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Reducing Optimistic Bias: From the Perspective of Construal Level Theory*

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The current study proposes that construal level can influence one's positive evaluation of his or her susceptibility to diseases compared with others. A series of experiments was conducted to demonstrate the link between them. In study 1, the effect of psychological distances (temporal and spatial distance) on optimistic bias was found, such that the proximal distance reduced the optimistic bias. In study 2, manipulating the construal level, we founded that the construal level influenced the optimistic bias. Subjects primed to have low construal level reported the reduced optimistic bias compared with those primed to have high construal level. Study 3 was conducted with a 2 (construal level: high vs. low) × 2 (perceived severity: high vs. low) between-subjects factorial design. The moderated mediation

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analysis discovered that perceived control mediated the two-way interaction effect between construal level and perceived severity on the optimistic bias. Studies 1 and 2 collected data using college students as the sample, and study 3 employed the general adult population to improvethe generalizability of the findings. Theoretical and managerial implications were discussed for researchers and practitioners.

Key words : Optimistic bias, construal level, perceived control, perceived severity, psychological distance

One of the most consistent findings in studies of health campaign is optimistic bias, which is defined as one's tendency to evaluate his or her own risk to be lesser than the risk of others (Weinstein, 1982). Optimistic bias has received a large amount of scholarly attention. Over the last four decades, optimistic bias has been demonstrated in various contexts such as the risks of HIV/AIDS (e.g., Chapin, 2000), sexually transmitted disease (STD) (e.g., Kaplan & Shayne, 1993), cancer (e.g., Clarke et al., 1997; Masiero et al., 2018), smoking (Arnett, 2000; Clarke et al., 1997), substance abuse (Hansen et al., 1991), general health (Glanz & Yang, 1996), Covid-19 (Shukia et al., 2021). These studies have consistently shown that individuals believe they are less likely to experience negative health events compared with others.

More importantly, some studies demonstrated that optimistic bias is negatively related to one's involvement in preventive behaviors such as vaccination (e.g., Abikoye, 2012; Lee & Ham, 2010) and positively

related to the self-harmful behaviors such as smoking and alcohol consumption (e.g., Masiero et al., 2018). Thus, it seems reasonable that studies have attempted to identify strategies to reduce optimistic biases (e.g., Park et al., 2014; Weinstein, 1982; Weinstein, 1983). In doing so, scholars have demonstrated the sources and mechanisms of optimistic bias such as infrequent events, perceived control, and negativity of events (Harris, 1996; Harris et al., 2008 Price et al., 2002). Indeed, these studies have contributed to the theoretical understanding of optimistic bias and provided strategical implications for practitioners.

Previous literature, however,did not investigate a potential role of construal level (CL hereafter), influencing optimistic bias. The role of CL might be explained by psychological distance, which is an antecedent of CL (e.g., Chu, 2022) because studies showed psychological distance influenced optimistic bias (e.g., Alicke et al., 1995 Harris et al.,2000). Thus, it is theoretically and practically worthwhile to investigate the link between CLand optimistic bias.

In other words, the main objective of this study is to demonstrate that changes in CL influence one's optimistic bias. To prove this, a series of experiments was conducted to manifest the association between psychological distance, CL, perceived control, and optimistic bias. Study 1 was designed to demonstrate the effect of psychological distance, which is an antecedent of CL, on the optimistic bias. As psychological distance increases, optimistic bias would increase. Study 2 was designed to demonstrate the direct link between CL and optimistic bias by priming subjects' CL. High CL (vs. Low CL) would lead to the increased (vs.

decreased) optimistic bias. Study 1 and 2 were designed to detect the theoretical association of CL and optimistic bias. Further, the current study proposes that the mechanism behind the link is perceived control because abstract (high CL) processing (vs. concrete (low CL)) of stimuli is related to one's perceived control over the stimuli, which is one of the sources of optimistic bias (Menon et al., 2009). In addition to perceived control, study 3 employed perceived severity to elaborate on the mechanism of the link.

This study is of value from theoretical and managerial standpoints. From theoretical standpoints, the examination of the link between CL and optimistic bias helps scholars better understand the mechanism of optimistic bias. By employing CL, the current study elaborates and produces potentially better explanation of people's cognitive process about optimistic bias, providing a more complete explanation of how to decrease optimistic bias. In doing so, the link will also serve as a means of expanding the scope of both theories. More specifically, this study also explores the mediating role of perceived control and moderating role of perceived severity, thus disentangling the theoretical process underlying how CL and optimistic bias are intertwined and helping scholars understand the cognitive process of health-related campaigns. Practitioners also benefit from this study in that our findings offer strategic insights into reducing one's optimistic bias and more specifically how healthcampaigns should be designed using the concept of psychological distance and CL.

1. OPTIMISTIC BIAS

Optimistic bias as a type of cognitive bias, occurs when people believe that, compared with others, they are less likely to experience a negative event (Klein & Helweg-Larsen, 2002). Optimistic bias is believed to be based on the-better-than-average-effect (i.e.,positive illusion about self & overly positive self-evaluation). In studies of social perceptions and cognitions, optimistic bias has been tested and confirmed in various contexts. People believe that they are less likely to be victims of auto accidents (McKenna, 1993), crime (Chapin et al., 2005; Perloff & Fetzer, 1986), earthquakes (Burger & Palmer, 1992) and a range of illness (Harris & Middleton, 1994).

Not surprisingly, optimistic bias has received considerable support in various health-relatedcontexts such as HIV/AIDS, cancer, and smoking risks (e.g., Chapin 2000; Clarke et al., 1997; Duck et al., 1995). Optimistic bias has emerged as an important research area because it can interfere with preventive behavior (e.g., Kim, 2011; Lee & Ham, 2010). Several studies demonstrated that people with optimistic bias are less likely to take preventive behaviors. For instance, Lee and Ham (2010) showed that people with greater optimistic bias are less likely to perform cancer-preventive behaviors. Moreover, Kim (2011) showed that optimistic bias negatively influenced the intention to receive a vaccine. Meanwhile, Arnett (2000) reported that optimistic bias on the risk of smoking addiction was a significant predictor of smoking. Furthermore, using college students as sample, Kim and Niederdeppe (2013) collected data

about the H1N1 virus and found that unrealistic optimists had lower intentions to perform preventive behaviors such as hand hygiene practices.

Considering previous findings, it is reasonable that researchers have devoted their efforts to identify how to eliminate or reduce optimistic biases. One of the noteworthy findings in this line of research might be the psychological distance. This line of studies showed that perceived distance to comparison target influences their judgment on their perceived vulnerability to risks. Comparing self with very closed people such as friends and family members reduces the optimistic bias. Alicke et al. (1995) showed that optimistic bias was greater when participants were asked to compare themselves with an average college student than with the personseated next to them. Harris et al.(2000) manipulated the perceived social distance and showed that the decreased social distance leads to a reduction in optimistic bias. Simply, these studies demonstrated that as the psychological distance to comparison targetdecreases (vs. increases), the optimistic bias decreases (vs. increases). The role of psychological distance in human behavior, perception, and cognition is well-explained by construal level theory (CLT hereafter).

2. CONSTRUAL LEVEL THEORY

CLT proposes the two levels of construal: high (abstract mindsets) versus low (concrete mindsets). CL is the degree to which people perceive stimuli such as objects and events as high or low levels of construal.

People's construal of objects or events in their environment varies according to the degree of concreteness or abstraction (Vallacher & Wegner, 1989) and it is determined by psychological distance (Trope & Liberman, 2003). According to the theory, individuals perceive temporal, spatial, social, and hypothetical distances from objects and/or events. Specifically, the farther the distance an individual perceives from a stimulus, the more abstract it will be thought of (high CL). By contrast, the closer the distance an individual perceives from a stimulus, the more concrete it will be thought of (low CL). Psychological distances influence CL, which in turn influences how concrete or abstract the stimuli are thought of (Cloarec et al., 2022).

Individuals with low CL use a more concrete mental mode. They pay more attention to the peripheral and secondary features that are specific, local, and tangible aspect of the situation or object. When people have low CL, they are focusing on the present in great detail (Fujita et al., 2006a). By contrast, individualswith high CL use a more abstract mental mode. They construe stimuli with relatively simple, decontextualized, and coherent representations that extract the gist from available information. Therefore, these people tend to be influenced by abstract and general features of stimuli, such as stereotypical or schematic features (e.g., Trope & Liberman, 2003). Over the last two decades, the effect of CLhas been examined in studies of people's perception and cognition including environmental communication (e.g., White et al.,2011), health communication (e.g., Ahn, 2015), consumer behavior (e.g., Youn & Kim, 2019 Septianto et al., 2019; Zhu et al., 2017), and voting behavior

(e.g., Kim et al.,2009).

3. THE LINK BETWEEN OPTIMISTIC BIAS AND CONSTRUAL LEVEL THEORY

Both CLT and optimistic bias have been studied and supported in various contexts, helping researchers understand people's social cognition and perceptionprocess of stimuli. Both theoretical frameworks are largely employed in the study of social cognition and perception about stimuli – the process through which people cognitively and socially interpret stimuli. More importantly, several studies implied an association between CLand optimistic bias. First, as stated prior, the effect of psychological distance between self and comparison target on optimistic biashas been documented (Alicke et al.,1995; Harris et al., 2000). According to these studies, as psychological distance decreases, optimistic bias reduces. For example, Harris et al. (2000) asked student subjects to rate their chances for 16 events (get an alcohol problem, have a heart attack, drop out of university, commit suicide, get AIDS, be burgled in the next year, have a nervous breakdown, be injured in a car accident, have a successful career, get a satisfying first job after graduation, develop or maintain a good relationship with your parent(s), achieve at least one of your life's ambitions, look young for your age when you are older, be given £50 just to spend on yourself, get a good degree, live past 80). They manipulated the out-group condition by asking students subjects to

estimate the chances that theevents will happen to students at another university and manipulated the in-group condition by asking subject to rate the chance that the events will happen to students at same university with subjects. They found that rating out-group target before the in-group target decreased the social distance and led to a reduction in optimistic bias (Harris et al., 2000).

Second, the association between CLT and optimistic bias might be based on the different information processing mode of high and low CL. As stated prior, people in high CL use the abstract information processing mode and people in low CL use the concrete information processing mode (e.g., Fujita et al., 2006a). In fact, the relationship between abstract/concrete processing of information and optimism was demonstrated in various domains (e.g., Chandran & Menon, 2004; Yan &Sengupta, 2013). Chandran and Menon (2004) showed that every day framing (concrete)makes health risks appear more concrete, decreasing optimistic perception. Similarly, Yan and Sengupta (2013) also showed that abstract information (base rate information in their terms) leads to the more positive perception about one's health compared toconcrete information (case information in their terms). By conducting a series of experiments, they demonstrated that subjects are more positive about their health when they are exposed to base rate information (e.g., disease prevalence in a population) compared to case information (e.g., disease symptoms). Abstract (vs. concrete) information processing leads to more optimistic evaluation (Chandran & Menon, 2004; Yan & Sengupta, 2013) because it influences perceived control (Zhu & Yzer, 2019), which is one

of the sources of optimistic bias (e.g., Harris,1996; McKenna, 1993; Menon et al., 2009). For example, Menon et al. (2009) demonstrated that students'perceived control over getting a good grade was related to their optimistic prediction about their grade in classes. Perceived control influences optimistic bias because individuals with higher perceived control believe they can increase the probability of positive outcomes and decrease the probability of negative outcomes (Weinstein, 1980). When people process concrete information about a disease, they are likely to perceive the disease more vivid relevant to them, estimating a higher probability of contraction (Lermer et al., 2016). This will lead to the decreased perceived control over the disease. These studies might imply that because people with high CL (vs. low CL) use abstract (vs. concrete) processing of information about disease, they might have greater (vs. lesser) perceived control over diseases, leading to stronger (vs. weaker) optimistic bias. Therefore, it might be worthwhile to empirically test the impact of CL on optimistic bias through perceived control.

4. STUDY 1

Previous studies indicated the role of psychological distance in influencing optimistic bias (e.g., Alicke et al., 1995; Harris et al., 2000). This finding is a foundation of the current study because CL varies in terms of psychological distance. Optimistic bias was reduced as social distance decreases. Alicke et al. (1995) showed that the

better-than-average effect, which is conceptually similar to optimistic bias (Alicke & Govorun, 2005), was reduced when subjects were asked to compare themselves with a person sitting next to them (proximal distance) than with a typical college student (distal distance). Moreover, Harris et al. (2000) compared the out-group (distal) and in-group (proximal) and showed that the decreased social distanceled to a reduction in optimistic bias. In the area of health communication, Meirick (2005) showed that people believe that groups who are socially distant are more affected by cigarette ads than close groups. Cho et al. (2013) proposed that decreased social distance will heighten one's sensitivity to diseases because of more self-relevance.

It should be, however, noted that these studies in the area of optimistic biashave used the psychological distance between self and others. Optimistic bias is based on a comparison of self with a comparison target hence, it is reasonable for studies to investigate the psychological distance between self and others. However, one's estimation of vulnerability to risk (i.e. diseases) is related to their perception of distance to risk (Li et al., 2021). Thus, previous studies in the area of optimistic bias did not consider the one's perception of distance to diseases. Unlike previous studies, the current investigation employs and tests the psychological distance between self and stimuli(e.g., diseases in the context of health campaign) basedon the conceptualization of CLT. This theory posits that psychological distance is a subjective perception that a stimulus (e.g., events, objects, or people) is close or far away from the self (Trope & Liberman, 2003). Based on the definition of

CLT, psychological distance is egocentric in nature because self is its reference point (Trope & Liberman, 2003). People perceive or evaluate their distance to stimuli,but they are not perceiving others' distance to the stimuli.Integrating the psychological distance of CLT with optimistic bias might suggest that one's psychological distance changes depending on environments, influencing his or her evaluation of their vulnerability to risks. However, their perception of others' distances to stimuli is likely to stay constant or less likely to change because people are not actively involved in judging others' distances to stimuli. Thus, its influence on their evaluation of others' vulnerability to risks stays constant. Relating to the current context, when individuals feel psychologically close to a disease, their evaluation of their vulnerability to the disease increases. Meanwhile, their perception of others' distances to the disease is less likely to change thus, their judgment of others' vulnerability also does not change. This leads to the reduction of optimistic bias. Thus, the following hypothesis was developed.

H1: When one's psychological distance to diseases decreases, his or her perception of vulnerability to diseases increase while his or her perception of others vulnerability to diseases will stay constant, which leads to the reduction of optimistic bias.

1) Methods (Study 1A)

(1) Experimental Design and Subjects

Study 1 is designed to demonstrate the effect of two types of psychological distance (Study 1A: temporal distance and Study 1B: spatial distance) on the optimistic bias. Participants were recruited at a mid-eastern public university in the USA. The first experiment employed a between-subjects design. Two experimental conditions, which vary in terms of temporal distance, were used. The sample size per condition ranged from 30 to 36. The temporal distance was manipulated by conducting the experiment at two different times of the year (June and November). Then, optimistic bias was measured.

A total of 66college students were included in the final data analysis. Of the participants, 57.6% were female (n = 38), with an average age of 21.15 years. The majority ethnic group was Caucasians (83.33%, n = 55), followed by African Americans (10.61%, n = 7), Asian Americans (3.03%, n = 2), and Hispanic Americans (3.03%, n = 2). Students who received a flu vaccine in the past 6 months were excluded by using a screening question.

(2) Procedures

Flu was selected as a test stimulus because it is the most prevalent contagious illness in the USA. The majority of college students are well-aware of the risk associated with the flu. According to the Center for Disease Control and Prevention, influenza activity often begins to

increase in October and can last as late as May. The data were collected in November, 2020 (proximal distance) and June, 2020 (distal distance) to influence subjects' temporal distance to flu. Participants completed the questionnaire for extra credit. The following statement is presented at the beginning of the questionnaire: "Influenza (flu) is most common during the fall and winter seasons. The exact timing and duration of flu seasons can vary, but influenza activity often begins to increase in October. Most of the time flu activity peaks between December and February, although activity can last as late as May." To check the manipulation of psychological distance (temporal distance), the following question was asked: Do you perceive flu season to be in the near future or in the distant future? The question was measured by a bipolar scale (1 – 7) anchored by the near and distant future. The manipulation check was successful. The participants in the condition of proximal distance (November) perceived that the flu season is in the near future. The t-test yielded significant differences in the expected direction ($t = 5.98$, $df = 64$, $p = .00$, $M_{distal} = 5.06$, $SD_{distal} = 1.05$ vs. $M_{proximal} = 3.30$, $SD_{proximal} = 1.02$).

(3) Measures

Optimistic bias. Optimistic bias was measured through the following two items: (1) Please estimate others' (people in your age and sex) chances to contract flu on a scale ranging from 0 (none) to 100 (extremely likely); and (2) Please estimate your chance to contract flu on a scale ranging from 0 (none) to 100 (extremely likely) (Otten & Van

der Pligt, 1996).For each respondent, a measure of optimistic bias was obtained by subtracting the second item from the first item. The order of these questions was randomized to prevent any order bias. (M_{self} = 47.88, SD_{self} = 24.22 vs. M_{others} = 58.17, SD_{others} = 23.42).

2) Results

Study 1 predicted that there would be a significant effect of psychological distance on optimistic bias. When participants perceive proximal distances (vs. distal distance) to the flu season, the optimistic biases would reduce (vs. increase). The results of *t*-test showed significant differences in optimistic bias between proximal and distal conditions (t = 2.647, df = 64, p = .032, M_{distal} = 13.83, SD_{distal} = 13.83 vs. $M_{proximal}$ = 6.03, $SD_{proximal}$ = 6.03). The condition of proximal distance generated the reduced optimistic bias as hypothesized. H1 was supported.

3) Method (Study 1B)

(1) Experimental Design and Subjects

The second experiment employed a between-subjects design. Two experimental conditions, which vary in terms of spatial distance, were used. The sample size per condition ranged from 31 to 35. Spatial distance was manipulated, and optimistic bias wasmeasured. A total of 66 college students were included in the data analysis in 2020. Students who completed the human papillomavirus (HPV) vaccination were

excluded by using a screening question. Of the participants, 56.06% (n = 37) were female, with an average age of 20.04 years. The majority ethnic group was Caucasians (68.18%, n = 45), followed by African Americans (19.7%, n = 13), Hispanic Americans (7.58%, n = 5), and Asian Americans (4.55%, n = 3).

(2) Procedures

The stimulus selected was HPV. Participants completed the questionnaire for extra credit. The following statement is presented at the beginning of the questionnaire: "HPV stands for human papillomavirus. It is the most common sexually transmitted infection. HPV is a group of more than 150 related viruses. Each HPV virus in this large group is given a number,which is called its HPV type. HPV is a very common virus; about one in four people is currently infected in (Name of City and State) vs. (the USA)." To check the manipulation of psychological distance (spatial distance), one bipolar scale (1 – 7) question was asked: The message is concerned with HPV _____, anchored by "locally" and "nationally." The manipulation check was successful. The participants in the condition of proximal distance were more likely to perceive HPV as a local issue. The *t*-test yielded significant differences in the expected direction (t = —-2.96, df = 64, p = .00, M_{distal} = 3.49, SD_{distal} = 1.83 vs. $M_{proximal}$ = 2.48, $SD_{proximal}$ = 1.30).

4) Results

The identical measurements for optimistic bias were used as explained in study 1A (M_{self} = 29.62, SD_{self} = 22.69 vs. M_{others} = 47.44, SD_{others} = 21.56). When participants perceive proximal distances (vs. distal distance) to HPV, the optimistic biases would decrease (vs. increase). The result showed a marginally significant difference in optimistic bias between proximal and distal conditions (t = −-1.86, df = 64, p = .068, M_{distal} = 22.89, SD_{distal} = 26.23 vs. $M_{proximal}$ = 12.1, $SD_{proximal}$ = 12.10). H1 was supported.

5) Discussion

Similar to previous studies, both study 1A and 1Bconfirmed the impact of psychological distance (temporal and spatial) on optimistic bias. Even though previous studies also showed the impact of psychological distance, the current finding is unique for several reasons. First, the concept of psychological distance used in previous studies refers to the distance between self and the comparison target. Meanwhile, this present study manipulated the temporal and spatial distance between self and an event (i.e., diseases) and found its effect on optimistic bias. Based on CLT, Trope and Liberman (2003) explained that the further off the event, the more likely it is that crucial factors will change in the meantime, thus detracting from the value of a current implementation intent in driving future action. It is somewhat surprising that not many

studies investigated the effect of psychological distance between self and an event. This finding is particularly useful for practitionersbecause it is feasible to influence the psychological distance between individuals and stimuli by message strategies. Many studies successfully manipulated the psychological distance between individuals and stimuli (i.e.,product or purchase timing) in promotional messages (e.g., Chang et al., 2015). Specifically, Chang et al. (2015) manipulated the temporal distance by emphasizing now (vs. distant future) in stimuli advertisements (messages) and found that its influence on purchase intention. This implies that practitioners can influence individuals' perceived distance to diseases and,consequently, their process of health-related messages.

More importantly, the current finding provides a foundation for the link between CLand optimistic bias because the psychological distance is an antecedent of CL. Psychological distance from objects and events is a central determinant of the level at which people construe the objects and events (Trope & Liberman, 2003). However, the finding is still limited to manifest the link because it confirmed the effect of psychological distance on optimistic bias, not the effect of CL.

5. STUDY 2

Based on the finding of study 1, the next step should delve into the effect of CL on optimistic bias because psychological distance influences one's perception, cognition,and behavior through CL(Fujita et al., 2006a

Henderson et al., 2006; Irmak et al., 2013; Liberman et al., 2002; Yan & Sengupta, 2011). People with high CL use abstract processing of related information, whereas those with low CL use concrete processing (Trope & Liberman, 2003). According to Watkins (2008), abstract processing focuses on the analysis of causes, meanings, and implications of events. By contrast, concrete processing focuses on the contextual and specific details of a situation. This study proposes the association between abstract/concrete information processing and optimism in various contexts because studies showed the association between CL and risk estimation (e.g., Chandran & Menon, 2004; Raue et al., 2015). High CL leads to a lower estimated probability of an event occurring compared with low CL (Lermer et al., 2016). Moreover, high CL is more likely to show risk-taking behaviors compared with low CL, which leads to lower risk-taking (Lermer et al., 2015). People with high CL are believed to underestimate the probability of a negative event occurring to them, which leads to risk-taking behaviors. Chandran and Menon (2004) found that individuals perceived a greater risk when the risk was presented in a day frame than in a year frame. They postulated that the temporal frame (day vs. year) influences the concreteness of risk, influencing individuals' evaluation of their vulnerability to risk. According to Pettus and Diener (1977), subjects who received concrete descriptions about a crime were more likely to support institutional preventive actions. The concrete information might have increased the subjects' assessment of their vulnerability to the crime, thus reducing optimism. Regarding the health-related behaviors, increasing the concreteness of risk-related

information enhances respondents' self-risk assessments and thereby reduces the optimism about themselves (Chandran & Menon,2004 Hendrickx et al.,1992). Concrete processing of information is believed toallow more objective evaluation of their susceptibility to health risk. Studies in planning fallacy (the tendency to underestimate the time to complete a task) showed that changing abstract overall tasks (e.g., grocery shopping) into concrete subtask (e.g., writing things to buy) leads to more objective judgment (e.g., Kruger & Evans, 2004). Meanwhile, people with abstract mindset tend to focus on value, which is a representation of ideal end state (e.g., Torelli & Kaikati, 2009). Abstract mindset evokes schematic processing and helps people focus on the value by putting information in a larger perspective (Trope & Liberman, 2003). This big-picture approachleads the underestimation of their vulnerability to risks because the focus on the ideal end state (e.g., I am healthy) might encourage individuals to disregard details (e.g., vaccination) required to achieve the ideal end state. All in all, these studies suggest that, when people are primed to use concrete information processing mode (low CL), they are less likely to be optimistic about themselves, reducingoptimistic biases about diseases than people using abstract information processing mode (high CL).

H2: When people are in low CL they are less likely to be optimistic about themselves, reducing optimistic biases about diseases than people in high CL.

1) Method

1) Experimental Design and Subjects

Data in study 2 were collected with college students as the sample in 2021. Consistent with experiment 1, a between-subjects design and two experimental conditions were employed. The conditions differed in terms of CL (high vs. low). A total of 65 participants were recruited, wherein 50.77% (n = 33) are male and the average age is 19.98 years. The major ethnic group was Caucasian (75.38%, n = 49), followed by African American (10.77%, n = 7), Asian American (7.69%, n = 5), and Hispanic American (6.15%, n = 4). Students who completed HPV vaccination were excluded by asking through screening question.

2) Procedures

The stimulus selected was HPV. Participants completed the questionnaire for extra credit. The opening statement about HPV in study 2 is identical to that in study 1B except for the last statement. The last statement is as follows: “HPV is a very common virus; about one in four people is currently infected.”

After reading the instruction, participants were primed to have low or high CL using the method developed by Fujita and Han (2009). A series of 40 objects (e.g., a dog) was presented to participants. Those in the high-level construal condition were asked to provide a superordinate category to which each object belonged (e.g., animal), whereas those in the low-level construal condition were asked to provide a specific

exemplar of each object (e.g., poodle). After the priming, participants were told to view the test ad, and subsequently were asked to indicate their opinions about the ad. The manipulation of construal was checked using Vallacher and Wegner's (1989) Behavior Identification Form (BIF) (see Appendix 1 for the items). The t-tests yielded significant differences between high and low CL conditions (t = —-2.28, df = 63, p = .038, M_{low} = 11.94, SD_{low} = 3.86vs. M_{high} = 14.19, SD_{high} = 4.10).

2) Results

The identical measurements for optimistic bias were used as explained in study 1A (M_{self} = 32.19, SD_{self} = 25.18 vs. M_{others} = 56.23, SD_{others} = 21.44).

Study 2 proposed that there would be a significant effect of CL (high vs. low) on optimistic bias. When subjects are primed to havelow CL (vs. high), the optimistic biases would reduce (vs. increase). The results showed marginally significant differences between two conditions (t = —-1.91, df = 62, p = .061, M_{low} = 18.13, SD_{low} = 15.49 vs. M_{high} = 29.97, SD_{low} = 31.50). H2 was supported.

3) Discussion

Study 2 manipulated the CL and examined its effect on optimistic bias. The result did show that CL influences optimistic bias. When subjects were primed to have low CL, they were less optimistic about

themselves. This confirms that concrete processing (low CL) about diseases (HPV in study 2) reduces one's optimistic evaluation of his or her own susceptibility to diseases.

To an extent, this finding is consistent with preceding literature from two perspectives. First, the literature reported that providing people with information and education about diseases reduces optimistic biases (e.g., Kim & Niederdeppe, 2016). Combining this with the current findings, if individuals processed information about diseases concretely, they would be more informed about the diseases, leading to decreased optimism about themselves. Second, concrete processing (vs. abstract processing) is associated with increased (vs. decreased) risk estimates (e.g., Lermer et al., 2016). Our finding is congruent with this result in that the optimistic bias was reduced for subjects primed to have low CL. More specifically, the optimistic bias was reduced because subjects' evaluation of their vulnerability to the disease increased. In fact, with the self-risk rating, a t-test was conducted to see whether subjects' evaluation of their vulnerability to disease indeed increased in the condition of low CL ($t = .792$, $df = 62$, $p = .048$, $M_{low} = 26.69$, $SD_{low} = 24.46$ vs. $M_{high} = 34.69$, $SD_{low} = 26.03$). Study 1 showed the relationship between psychological distance and optimistic bias. However, the finding of study 1 is limited to manifest the theoretical connection between optimistic bias and CLT. Study 2 was pivotal to demonstrate the link between two theories. However, the mechanism between CL and optimistic bias still remains unexplored.

6. STUDY 3

Another line of research in optimistic bias is the sources and mechanisms behind, one of which is perceived control as identified by previous literature (e.g., Harris,1996 Park et al., 2021). The current study proposes that CL influences one's perception of control over diseases, influencing his or her estimates of likelihood to acquire diseases. As previously stated, concrete processing of information allows a more objective assessment of environments. The objective evaluation might be due to perceived control. In fact, various studies demonstrated that perceived control is a mechanism for optimistic bias (e.g., Klein & Helweg-Larsen, 2002). Increased perceived control leads to a greater optimistic bias. If individuals believe that they have control over a negative event, theytend to believe that the event is less likely to happen to them. This relationship was supported in various health-related domains such as Alzheimer's disease (Park & Ju, 2016) and smoking behavior (Masiero et al., 2015). Klein and Helweg-Larsen (2002) conducted a meta-analysis of 27 samples in health-related studies and found that greater perceived control was significantly associated with greater optimistic bias.

However, studies examining the relationship between CL and perceived control are scarce. Meanwhile, the association between CL and self-control has gained scholarly attention. Fujita et al. (2006b) examined how CL influenced self-control. They explained that CL enhances or undermines self-control by highlighting different goals. Low (vs. high) CL highlights

local (vs. global) goals therefore, it hinders (vs. facilitates) self-control. In a similar vein, based on the goal activation approach, Agrawal and Wan (2009) explained that low CL makes the role of resource accessibility more salient, leading to depleted self-control. Perceived control and self-control are distinct constructs. However, they are somewhat similar conceptually because both constructs are related to one's ability to regulate his or her own internal states such as feelings, thoughts, and behaviors. Self-control focuses on one's ability to regulate one's internal states (Fujita et al., 2006b). Meanwhile, perceived control goes beyond regulating one's internal states because it concerns more about one's perceived ability to influence his or her own environment and bring about desired outcomes through own behaviors (Lachman & Weaver, 1998). Thus, even though those studies (Agrawal & Wan, 2009; Fujita et al., 2006b) provided important implications for the relationship between CL and perceived control, they are limited to manifest the effect of CL on perceived control.

Scholars from various fields showed the correlation between perceived control and abstract/concrete processing of information (Skinner, 1997; Smith & Trope, 2006). More relevant to health issues, abstract representations (high-action identification in their term) of drinking is associated with impaired control, which is composed of perceived and failed control (Palfai & Ostafin, 2010; Wegner et al., 1989). Wegner et al. (1989) explained that individuals represent an action concretely (at lower levels) when they are less experienced with the action, presumably the low perceived control situation.Concrete processing of actions or

events leads to thoughts about related tasks that are required to complete the actions or overcome events. Derived from these findings, for example, individuals' concrete processing about flu leads to a list of things they should do to prevent from catching the flu such as washing hands often, disinfecting communal surfaces, avoiding close contact with sick people, and avoiding touching the eyes. This processing of the to-do-list would help them realize that they do not have control over the flu. In sum, abstract (vs. concrete) processing of information about diseases would strengthen (vs. attenuate) their perception of control over contracting diseases, thereby leading to the greater (vs. reduced) optimistic bias.

H3: Theeffect of CL on optimistic bias is mediated by perceived control.

Further, perceived severity is another factor that can influence perceived control in the current context. In fact, studies showed that perceived severity reduces optimistic biases. Educating people about the severity and reminding them about high-risk experience led to a decreased optimistic bias (e.g., Cho et al., 2013; Harris et al., 2008; Weinstein, 1983). According to Taylor and Shepperd (1998), individuals are less optimistic about themselves for diseases with severe outcomes than for those that are relatively less severe because diseases that impose severe outcomes can lead to dramatic changes in one's life. The impact of disease severity on risk estimates should interact with CL, influencing

one's perception of control over diseases. Abstract (vs. concrete) processing of disease will not lead to the greater (vs. lesser) perceived control if people perceive severe potential outcomes. In other words, perceived control will be particularly weak when people use concrete processing mode (low CL) and anticipate severe outcomes of diseases. The concrete processing about the disease will make potential severe outcomes more salient, influencing perceived control.

H4: The mediating relationship among CL, perceived control and optimistic bias is moderated by perceived severity because CL and perceived severity are interacting each other.

H4a: High CL will not lead to the greater perceived control if people perceive severe potential outcomes, reducing optimistic bias.

H4b: Low CL will lead to the lesser perceived control if people perceive severe potential outcomes, increasing optimistic bias.

1) Method

Data in study 3 were collected with the use of Amazon Mechanical Turk (MTurk) in 2021. A 2 (CL: high vs. low) × 2 (perceived severity: high vs. low) between-subjects factorial design was employed. A total of 450 participants were recruited, wherein 53% are male and the mean age is 35 years. The major ethnic group was Caucasian (64.2%), followed by African American (11.3%),Asian American (8.7%), Hispanic American (6.4%), and Native American (4.2%). Subjects who received

the flu vaccine in the past 6 months were excluded by using a screening question.

1) Procedures and Stimulus Development

Flu was selected as a test stimulus because it is the most prevalent contagious illness in the USA. The procedure was similar to thatin study 2. The subjects' CL was primed by following the method developed by Fujita and Han (2009). Subsequently, the participants were exposed to the stimulus, followed by the measurements. Manipulation check using Vallacher and Wegner's (1989) BIF was successful (t = −-1.82, df = 448, p = .023, M_{low} = 11.93, SD_{low} = 3.86 vs. M_{high} = 13.92, SD_{high} = 4.10). For the manipulation of perceived severity, the vaccination ad was created by varying the degree of flu outcomes: Flu causes illness (low) vs. Flu causes illness and death (high). The manipulation was checked by two items: (1) I believe that symptoms of FLU are severe and (2) I believe that symptoms of FLU are serious (Witte et al., 1996) (t = 2.90, df = 448, p += .00, M_{low} = 12.48, SD_{low} = 5.39 vs. M_{high} = 13.92, SD_{high} = 5.72). Two test ads are identical, except for the manipulated perceived severity (see Appendix 2 for the test ads).

2) Measurements

Optimistic bias. The identical measurements for optimistic bias were used as explained in study 1A (M_{self} = 35.44, SD_{self} = 25.86 vs. M_{others} = 44.08, SD_{others} = 23.74).

Perceived control. Perceived control is defined as the belief that one can

determine one's own internal states and behavior, influence one's environment, and/or bring about desired outcomes (Lachman & Weaver, 1998). Perceived control was measured by using four items: (1) There is little I can do to prevent flu (reverse coded); (2) Flu is beyond my control (reverse coded); (3) Flu is something I can manage; and (4) Flu is something I can regulate (Lachman & Weaver, 1998) (= .88).

2) Results

The analysis tested two proposed relationships using Hayes' (2013) PROCESS: (1) the mediating role of perceived control between CL and optimistic bias and (2) the moderated mediation with perceived severity. According to Hayes (2013), in PROCESS, testing a simple mediation model is based on two linear regression analysis. First, the mediating variable is predicted by the independent variable. Second, the dependent variable is predicted by both the mediating variable and the independent variable. The test for inferring whether there is a significant indirect effect is based on bootstrap confidence intervals. If the confidence interval does not include zero, then it is inferred that the indirect effect is significant, that is, that there is a mediation effect.

First, the mediating role of perceived control was analyzed using Hayes' (2013) PROCESS, a bootstrapping method with 5,000 resamples (Model 4). Overall, the mediation analysis was significant (β = .86, SE = .46, 95% CI = .10 to 1.94). Specifically, CL led to perceived control (β = 1.15, t(448) = 2.36, p = .018) in turn, perceived control also

led to optimistic bias (β = .74, t(447) = 4.20, p = .00). However, the effect of CL on optimistic bias was not significant (β = 2.22, t(447) = 1.85, p> .05). Thus, the mediating role of perceived control received the support (see Figure1 and Table 1). H3 was supported.

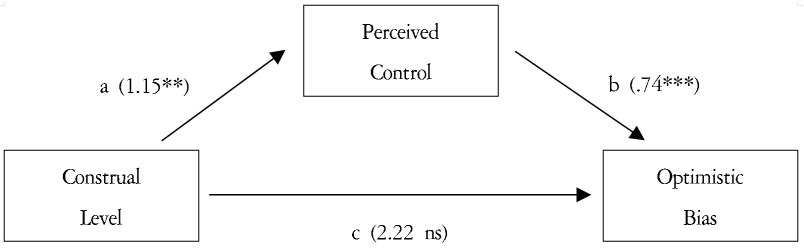

Figure 1. Mediating Role of Perceived Control

Table 1. Mediating Role of Perceived Control

Path	β	t	p	C.I. bootstrap	
				LLCI	ULCI
a (X → M)	1.15	2.36	.018	.19	2.10
b (M → Y)	.74	4.20	.000	.40	1.10
Indirect c' (X → M → Y)	.86	-	-	.10	1.94
Direct c (X → Y)	2.22	1.20	.23	-1.41	5.85

X = Construal Level, M = Perceived Control, Y = Optimistic Bias

*** p<.01, ** p<.05, p<.07

Further, study 3proposed the moderating role of perceived severity between CL and perceived control, which requires moderated mediation analysis in the current model. According to Hayes (2015), moderated mediation occurs when the strength of mediating relationship varies on the level of the proposed moderator. In the analysis, the mediator is estimated as a linear function of the independent variable, with the effect of the independent variable modeled as linearly related to the moderator and the dependent variable as a linear function of both the mediator and independent variable.

The analysis was conducted using Hayes' (2013) PROCESS, a bootstrapping method with 5,000 resamples (Model 7). Overall, the moderated mediation analysis yielded a significant result (β = −-1.11, SE = .62, 95% CI = −-2.41 to −-.02). The effect of CL on perceived control was significant (β = 2.91, t(446) = 2.40, p < .05). Moreover, the interaction effect of CL and perceived severity on perceived control was marginally significant (β = −-1.48, t(446) = −-1.93, p = .054). In the condition of low perceived severity, the effect of CL on perceived control was significant (β = 1.43, t(446) = 2.65, p < .01) however, in the high condition, the effect was not significant (β = −-.04, t(446) = −-.08, p > .05). Further, the direct effect of CL on optimistic bias was not significant (β = 2.22, t(446) = −-1.20, p > .05). Specifically, the mediation relationship was only significant in low perceived severity condition (β = 1.07, SE = .53, 95% CI = .15 - 2.26 vs. high condition: β = −-.03, SE = .38, 95% CI = −-.75 to .80), which confirms the moderating role of perceived severity (see Figure

2 and Table 2).H4 was supported.

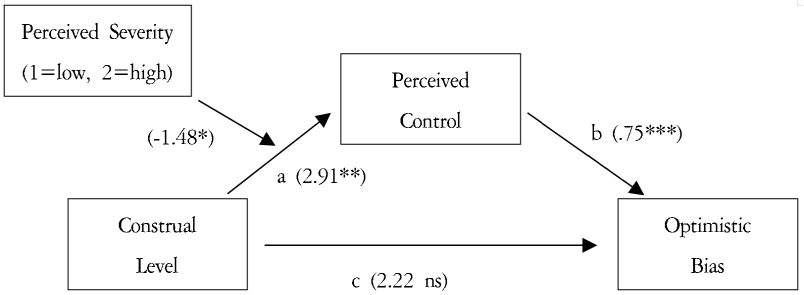

Figure 2. Moderated Mediating Role of Perceived Severity

Table 2. Moderated Mediating Role of Perceived Severity

Path	β	t	p	C.I. bootstrap	
				LLCI	ULCI
a (X → M)	2.91	2.40	.016**	.53	5.29
b (M → Y)	.75	4.20	.000***	.40	1.10
W → M	-4.14	-3.42	.000***	-6.52	-1.77
X*W Interaction	-1.48	-1.93	.0545*	-2.98	.03
Direct c (X → Y)	2.22	1.20	.23	-1.41	5.85
Indirect c (W=1) (X → M → Y)	1.07	-	-	.15	2.26

X = Construal Level, M = Perceived Control, Y = Optimistic Bias, W = Perceived Severity

*** p<.01, ** p<.05, p<.07

3) Discussion

The finding confirmed the role of perceived control in explaining optimistic bias. Extant research has shown that perceived control is a strong source of optimistic bias (e.g., Klein & Helweg-Larsen, 2002). Applying to the current context, subjects who were confident about their ability to prevent flu were more likely to show stronger optimistic bias. This means that both practitioners and researchers should contemplate how to reduce perceived control. Combined with the finding of study 2, this study proposes that CL can be another way to regulate perceived control and consequently optimistic bias. The finding confirmed that CL can be a factor to influence one's assessment of his or her ability to prevent diseases. This is meaningful for several reasons. First, the finding adds to the current literature on sources of optimistic bias. Second, not many studies have shown the role of perceived control in conjunction with CL. Third, the mediating role of perceived control elaborates on the theoretical association between CL and optimistic bias.

In addition, the current study tested perceived severity as a moderator and found support. The current finding indicates that perceived severity influences optimistic bias through perceived control, thereby stressing the role of perceived control in the current context. With a moderated mediation analysis, our finding demonstrates the interaction between CL and perceived severity, influencing optimistic biases through perceived control. The proposed mediating role of perceived control was only significant in lowperceived severity conditions.

Concrete processing mode (low CL) did not lead to less perceived control when subjects perceived severe potential outcomes.It is believed that the severe outcomes are salient to people, and the salience reinforces or hampers the effect of CL on perceived control.

4) General Discussion

Integrating theories of CLT and optimistic bias into the model, this study examined the effect of psychological distance and CL on optimistic bias by conducting multiple experiments. The incorporation of perceived control as a mediator and perceived severity as a moderator deepened our understanding of how CL is related to optimistic bias. To improve the generalizability of findings, experiments with samples of student and nonstudent adults were conducted using two types of diseases: flu and HPV.This study provides important implications in that optimistic bias was tested with CL and psychological distance. The current study expands the perspective of examining optimistic bias because, in studies 1, 2, and 3, we found the support for the link between optimistic bias and CLT. The finding demonstrates the theoretical utility of CLT in understanding the effect of optimistic bias for researchers and provides another way to reduce optimistic biasesfor practitioners.

Previous studies examined how thepsychological distance between self and comparison target influences optimistic bias (e.g., Alicke et al., 1995; Harri et al., 2000). This approach is somewhat limited because it merely evaluates and measures their perception of distance to others and

does not considers one's perception of distance to diseases which is an important criterion for risk estimation because one's estimation of vulnerability to risk is based on his or her perception of distance to diseases (Li et al., 2021). Although they utilized the concept of psychological distance as a theoretical background, individuals' perception of distance to stimuli (i.e., diseases) was overlooked.

Our study used the concept of psychological distance between self and diseases and showed its effect on optimistic biases. Unlike our study, a stream of research in optimistic bias has tested social distance, which is the measure of space between two or more people. Moreover, our study investigated two types of psychological distance (temporal and spatial) with a focus on the idea of when and where diseases are affecting people. Temporal distance highlights immediate or delayed risks, whereas spatial distance highlights physically near or distant risks. The support for the role of psychological distance found in study 1A and 1B was essential for subsequent experiments (studies 2 and 3) to manifest the association between optimistic bias and CLT.

In studies 2, CL did influence individuals' estimate of risk. Study 3 demonstrated that CL influences optimistic bias through perceived control. Recent studies on CLT showed that abstract thinking leads to a lower estimated probability of an event occurring compared withconcrete thinking (e.g., Lermer et al., 2016). The finding of study 3 is consistent with this idea. Subjects who were primed to have low CL showed the reduced optimistic bias compared with those in high CL mode. This might indicate that CL can indeed be very useful for increasing the

awareness of and changing the attitude toward diseases, which would lead to preventive behaviors. Further, the current study demonstrated the mechanism of CL on optimistic bias by employing the perceived control. In fact, a large bulk of studies showed that perceived control is a mechanism of optimistic bias. Unlike other studies, our study showed that CL influenced perceived control. Low CL (vs. high CL) led to reduced perceived control due to the concrete processing. Concrete processing about diseases produces subordinate but required means (e.g., personal hygiene)to attain an ideal end state (e.g., being healthy). This helps individuals realize that they do not have full control over the diseases. This finding showed that CL influenced the optimistic bias through perceived control, implying that perceived control is the conceptual link between CL and optimistic bias.

In addition, the current study views perceived severity as an important factor that influences optimistic biases. Specifically, the finding demonstrates a two-way interaction effect, such that perceived severity moderates the CL effect on perceived control. Previous research has examined the role of perceived severity in reducing optimistic bias. By employing perceived severity, we extend the literature on the role of perceived control on optimistic bias because the finding addresses that the effect of perceived severity on optimistic bias performs through perceived control as well. In estimating risk, perceived severity emphasized in the message may be effective because outcomes of disease look more salient, which therefore reduce perceived control and optimistic biases. These findings help disentangle the psychological process

underlying how CL and optimistic bias interplay.

The current attempt to link CLT with optimistic bias is theoretically meaningful for several reasons. Drawing from previous studies, our findings tested and demonstrated that temporal, spatialdistance (study 1) and CL (study 2) influence optimistic bias through perceived control (study 3). The link between two theories not only helps scholars gain a deeper understanding of individuals' cognitive processes about health-related issues but also allows scholars to develop a theoretical framework to increase risk estimates. In the context of health campaign, scholars have explored ways to increase consumers' perception of risk on the premise that greater risk perception motivates consumers to take desirable actions to prevent or decrease health problems (Ahn, 2015; Chandran & Menon, 2004; Kees, 2010). By recognizing that CL influences optimistic biases, scholars might be able to build a theoretical framework that postulates how to motivate individuals' preventive behaviors and combat psychological hurdles in health campaign. It is hoped that the current findings will be able to serve as a cornerstone for future attempts to integrate two theories. According to Elliott (1985), theory integration can be viewed as an alternative strategy for theory development and testing that addresses some of the limitations of the theories. By testing the link, this study demonstrated the potential for the integration of two theories in the context of health campaign. Both theories involve the investigation of one's social cognition of how people think and process information. Broadly, the integration will be fruitful for scholars to understand the nature of the cognitive and social

processes. Another unique contribution of this study involves theoretical insights into the underlying mechanism by which perceived control serves as a mediator in explaining the effect between CL and optimistic bias. The results of our mediational analysis revealed that the effect of CL was mediated by perceived control. This finding lends support for the previous studies'findings that perceived control is an important mechanism of optimistic bias. Thefinding is unique in that CL influences perceived control: Perceived control was weaker when people are in low CL mode (vs. high CL), indicating that concrete processing (vs. abstract) decreases one's perception of control over health-related issues. The understanding of CL effect on perceived control advances our knowledge about the theoretical process behind the intertwined relationship between CL and optimistic bias.

Practically, the finding can play an important role to design health messages because it can help practitioners reduce publics' optimistic bias. As stated prior, when people have the greater optimistic bias, they are less likely to engage in preventive behaviors. The current finding revealed and confirmed factors such as CL, perceived control and perceived severity which influence optimistic bias. When practitioners design health campaign, they can use the findings to attempt to reduce publics'optimistic bias.

5) Study Limitations and Future Directions

Despite the valuable implications of our findings, some limitations

merit considerations. First, study1A manipulated the temporal distance by collecting data in June and November, which means it was not able to randomly assign participants to two conditions. In other words, study1A was pseudo experiment. Second, even though this study tested two types of diseases, namely HPV and flu, to increase external validity, our findings may be limited to the health-related issues. Given that optimistic biases are consistently found in various contexts, future research is needed to see whether the results of this study can be generalized to other domains.

Another area for fruitful future research is to explore other factors as moderators in determining CL effects on optimistic bias. Factors such as regulatory focus may affect the way individuals respond to health campaigns. According to previous findings(Lee and Aaker 2004), individuals with a high (vs. low) CL mindset are more likely to show favorable responses to promotion-focused (vs. prevention-focused) framed messages. How would this influence one's perception of risk estimates? Investigating whether promotion-focused (vs. prevention-focused) framed messages moderate the effect of CL on optimistic bias would be valuable. In addition, given that various individual differences interact with CL (e.g., Youn & Kim, 2019), more research on individual differences as moderators will advance our knowledge of optimistic bias.

It should be noted that the effect of spatial distance in study 1B were marginally significant. It is speculated that this stems from a different level of involvement of diseases tested in study 1A (Flu) and 1B (HPV). Flu is more frequent than HPV, making people more

sensitive to health campaign. In fact, frequency is an important factor for optimistic bias (Price et al., 2002). For example, people may respond to the health campaigns differently, depending on a level of frequent occurrence. Comparatively, HPV is associated with low occurrence, entailing the more optimistic estimate about risk of contraction. Future researchers might need to examine the moderating role of frequency in determining the effect of CL on risk evaluations.

In closing, this study provides new insights for understanding the effect of CL on individuals' responses to health campaigns in conjunction with optimistic bias. It is hoped that our findings assist professionals in developing strategic guidelines to make health campaigns more diagnostic for reducing optimistic biases.

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Appendix 1. The Behavior Identification Form

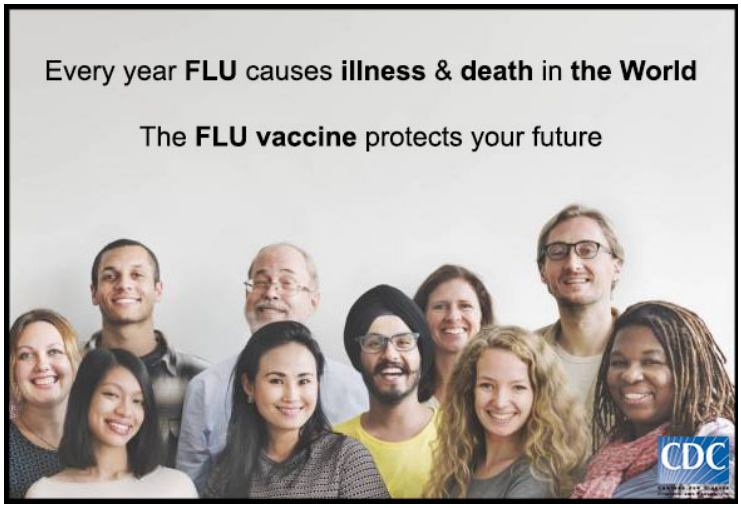
Item	Item
Making a list	Climbing a tree
a. Getting organized*	a. Getting a good view*
b. Writing things down	b. Holding on to branches
Reading	Filling out a personality test
a. Following lines of print	a. Answering questions
b. Gaining knowledge*	b. Revealing what you're like*
Joining the Army	Tooth-brushing
a. Helping the Nation's defense*	a. Preventing tooth decay*
b. Signing up	b. Moving a brush around in one's mouth
Washing clothes	Taking a test
a. Removing odors from clothes*	a. Answering questions
b. Putting clothes into the machine	b. Showing one's knowledge*
Picking an apple	Greeting someone
a. Getting something to eat*	a. Saying hello
b. Pulling an apple off a branch	b. Showing friendliness*
Chopping down a tree	Resisting temptation
a. Wielding an axe	a. Saying "no"
b. Getting firewood*	b. Showing moral courage*
Measuring a room for carpeting	Eating
a. Getting ready to remodel*	a. Getting nutrition*
b. Using a yardstick	b. Chewing and swallowing
Cleaning the house	Growing a garden
a. Showing one's cleanliness*	a. Planting seeds
b. Vacuuming the floor	b. Getting fresh vegetables*

Painting a room	Traveling by car
a. Applying brush strokes	a. Following a map
Making the room look fresh*	Seeing countryside*
Paying the rent	Having a cavity filled
a. Maintaining a place to live*	a. Protecting your teeth*
b. Writing a check	b. Going to the dentist
Caring for houseplants	Talking to a child
a. Watering plants	a. Teaching a child something*
b. Making the room look nice*	b. Using simple words
Locking a door	Pushing a doorbell
a. Putting a key in the lock	a. Moving a finger
b. Securing the house*	b. Seeing if someone's home*
Voting	
a. Influencing the election*	
b. Marking a ballot	

*High CL

Appendix 2. Study 3 - Test ads

A. High Perceived Severity Condition



B. Low Perceived Severity Condition

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본 논문은 해석수준이 개인이 가지고 있는 질병에 대한 낙관편향에 영향을 줄 있다는 것을 제안합니다. 본 논문은 세 개의 실험을 통해 이러한 해석수준과 낙관편향의 관계를 보여주고 잇습니다. 실험1에서는 대학생 표본을 이용하여 심리적 거리감(시간적& 공간적 거리감)의 낙관편향에 대한 영향을 주었습니다. 실험2에서는 대학생 표본을 이용하여 해석수준을 조작하여 해석수준이 낙관편향에 미치는 영향을 보여주었습니다. 구체적으로 하위 해석수준으로 조작된 실험참가자들은 상위 해석수준으로 조작된 참가자들에 비해 낙관편향이 줄어드는 결과를 보여주었습니다. 실험3에서는 2 (해석수준: 상위 vs. 하위) X 2 (지각된 심각성: 높음 vs. 낮음) 요인설계를 진행하였습니다. 조절된 조절된 매개효과 (moderated moderated mediation) 분석을 통해 지각된 통제감이 해석수준과 지각된 심각성의 상호작용을 매개하는 것을 발견하였습니다. 실험3는 연구의 외적 타당성을 높이기 위해 일반인들을 대상으로 진행되었습니다.

주제어 : 낙관편향, 해석수준이론, 심리적 거리감, 지각된 통제감, 지각된 심각성