalent), sleeping 7-8 hours per night and exercising as good examples of behaviors in which there were ambivalent attitudes.

In the case of health-risk behaviors, when there is high intercomponent attitudinal ambivalence (e.g., fun but unhealthy, or healthy but boring), affective attitudes are usually stronger predictors of intentions than cognitive attitudes (Lawton, Conner, & McEachan, 2009; Lawton, Conner, & Parker, 2007; Trafimow & Sheeran, 1998; Trafimow et al., 2004). The present research extends these findings to the domain of Construal Level Theory (CLT; Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2003) by showing how the level at which people construe their future intentions influences which attitudinal component is used (affective or cognitive).

According to CLT, individuals use more abstract mental models when they represent actions situated in the distant future (versus concrete mental models used to represent near-future events). Abstract or high-level construals are relatively simple and decontextualized representations focused on superordinate traits and relevant goals; at the opposite pole are situated concrete or low-level construals, contextualized and more detailed representations that include subordinate features. Liberman and Trope (1998) found that superordinate aspects like desirability are valued more when people make decisions about the distant future, whereas subordinate aspects such as feasibility are

taken more into account when temporal distance decreases. In the same vein, Kivetz and Tyler (2007) showed how a more distal time perspective activated the idealistic self (i.e., values), but a more proximal time frame focused people on their pragmatic self (i.e., practical concerns).

Eyal, Sagristano, Trope, Liberman and Chaiken (2009), exploring how construal level moderated the influence of values on intentions, suggested that this effect could be explained in terms of the *compatibility principle* proposed by Ajzen and Fishbein (1977). The compatibility principle states that we obtain better predictions when attitudes and behavioral intentions are defined using the same level of specificity. CLT (Eyal et al., 2009) proposes that depending on the construal level (e.g., time perspective), the same behavior may be construed abstractly (e.g., “snacking”) or concretely (e.g., “eating sweets”), and that this difference might affect which predictor is more appropriate in each mindset. Thus, Eyal and colleagues (2009) proposed that the coherence in construal level between mindset and predictors works as a Lewin-type channel factor, increasing the strength of predictions. They found that people are more likely to use an abstract construct (e.g., their values) in forming behavioral intentions when they are in an abstract mindset, compared with the case of a concrete mindset. Consistent with this, in the framework of attitudes, recent results show that people make more use of their general attitudes (high-level information) to form intentions when they are in an abstract mindset, but that they more often use their detailed past experience (low-level information) when they are in a concrete mindset (see Carrera, Muñoz, Caballero, Fernández, & Albarracín, 2012b).

Bearing in mind these previous findings, we are interested in extending CLT to the domain of attitudinal components (affective and cognitive attitudes) by testing whether predictions from affective and cognitive attitudes are moderated by the

construal level at which people construe their future intentions. When people have to decide about their future behaviors they form a mental representation of them; in doing so, they can focus on different aspects. When they are in an abstract mindset we would expect them to use the most abstract construals available, but in a concrete mindset they will use the most concrete construals. When predictors and mindset match in construal level, predictions will be better than in situations of mismatch.

To test this hypothesis we need to evaluate the abstraction level of construals available for forming behavioral intentions, which in our experiments corresponded to affective and cognitive attitudes. Is the affective attitudinal component more abstract than the cognitive one? To answer this question, the empirical evidence must be carefully analyzed. We consider affective attitudes as abstract construals based on abstract affects (beliefs about genuine emotions) (see Bülbul and Menon, 2010; Robinson & Clore, 2002). It is very different to feel the pleasure of tasting a Belgian chocolate (focusing on concrete properties like its *sweet flavor*) from appraising a piece of chocolate as pleasant (focusing on abstract properties like its sweetness). In the frame of affective appeals, Bülbul and Menon (2010) distinguished between abstract affects (i.e., de-contextualized, superordinate, and linked to the essence of an object or situation) and concrete affects (i.e., contextualized, subordinate, and linked to details and situations), each one driving behavioral intentions in different time perspectives (longer-term and shorter-term, respectively). Bülbul and Menon (2010) used different emotional labels to better tap this difference (e.g., *affection* as abstract affect versus *excited* as concrete affect); but the same idea can be sustained by changing the task required of participants (not the emotional term): when affective evaluations (i.e. affective attitudes) are required, people will report abstract affects, but when they are faced with an emotional stimulus, they will report their current genuine emotions.

According to this reasoning, affective attitudes could be considered a high-level construal based more on emotional valence (abstract affects) than on actual emotional experiences (concrete affects). When people fill out affective attitudinal scales, they do not need to experience concrete emotions as if they were faced with the stimulus in a real situation. This difference helps to explain apparent contradictions in CLT: abstract affects would be involved when affects drive intentions in a more long-term perspective (e.g., Bülbül & Menon, 2010) and when people are more sensitive to affective information in abstract mindsets (e.g., Critcher and Ferguson, 2011); but concrete affects should be considered when people interact directly with emotional stimuli (see Metcalfe & Mischel, 1999; Van Boven, Kane, McGraw, & Dale, 2010). Thus, affects would be abstract construals when people focus on their evaluative value, such as when they are used to measure attitudes; on the other hand, they could be considered concrete construals when they are used to describe actual phenomenological experiences.

The cognitive component of attitude in health-risk behaviors, such as evaluations, could also be considered an abstract concept, but given that in the behaviors studied here the evaluations refer to physically detectable health consequences that can be observed directly (e.g., obesity) or indirectly using medical tests (such as blood tests), then their abstractness may decrease, so that they come closer to concreteness. As Semin and Fiedler (1988) pointed out, abstractness is a matter of degree rather than an absolute concept, and Trope and Liberman (2010), setting out their basic assumptions of CLT, stressed that there are multiple levels of abstractness.

The Present Research

In the present research two preliminary control checks (see Study 1a) were designed in order to better evaluate the level of abstractness-concreteness presented by affective and cognitive terms used for measuring attitudes towards health-risk

behaviors. We first tested whether the affective adjectives classically used to measure affective attitudes were more abstract than the cognitive ones by asking people to assess them for abstractness-concreteness on a 7-point scale. Second, following Semin and Fiedler's (1988) proposal, we measured abstraction in attitudinal adjectives by evaluating their level of *verifiability* and *disputability*. All these results showed that affective terms presented higher abstraction than cognitive ones.

Taking into account these previous checks and the CLT findings described above, we expect people in abstract mindsets (vs. concrete mindsets) to use the most abstract information available to construe their behavioral intentions. In our design this will be the affective component of attitudes. Correspondingly, we expect cognitive attitudes, lower in abstraction, to better predict behavioral intentions in concrete mindsets.

We selected one health-promoting behavior (*exercising*) and two risk behaviors (*sleep debt* and *binge drinking*) in order to examine how construal level moderates the role of affective and cognitive attitudes in predicting health-risk behavioral intentions. To test these hypotheses we manipulated construal level through a priming task developed by Freitas, Gollwitzer and Trope (2004) in Study 1a and Study 1b, and in Study 2 by varying temporal distance (Liberman, Sagristano, & Trope, 2002). In all three studies, before manipulating construal level, participants were asked to report their affective and cognitive attitudes, separately, toward exercising (Study 1a), sleep debt (Study 1b) and binge drinking (Study 2). Future intentions were measured in the usual way by means of rating scales, with the exception of Study 2, where to measure behavioral intentions to drink we used the "Simulated Drinking Behavior Scale" (SDBS), a new instrument validated in a previous control study.

Study 1a

In the present study we explore how affective and cognitive attitudes toward a health-promotion behavior “*doing any type of exercise for at least 20 minutes, three times per week*” predict intention to exercise, and how their influence is moderated by the construal level activated in the mindset (abstract versus concrete). We expect affective attitudes to play a more important role in predictions when participants are in an abstract mindset, and correspondingly, we expect cognitive attitudes to better predict intentions in a concrete mindset.

We manipulated construal level using the Freitas et al. (2004) task. In this experiment we asked about intention to do exercise during one’s holidays. We chose holidays in order to avoid limitations related to schedules.

Method

Participants.

Participants were 87 (average age 18.88 years, $SD = 1.52$) psychology students (62 females), randomly assigned to each construal level condition (29 women and 14 men in the abstract condition and 33 women and 11 men in the concrete condition).

Preliminary control checks.

Before testing the effect of construal level on the predictive power of affective and cognitive attitudes, we needed to test whether the affective terms used to measure affective attitudes were more abstract than the cognitive ones. We selected the following adjectives to be tested: *pleasant, enjoyable, agreeable, unpleasant, boring* and *disagreeable* for affective attitudes, and *healthy, beneficial, safe, unhealthy, unsafe* and *harmful* for cognitive attitudes. These terms were selected following previous work on affective-cognitive discrepancies, such as that of Crites, Fabrigar and Petty (1994), who offered suggestions on how to properly measure affective attitudes (e.g., *enjoyable, bored, delighted*) and cognitive attitudes (e.g., *safe, beneficial, unsafe, harmful,*

unhealthy), and also in line with some of the affective scales used by Lawton et al. (2009) (e.g., *enjoyable*) and by Sparks, Hedderley and Shepherd (1992) (e.g., *pleasant, unpleasant*). All such work highlights the differences between affective and cognitive attitudinal components. We added a Spanish synonym and antonym of pleasant (i.e., *agreeable-disagreeable*). These terms are frequently used by researchers in the area of attitudes

In the first control check participants were twenty-eight university students (14 women, average age 21.11 years, $SD = 2.83$). They were required to rate each affective and cognitive attitudinal term presented in Spanish (Spanish/English items: *placentero/pleasant, divertido/enjoyable, agradable/agreeable, displacentero/unpleasant, aburrido/boring and desagradable/disagreeable; and saludable/healthy, beneficioso/beneficial, seguro/safe, perjudicial/unhealthy, inseguro/unsafe and dañino/harmful*) on a bipolar 7-point scale ranging from *clearly concrete* (1) to *clearly abstract* (7). Prior to this they had been provided with a definition of *concreteness* and *abstractness* following the instructions used by Paivio and colleagues (1968) and by Algarabel (1996)¹. All adjectives (affective and cognitive) were presented in random order (two versions).

We averaged affective and cognitive terms in order to obtain an abstraction index for each type of information. A repeated-measures analysis of variance revealed that affective adjectives were judged as more abstract than cognitive ones ($F(1, 27) = 22.73, p < .001, \eta_p^2 = .46; M_{affective\ terms} = 4.12, SD_{affective\ terms} = 1.04$ and $M_{cognitive\ terms} = 2.97, SD_{cognitive\ terms} = 0.80$). Affective terms presented higher levels of abstraction than cognitive ones. We found no differences between the two versions of the order ($F_s > 0.15, ns$).

Since differences in abstractness between affective and cognitive attitudes form the basis of our reasoning, we carried out a second control check in order to better support the difference found in the previous one. Following Semin and Fiedler's (1988) criteria about *verifiability* and *disputability* for distinguishing abstraction level (low verifiability and high disputability mean higher abstraction), we asked sixty-five participants (45 women, average age 18.13 years, $SD = 3.42$) to rate in both dimensions all the attitudinal terms selected. Adjectives were presented in random order (two versions). Verifiability was indicated by participants' answers to the question "*To what extent do you think that this feature can be objectively measured?*", and disputability by answers to "*To what extent do you think that different people will disagree on assigning this feature to a behaviour?*" Both questions were evaluated on 5-point scales ranging from *not at all* (1) to *very much* (5). A repeated-measures analysis of variance showed that affective terms presented lower verifiability levels than cognitive terms, ($F(1, 64) = 73.81, p < .001, \eta_p^2 = .53; M_{\text{affective terms}} = 3.14, SD_{\text{affective terms}} = 0.70$ and $M_{\text{cognitive terms}} = 3.99, SD_{\text{cognitive terms}} = 0.49$); and higher disputability, ($F(1, 64) = 100.85, p < .001, \eta_p^2 = .61; M_{\text{affective terms}} = 3.08, SD_{\text{affective terms}} = 0.66$ and $M_{\text{cognitive terms}} = 2.26, SD_{\text{cognitive terms}} = 0.56$). We did not find any differences between the two versions of the order ($F_s > 0.10, ns$).

In sum, these results supported the assertion that the affective terms tested are more abstract than the cognitive ones. Considering the middle point in the scales, we must admit that the data collected in these checks show the affective terms to be moderately abstract and the cognitive ones to be concrete. Bearing in mind that abstractness is a matter of degree, and focusing on the matching hypothesis proposed, we would like to highlight the significant differences found in abstraction level between the two types of adjectives.

Procedure and measures.

In the first part of the session, using 7-point scales, attitudes towards “*doing any type of exercise for at least 20 minutes, three times per week*” were measured using the items tested in the preliminary control checks (*pleasant, enjoyable, agreeable, unpleasant, boring and disagreeable* for affective attitudes, and *healthy, beneficial, safe, unhealthy, unsafe and harmful* for cognitive attitudes). Participants reported their attitudes on scales ranging from 1 (*not at all*) to 7 (*very much*). Cronbach’s alphas were adequate (.91 and .75 for affective and cognitive attitudes, respectively). Affective and cognitive attitudinal indexes were calculated averaging affective and cognitive items separately (recoding negative terms).

We manipulated construal levels by using a direct prime developed by Freitas et al. (2004). Previous extensive research (see Wakslak & Trope, 2009) suggests that expressing *why* one performs a behavior temporarily induces higher-level construals (an abstract mindset), whereas expressing *how* one performs a behavior temporarily elicits lower-level construals (a concrete mindset). Following Freitas and collaborators (2004), participants were asked to answer a set of questions about *improving and maintaining good health*. After being randomly assigned to one of the two construal level conditions, in the abstract mindset condition they were asked to consider *why* they would engage in health improvement activity, whereas in the concrete mindset condition they were required to consider *how* they would engage in the same activity. In Freitas’ procedure, *why* and *how* questions were presented with a diagram of vertically-aligned boxes connected by arrows: in the abstract condition the first sentence “*improving and maintaining good health*” was situated at the bottom of the page and the four boxes in which participants had to write their answers were connected by upward arrows preceded by the *why* question; in the concrete condition, on the other hand, the first

sentence was situated at the top of the page and the four boxes were connected by downward arrows preceded by the *how* question. As an introduction to the mindset prime we offer the same examples used by Freitas and colleagues (2004; Experiment 1). These instructions maintain constant the content domain, varying only the construal level. After reading the example, participants had to answer the *why* (abstract prime) or *how* (concrete prime) questions about *improving and maintaining good health* presented with the diagram described above. Finally, participants were asked to report their behavioral intention *to exercise for at least 20 minutes, two times per week during holiday periods* on a 7-point scale ranging from 1 (*not at all*) to 7 (*very much*). Participants were then debriefed and thanked for their participation.

Results and Discussion

We did not find differences in affective attitudes, cognitive attitudes or intention to do exercise between experimental conditions (all $F_s < .82$, *ns*). Following Sparks and colleagues (1992), for assessing affective-cognitive ambivalence we measured affective and cognitive attitudes separately, and then computed the absolute difference between the sum of those rating scales with a more cognitive emphasis (e.g., *healthy*) and those with a more affective emphasis (e.g., *pleasant*), all of them recoded at the positive pole. Higher scores on this measure indicate higher levels of ambivalence. We obtained a low-medium and similar level of affective-cognitive ambivalence in the two conditions ($F(1, 85) = 0.15$, $p = .69$; $M_{abstract\ mindset} = 1.37$, $SD_{abstract\ mindset} = 1.17$ and $M_{concrete\ mindset} = 1.46$, $SD_{concrete\ mindset} = 1.08$). The correlation between affective and cognitive attitudes was moderate and significant ($r(87) = .29$, $p < .01$).

To test whether affective attitudes are a stronger predictor of behavioral intentions when people are in an abstract mindset, and whether cognitive attitudes better

predict intention in a concrete mindset, we computed several hierarchical regressions (centered variables). We regressed behavioral intention to exercise on the main effects of affective attitudes, on cognitive attitudes (both centered), on construal level (dummy coded: concrete as 0 and abstract as 1), and on their double and triple interactions. The model was significant ($R_c^2 = .15$, $F(7, 79) = 3.21$, $p < .01$), showing only a significant interaction effect between affective attitudes and construal level ($\beta = 0.42$, $t = 2.60$, $p < .01$) (see Table 1).

To gain better knowledge of the moderating role played by construal level on affective and cognitive attitudes we calculated simple slopes analyses using the ModGraph-I program designed by Jose (2008), with beta weights for each construal level condition being used to aid interpretation. Where moderation was demonstrated (i.e., affective attitudes \times construal level), the simple slopes test revealed that among people in the abstract construal condition there was a significant main effect of affective attitudes on exercising intentions ($\beta = .35$, $SD = 0.13$, $t(81) = 2.68$, $p < .01$), but not when people were in a concrete mindset (see Table 1). Interaction of construal level and cognitive attitudes was not significant, and the simple slopes analysis showed that construal level did not influence the relation between cognitive attitudes and intentions (see Table 1).

All of these results support previous findings showing the importance of affective attitudes in predicting health behaviors; the novelty of our findings here was to reveal how the predictive power of affective attitudes is moderated by the level on which people construe their behavioral intentions. Study 1a showed how the higher abstractness associated with affective attitudes (supported in preliminary control checks) and the abstract mindset in which participants report their future behavioral

intentions interact to enhance predictions. However, our predictions about cognitive attitudes were not supported.

Study 1b

Study 1b was designed to replicate the results of Study 1a with a risk behavior: *sleep debt*. We found no consensual definition for *sleep debt*, which can refer to voluntary sleep-shortening but is also interpreted to include sleep problems such as insomnia, nocturnal waking, early waking or non-restorative sleep. In the concept of sleep debt our intention was for it to involve the idea of volition, whereby people voluntarily reduce the number of hours they sleep so as to do other things (e.g., work/leisure activities). When people voluntarily shorten their sleep time, they still do not avoid its negative consequences for physical and mental health (Laberg et al., 2011; Moo-Estrella et al., 2005; Regestein et al., 2010). For these reasons, lack of sleep may be considered a risk behavior at the same level as smoking or speeding. Given that numerous studies have proposed adequate sleep time for adults as 6-8 hours per night on a regular basis (Lorton et al., 2006), we asked participants questions related to their personal experience and attitudes toward “*sleep debt*, that is, voluntarily (due to work/study conditions or travelling or for reasons of leisure) shortening one’s sleep time to less than 6-8 hours per day on a regular basis”. In the present study we explored how affective and cognitive attitudes toward *sleep debt* predict future intention to shorten sleep time, and how these attitudinal influences were moderated by the construal level activated (abstract versus concrete). In the abstract mindset we expect affective attitudes to play a more important role in predictions, but in the concrete mindset we expect cognitive attitudes (vs. affective attitudes) to play a more central role.

Method

Participants.

Forty-five students (average age 20 years, $SD = 1.79$) participated voluntarily in this study. Twenty-two students (10 females) were randomly assigned to the abstract mindset and the other twenty-three (13 females) to the concrete mindset.

Procedure and measures.

First, participants were informed about the definition of *sleep debt*: “voluntarily (due to work/study conditions or travelling or for reasons of leisure) shortening one’s sleep time to less than 6-8 hours per day on a regular basis”. They were then asked to respond on 7-point scales. We asked them about their personal experience in sleep debt to evaluate the relevance of this unhealthy behavior in our sample, using the question “How frequently have you decided to shorten your sleep time over the last three months / last week” (ranging from 1 *never*, to 7 *very frequently*; $r = .60$). We also asked them about their affective attitudes through their rating of how *pleasant, enjoyable, agreeable, unpleasant, boring* and *disagreeable* sleep debt was, and about their cognitive attitudes by rating how *healthy, beneficial, safe, unhealthy, unsafe* and *harmful* sleep debt was on scales from 1 (*not at all*) to 7 (*very much*). Following the line of Study 1a, the affective items used in this study were averaged into an overall affective attitudinal index (recoding negative items, Cronbach’s $\alpha = .90$), and the same procedure was calculated for the cognitive attitudinal index (recoding negative items, Cronbach’s $\alpha = .84$). We next introduced Freitas et al.’s priming manipulation described in Study 1a. After completing this task, participants reported the extent to which they intended and planned ($r = .87$) to shorten their sleep time (sleep debt) in the coming weeks, using scales from 1 (*not at all*) to 7 (*very much*). Participants were then debriefed and thanked for their participation.

Results and Discussion

We did not find any significant differences between conditions in personal experience, affective attitudes, cognitive attitudes or behavioral intentions (all $F_s < 1.32$, ns). Affective-cognitive ambivalence (i.e., Sparks et al., 1995 formula) was low and similar between conditions ($F(1, 43) = 0.11$, $p = .73$; $M_{abstract\ mindset} = 1.07$, $SD_{abstract\ mindset} = 0.98$ and $M_{concrete\ mindset} = 0.98$, $SD_{concrete\ mindset} = 0.77$). The correlation between affective and cognitive attitudes was high and significant ($r(45) = .54$, $p < .001$). High levels of personal experience were found in both conditions, so that this risk behavior can be considered relevant in our sample ($F(1, 43) = 1.33$, $p = .25$; $M_{abstract\ mindset} = 4.29$, $SD_{abstract\ mindset} = 1.76$ and $M_{concrete\ mindset} = 4.84$, $SD_{concrete\ mindset} = 1.44$).

We carried out a hierarchical regression in which construal level (dummy coded: concrete as 0 and abstract as 1), affective and cognitive attitudes (centered) and their double and triple interactions were entered simultaneously while controlling past experience (centered) to predict behavioral intentions in relation to sleep debt. Past experience is an important predictor in health-risk behaviors (see Albarracín & Wyer, 2000), so it was included as a control. The model was significant ($R_c^2 = .26$, $F(8, 36) = 2.88$, $p < .01$), past experience being highly significant ($\beta = .50$, $t = 3.40$, $p < .001$), as well as the interaction between construal level and affective attitudes ($\beta = .52$, $t = 2.33$, $p < .05$); however, the interaction between construal level and cognitive attitudes was marginally significant ($\beta = -.34$, $t = -1.50$, $p = .14$). Simple slopes analysis marginally revealed that when participants were in an abstract mindset they used their affective attitudes to form their behavioral intentions in relation to sleep debt (see Table 2).

Study 2

Study 2 was designed to replicate these previous findings with two novelties: a) using a more realistic measure of binge drinking intentions, the “Simulated Drinking Behavior Scale” (SDBS), and b) manipulating construal level indirectly by varying

temporal distance. Thus, instead of asking about behavioral intentions using the classical rating scales, intention to drink was now measured by a simulation procedure designed specifically to evaluate binge drinking dispositions at a party with free alcohol. This is a more contextualized measure, closer to real behavior (i.e., high ecological validity). To better replicate previous results we also decided to change the task for inducing construal level, temporal perspective (distant vs. near future) being the major determinant of which level of construal is activated (Liberman, Sagristano, & Trope, 2002). According to CLT, people make higher-level construals of events that are expected to occur in the distant future, and detailed and contextualized representations of near-future events. We expect that in the distant-future condition (one year from now) participants will more likely use their affective attitudes to decide about their intentions to drink than in the near-future condition (next weekend), where they would use more their cognitive attitudes.

Method

Participants.

Sixty-nine undergraduates (average age 20.89 years, $SD = 2.55$) participated voluntarily in this study. Thirty-five (22 females) were randomly assigned to the distant-future condition (i.e., abstract construal level) and the other thirty-four students (15 females) to the near-future condition (i.e., concrete construal level).

Procedure and measures.

To better test attitudes towards binge drinking we followed the recommendations of the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2003), to define binge-drinking as 5 or more consecutive drinks for males, and 4 or more consecutive drinks for females. These criteria are similar to those set down by the Spanish Ministry of Health, which defines excessive drinking as more than 30 gr. of

alcohol per day for males and 20 gr. of alcohol per day for women (a mixed drink, such as rum and coke, usually contains around 10 gr. of alcohol). Participants were required to read this *binge drinking* definition and to answer questions about their personal experience and their affective and cognitive attitudes towards it. We used 7-point scales to ask about their personal experience (ranging from 1 *never* to 7 *very frequently*) in binge drinking: “How often have you drunk excessively in your life / in the last year?” ($r = .80$). To measure affective attitudes towards binge drinking, participants had to report how *pleasant, enjoyable, unpleasant, boring* (recoding negative items, Cronbach’s $\alpha = .73$), and for cognitive attitudes how *healthy, beneficial, unhealthy, harmful* (recoding negative items, Cronbach’s $\alpha = .78$) binge drinking was on scales ranging from 1 (*not at all*) to 7 (*very much*)². The affective attitudinal index and cognitive attitudinal index were calculated by averaging affective and cognitive terms, respectively (recoding negative items in both indexes). We then measured intention to drink alcohol using the “Simulated Drinking Behavior Scale” (SDBS). In this scale we included construal level manipulation (distant future versus near future). Participants had to answer the following questions: “Suppose you are at a party where the alcohol is free and they are playing your favorite music (a year from now – distant future – versus next weekend – near future). You have to prepare your own drink, and to do so you can choose any non-alcoholic beverage, a long drink mixing any soft drink (coke, orange juice, etc.) with any spirit (whisky, vodka, etc.), or a neat alcoholic drink”. All participants chose the second option, mixed drinks. Participants were then asked to report their intention to drink by marking how much alcohol they would add on a drawing simulating a glass (no ice), with six marks indicating a range of 5 to 30 centiliters (see Appendix 1). There was a photograph of a real glass next to the drawing. After marking the quantity of alcohol, participants had to report *how many of such*

drinks they would be prepared to drink at the party a year from now (distant future)/next weekend (near future). They were then debriefed and thanked for their participation. The results showed that participants (most of them women) chose a mean of 5.39 ($SD = 2.24$) mixed drinks, matching the binge drinking level.

Control check.

In a control study we had checked the validity of the new measure called “Simulated Drinking Behavior Scale” (SDBS) by calculating its correlations with personal experience and behavioral intention for binge drinking. Participants were 199 undergraduate students (177 women, average age 21.01 years, $SD = 1.11$). They were asked, using a 7-point-scale response format: “*How frequently have you drunk alcohol to excess (binge drinking)?*” ($M = 3.40$, $SD = 1.24$); this question was used in conjunction with the standard item employed for measuring behavioral intention in attitude research: “*To what extent would you drink excessively at a party where the alcohol was free?*” ($M = 2.22$, $SD = 1.41$). Behavioral intention to drink alcohol was then also measured by means of the “Simulated Drinking Behavior Scale” described above. We did not mention the time perspective in any of the measures. The results (all variables were standardized) showed a significant correlation between intentions to drink as measured by the “Simulated Drinking Behavior Scale” (SDBS) and personal experience in binge drinking ($r_{(199)} = .46$, $p < .001$), and also – and most importantly – between intentions to drink measured by the SDBS and the typical rating scale used in previous research to measure behavioral intention to drink excessively ($r_{(199)} = .40$, $p < .001$). These correlations lend support to the SDBS as a robust measure for evaluating future drinking intention.

Results and Discussion

We found no differences between the distant and near-future conditions in personal experience, affective attitudes, cognitive attitudes or intention to drink (all F s < 2.55, *ns*). As in Studies 1a and 1b, we calculated affective-cognitive ambivalence (i.e., Sparks et al., 1995 formula); this result showed no differences between experimental conditions ($F(1, 67) = 0.18, p = .67$), and the level of affective-cognitive ambivalence was low ($M_{distant} = 0.96, SD_{distant} = 0.67$ and $M_{near} = 1.05, SD_{near} = 0.90$). The correlation between affective and cognitive attitudes was high and significant ($r(69) = .57, p < .001$). Personal experience was moderate in both conditions ($M_{distant-future} = 3.05, SD_{distant-future} = 1.47$ and $M_{near-future} = 3.25, SD_{near-future} = 1.52$).

To test the moderation effect we carried out the same regression analysis used in previous studies. Intention to drink as measured by the SDBS was regressed on temporal distance (dummy coded: near future as 0 and distant future as 1), on affective and cognitive attitudes and on their double and triple interactions. The importance of past behavior for predicting binge drinking has been shown in previous research (see Carrera et al., 2011, 2012a, b), so it was included in the analysis as a control. The model was clearly significant ($R_c^2 = .30, F(8, 60) = 4.64, p < .001$): personal experience ($\beta = .43, t = 3.74, p < .001$), affective attitudes ($\beta = .24, t = 1.96, p = .054$) and the interaction of affective attitudes with temporal distance ($\beta = .22, t = 2.06, p < .05$) were significant (see Table 3). Cognitive attitudes were not significant. Simple slopes tests showed that among people in the distant future condition (i.e., abstract mindset), there was a significant main effect of affective attitudes on drinking intentions ($\beta = .46, SD = 0.16, t(64) = 2.73, p < .001$). The more positive the affective attitudes towards binge drinking, the more likely participants were to be well-disposed to drink excessively in the distant future (see Table 3), but this relation was marginal for predictions concerning the near

future ($\beta = .23$, $SD = 0.11$, $t(64)=1.90$, $p=.053$). Simple slopes analysis did not support the moderation effect in cognitive attitudes (see Table 3).

All in all, the results found in these previous three studies supported the hypothesis that affective attitudes predicted participants' behavioral intentions only for the abstract mindset, but not at a concrete construal level. However, simple slopes analysis showed that this relation was only marginally significant in Study 1b. In order to clarify these differences we conducted a meta-analysis taking together all correlations between affective attitudes and behavioral intentions³. When an abstract prime was induced, the Pearson's correlations (see Tables 1-3) between affective attitudes and intentions were significant in two studies (Study 1a and Study 2), but not in Study 1b. In the concrete condition the correlations between affective predictor and intention were never significant. Meta-analysis provides procedures that allow the combination of independent estimates of some magnitude (Cooper, Hedges, & Valentine, 2009). The magnitude is usually an index of effect size (Ellis, 2010; Grissom & Kim, 2012; Kelley, & Preacher, 2012), but meta-analytical techniques can also be applied in other contexts, such as that of the psychometric properties of measurement tools (Botella, Suero, & Gambaro, 2010; Hunter & Schmidt, 2004). We used a random-effects model, which is considered more suitable and credible than a fixed-effects model (Borenstein, Hedges, Higgins, & Rothstein, 2010). On calculating the combined correlation (weighted by the inverses of their variances) and the corresponding confidence interval, we found that when the prime was abstract the combined correlation was statistically significant ($r = .511$; 95% CI: .647; .344) but that in the concrete prime condition it was not ($r = .001$; 95% CI: .206; -.205). The interval does not contain the zero value in the first condition, but it is included in the second one. This result supports the hypothesis that there is a significant association in the abstract mindsets but not in the concrete mindsets.

Furthermore, the intervals do not overlap a result which, as expected, supports the assertion that there is a higher correlation between affective attitudes and behavioral intentions under an abstract prime than under a concrete prime.

General Discussion

In the field of health-risk behaviors, affective attitudes have been identified as stronger predictors of intentions and behaviors than cognitive ones (Lawton, et al., 2007, 2009; Trafimow & Sheeran, 1998; Trafimow et al., 2004). In parallel, Construal Level Theory (Liberman et al., 2007; Trope & Liberman, 2003) offers robust empirical evidence about the influence of construal level on how actions are mentally represented. The present research builds on these two perspectives, focusing on how construal level moderates the role of affective and cognitive attitudes in the prediction of health-risk behavioral intentions.

Previous findings had shown that construal level moderated the weight of values in decisions, which was greater in abstract mindsets (see Eyal et al., 2009). This influence between values and abstract thinking was explained by the principle of compatibility in construal level between predictors and mindset. The present research extended this principle to attitudinal components (affective and cognitive).

Our proposal is based on the notion that affective attitudes are affective appraisals, and therefore abstract affects focus on the desirability of an action or object, which cannot necessarily be linked to genuinely-experienced concrete emotions. The affective terms used in attitudinal scales allow participants to evaluate the affective components of attitudes, but such use does not mean that these same labels might not be used to describe actually-experienced concrete emotions if employed in tasks not involving mere evaluation. This difference is supported by previous research that distinguishes between abstract affects and concrete affects (see Bülbül & Menon, 2010),

or that which differentiates between abstract appraisals based on the desirability of an action and vivid emotional experience resulting from being faced with a real stimulus (Critcher & Ferguson, 2011). Taking into account the fact that affects can be abstract or concrete helps us to explain some contradictions, such as why thinking in an abstract way about moral behaviors sometimes leads to more extreme affective-moral judgments (e.g., Agerström & Björklund, 2009; Liberman & Trope, 2008), while on other occasions we find such extreme judgments in concrete conditions (e.g., Gong & Medin, 2012).

We found that affective attitudes were more abstract concepts than cognitive attitudes (control checks in Study 1a), so we expected that affective attitudes would better predict behavioral intentions when people were in abstract mindsets or using distal perspectives (abstract construal level). Following this reasoning, we also hypothesized a parallel effect in the case of cognitive attitudes, whereby when people were in concrete mindsets or using proximal perspectives, then cognitive attitudes would be the best predictor.

When the compatibility hypothesis in construal level was tested, our results supported the predictions about affective attitudes in one health-promotion behavior (exercising) and two risk behaviors (sleep debt and binge drinking). Construal level moderated the influence of affective attitudes on intentions both when we manipulated construal level directly (Studies 1a and 1b) and when we did so indirectly by changing the temporal distance (Study 2). Examining in detail these results by using simple slopes analyses, the moderation effect was found to be supported in Study 1a and Study 2, and the effect was also close to significance in Study 1b. The marginality of this result (Study 1b) could be explained by the sampling effect, and we therefore conducted a meta-analysis in order to better test the influence of construal level on affective

attitudes. The meta-analysis showed that, taken together, all three studies endorsed the view that affective attitudes predict behavioral intentions in abstract mindsets but not in concrete ones.

Results on cognitive attitudes were less conclusive: the interaction between construal level and cognitive attitudes was only marginally significant in Study 1b (sleep debt); furthermore, the main effect of cognitive attitudes was not significant in any of the present studies. This low influence of the cognitive component supports previous findings on the prediction of health-risk behaviors where the stronger influence of affective attitudes has been shown (see Lawton et al., 2009).

All in all, the present findings lend support to the notion that affective attitudes are more abstract than cognitive ones, and suggest that in the case of affective attitudes it is important to consider their interaction with people's style of thinking (i.e., construal level). Under an abstract mindset people use more affective attitudes to form their behavioral intention, so that the match in construal level between predictors and mindset should be considered in the prediction of health-risk behaviors.

Implications for behavior change interventions were not the focus of the present research, but our results suggest new strategies for improving predictions from attitudes. Thus, prevention campaigns could select not only what information (affective or cognitive) it is better to highlight, but also how people should think about it (abstract style or concrete style). When highly positive affective attitudes towards a health-promotion behavior are involved, an abstract mindset should be induced; however, if affective attitudes are clearly negative towards a protective behavior, then a concrete mindset could be more appropriate. These and other possible practical implications should be properly tested in future research.

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Table 1
Regression, Correlations and Simple Slopes Analysis (Study 1a)

	Regression Coefficients ($R_c^2 = .15$)		Abstract Construal Level					Concrete Construal Level				
	Main effect	Interaction	r	Simple Slopes			r	Simple Slopes				
	β	β		β	Low	Medium		High	β	Low	Medium	High
Affective Attitude	-.15	.42**	.50***	.35*	-.21	.13	.48	-.13	-.12	.07	-.05	-.17
Cognitive Attitude	.13	.10	.44**	.46	-.34	.13	.61	.15	.21	-.26	-.05	.16

*** $p < .001$; ** $p < .01$; * $p < .05$

Table 2
Regression, Correlations and Simple Slopes Analysis (Study 1b)

	Regression Coefficients ($R_c^2 = .26$)		Abstract Construal Level				Concrete Construal Level						
	Main effect	Interaction	Simple Slopes							Simple Slopes			
	β	β	r	β	Low	Medium	High	r	β	Low	Medium	High	
Affective Attitude	-.42 [†]	.52*	.32 [†]	.22 [†]	-.16	.04	.25	-.03	-.28 [†]	.25	-.03	-.31	
Cognitive Attitude	.30	-.34 [†]	-.06	.26	.22	.04	-.12	.33 [†]	-.17	-.29	-.03	.23	
Past Experience	.50***												

*** $p < .001$; ** $p < .01$; * $p < .05$; [†] $p < .15$

Table 3
Regression, Correlations and Simple Slopes Analysis (Study 2)

	Regression Coefficients ($R_c^2 = .30$)			Abstract CL				Concrete Construal Level				
	Main effect	Interaction	<i>r</i>	Simple Slopes			<i>r</i>	Simple Slopes				
	β	β		β	Low	Medium		High	β	Low	Medium	High
Affective Attitude	.24 [†]	.22*	.62***	.46**	-.35	.10	.56	.20	.23 [†]	-.26	-.03	.20
Cognitive Attitude	-.04	.01	.09	-.03	.13	.10	.07	-.04	-.04	.01	-.03	-.07
Past Experience	.43***											

*** $p < .001$; ** $p < .01$; * $p < .05$; [†] $p < .15$

Appendix 1: *Simulated Drinking Behavior Scale (SDBS)*

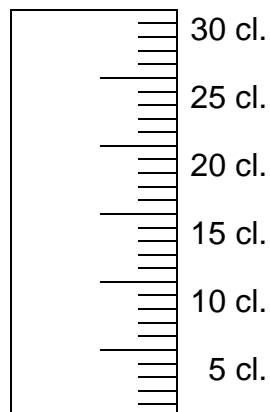
IMAGINE that you are going to prepare a drink to your liking at a **PARTY WITH A FREE BAR.**

The drink can be a mix of soft drink/juice with alcohol or just a straight alcoholic drink.

Please indicate the amount of **alcohol** (e.g., gin, rum, whisky, vodka) that:

- you would mix with the soft/drink/juice of your choice, or
- you would drink without mixing.

Indicate this by **filling in the centiliter levels (cl.) to show how much you would put in the glass, without including the ice.**



How many of these mixed drinks or neat alcoholic drinks would you drink at a party with a free bar?: _____

Footnotes

¹ “Any word that refers to objects, materials, or persons should receive a high concreteness rating; any word that refers to an abstract concept that cannot be experienced by the sense organs should receive a high abstractness rating. Based on your own valuation, you must decide the level of concreteness-abstractness of each term presented. There are no right answers: the judgments are personal and subjective”.

² The terms used to measure attitudes were fewer than in Studies 1a and 1b, due to an error in the questionnaire printing process, but Cronbach’s alphas were acceptable (.73 and .78 for affective and cognitive terms, respectively). As a manipulation check of this shorter list of terms we re-calculated abstraction level using data collected in control checks. This shorter list of affective adjectives were judged as more abstract than cognitive ones ($F(1, 27) = 9.80, p < .01, \eta_p^2 = .26; M_{\text{affective terms}} = 3.92, SD_{\text{affective terms}} = 1.14$ and $M_{\text{cognitive terms}} = 3.04, SD_{\text{cognitive terms}} = 0.94$); they also presented lower verifiability levels than cognitive terms, ($F(1, 64) = 75.42, p < .001, \eta_p^2 = .54; M_{\text{affective terms}} = 3.15, SD_{\text{affective terms}} = 0.74$ and $M_{\text{cognitive terms}} = 4.10, SD_{\text{cognitive terms}} = 0.54$); and higher disputability, ($F(1, 64) = 122.13, p < .001, \eta_p^2 = .65; M_{\text{affective terms}} = 3.20, SD_{\text{affective terms}} = 0.73$ and $M_{\text{cognitive terms}} = 2.17, SD_{\text{cognitive terms}} = 0.59$).

³ The interaction between construal level and cognitive attitudes was only marginally significant in Study 1b, so we did not conduct a meta-analysis.