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ABSTRACT

Title of Document:	THE IMPACT OF CONSIDERATION OF FUTURE CONSEQUENCES AND TEMPORAL FRAMING ON ACCEPTANCE OF THE HPV VACCINE
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The current dissertation research investigates the role that individual difference in Consideration of Future Consequences (CFC) plays in the context of health communication. In specific, the first purpose of the current research is to investigate the role of CFC in predicting vaccination behavior against the human papillomavirus (HPV). The second purpose of this research is to provide a better understanding of CFC's indirect effects through the Health Belief Model (HBM) constructs on acceptance of the HPV vaccine. The third purpose of this research is to provide a better understanding of the moderating effects of CFC on the relationship between temporal framing and persuasion, specifically within the HPV vaccination context.

Two studies were conducted. The first study examined the impact of individual difference in CFC on the uptake of the HPV vaccine and HPV-related health beliefs as potential mediators of this relationship. A cross-sectional survey of 767 college students was conducted. Findings indicated that CFC had no direct effect on HPV vaccine uptake. However, CFC had significant impacts on a number of HPV-related health beliefs in that greater CFC was associated with less perceived susceptibility to HPV, greater perceived severity of HPV, less perceived logistic/financial barriers, and higher perceived vaccine efficacy. CFC exerted a significant indirect effect on vaccine uptake through perceived vaccine efficacy.

The second study examined how individual difference in CFC and temporal message framing (i.e., present-oriented message and future-oriented message) interact to influence attitudinal and intentional outcomes. Results of a controlled experiment (N =416) showed a significant interaction effect of CFC and temporal framing on attitudes and intentions as a whole indicating high CFC individuals were more persuaded by present-oriented (versus future-oriented) messages. Low CFC individuals responded similarly to different temporal frames. These somewhat surprising findings are discussed in light of the unique characteristics of HPV vaccination behavior.

Theoretical contributions and practical implications of the current research are provided, and limitations along with future directions are discussed.

THE IMPACT OF CONSIDERATION OF FUTURE CONSEQUENCES AND TEMPORAL FRAMING ON ACCEPTANCE OF THE HPV VACCINE

By

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Dedication

To my parents,

Hongchul Kim and Kangsook Ahn

for their love, support, and sacrifice.

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Chapter 1: Introduction

Health communication is an interdisciplinary area of study that investigates how communication plays roles in health care delivery and health promotion. As an extremely broad research area, health communication concerns with various levels of communication in different social contexts (Kreps, Query, & Bonaguro, 2007). One of the main approaches to health communication research has been a better understanding of the key determinants of health behaviors, which further informs the design of persuasive health messages.

Recently, scholars have started to look at the role *time* plays in health-related decision making (e.g., Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell, Perugini, & Rakow, 2004) and persuasive message effects (e.g., Kees, 2010, 2011). One of the time-related factors that has been studied is individual difference in consideration of future consequences (CFC). Strathman, Gleicher, Boninger, and Edwards (1994) defined CFC as "the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (p. 743). Strathman et al. attended to behaviors that cause intrapersonal struggles between immediate and future outcomes and hypothesized that the way individuals resolve the dilemma in favor of one over the other would indicate people's personality traits related to CFC.

Individuals high in CFC tend to put up with immediate costs (e.g., monetary cost or fear from detecting disease) in exchange for future benefits (e.g., early treatment of abnormalities or possible disease prevention), whereas those low in CFC tend to seek immediate benefits (e.g., engaging in pleasurable, but risky behaviors) at the cost of negative future consequences (e.g., increased risk of developing diseases years later). CFC has been found to predict an array of behaviors that have short-term costs and long-term benefits tradeoffs (e.g., compulsive buying, Joireman, Kees, & Sprott, 2010; pro-environmental behaviors, Strathman et al., 1994).

Because health behaviors often involve immediate costs and delayed benefits, research has shown that CFC predicts the adoption of various health behaviors (e.g., taking part in Type 2 diabetes screening, Orbell & Hagger, 2006; receiving colorectal cancer screening, Orbell et al., 2004; getting HIV test, Dorr, Krueckeburg, Strathman, & Wood, 1999; applying sunscreen, Orbell & Kyriakaki, 2008; healthy eating behaviors, Kees, 2010, 2011). Extending this body of literature, the current study first seeks to examine the role of CFC in predicting acceptance of the human papillomavirus (HPV) vaccine among young adults.

Prior studies on CFC have focused on examining whether CFC has an effect on a health behavior rather than theorizing the underlying mechanisms whereby CFC influences the given behavior. The current study, then, also aims to explore the factors that mediate the relationships between CFC and

acceptance of the HPV vaccine. Guided by the health belief model (HBM), by far the most commonly utilized theory in health behavior research (Glanz, Rimer, & Lewis, 2003; National Cancer Institute, 2005) and acknowledged to be a powerful framework in predicting vaccination behaviors (Brewer & Fazekas, 2007), this study investigates how CFC might *indirectly* affect acceptance of the HPV vaccine through the constructs proposed by HBM, including perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

Understanding the determinants of health behaviors often enlightens persuasive health message designs. Scholars (Orbell et al., 2004; Strathman et al., 1994) have suggested that individuals high in CFC would be more affected by future-oriented messages (e.g., healthy eating has long-term health benefits), while those low in CFC would be more affected by present-oriented messages (e.g., healthy eating has immediate health benefits). The limited extant research has shown inconsistent results concerning the interaction between CFC and temporal framing (e.g., Costar, 2007; Kees, 2011; Orbell et al., 2004; Zhao, Nan, Iles, & Yang, forthcoming). As such, this research seeks to further examine the moderating role of CFC in the effects of temporal framing in the context of persuasive messages promoting HPV vaccination.

In sum, the first purpose of the current research is to investigate the role of CFC in predicting vaccination behavior against HPV. The second

purpose of this research is to provide a better understanding of CFC's indirect effects through several health beliefs specified in the HBM on acceptance of the HPV vaccine. The third purpose of this research is to provide a better understanding of the moderating effects of CFC on the relationship between temporal framing and persuasion, specifically within the HPV vaccination context.

Chapter 2: Literature Review

HPV Vaccination

Worldwide, cervical cancer is the fifth most common disease in women, and about 471,000 women are newly diagnosed each year. It means one person dies due to cervical cancer every 2 minutes (CervicalCancer.org, 2007). According to the American Cancer Society's recent data (2012), about 12,170 new cases of cervical cancer will emerge in the United States, and approximately 4,220 women will die from cervical cancer this year. Each year approximately $1.4 billion is spent on cervical cancer treatment in the United States.

According to the National Cancer Institute (NCI, 2012), over 70% of cervical cancers and about 85% of anal cancers are caused by the human papillomavirus (HPV), the most common sexually transmitted infection in the United States (National Cervical Cancer Coalition, n.d.). HPV is also the leading cause for genital warts. HPV is a commonly found virus, with more than 50% of sexually active individuals getting infected at some time in their lives. Currently, approximately 20 million Americans are estimated to be infected with HPV, and another 6 million people get infected each year, according to the Centers for Disease Control and Prevention (CDC, 2011).

In 2006, the Food and Drug Administration (FDA) approved two HPV vaccines –Gardasil® and Cervarix® – for the prevention of cervical cancer

and genital warts.[1] Both vaccines are given in three doses over a few months. The CDC (2013a) recommends that 11- or 12 year-old boys and girls be routinely vaccinated against HPV. Catch-up vaccination is recommended for 13 through 26 year-old females and 13 through 21 males who have not completed the vaccine series.

Although the HPV vaccines are very effective against HPV infection, the uptake rates of the vaccine remain unsatisfactory, especially among the young adult population. Less than half of young women aged 19-26 years old and less than 5% of young men in this age group have taken at least one shot of the vaccine (CDC, 2013b). According to the most recent National Immunization Survey data for 2011, the most comprehensive national data regarding vaccination (Sheinfeld Gorin et al., 2011), 53% of female teens aged 13-17 have received at least one shot and 34.8% have completed three shots of HPV vaccine, while 8.3% of male teens aged 13-17 have received at least one shot and only 1.3% have completed three shots (CDC, 2012b). Among the young adults, 43.1% of females aged 19-21 and 21.5% of those aged 22-26 have received at least one shot while 2.8% of males aged 19-21 and 1.7% of those aged 22-26 have received at least one shot (CDC, 2013b), according to the 2011 National Health Interview Survey. Compared with 2010, the survey data show modest increases in vaccination among young women aged 19-26

[1] Gardasil is effective against HPVs that cause both cervical cancer and genital warts. Cervarix is effective against HPVs that cause cervical cancer, but not genital warts.

by about 9% increases from 20.7% to 29.5% in at least one shot acceptance rates, but only little increases from 0.6% to 2.1% among young men aged 19-26 (CDC, 2012a). Not to mention about the low coverage rates for males, females' coverage rates are well below the targets of Healthy People 2020, which aims to reach 80% of female teens aged 13-15 receiving all three shots, and 80% of teens aged 13-15 receiving at least one shot of the vaccine (U.S. Department of Health and Human Services, 2013). Such data indicate the need for efforts to reduce the rates of HPV vaccine-preventable diseases.

Consideration of Future Consequences

The Concepts of Time Perspective

"Time is a dimension in which all living organisms adjust to their environment" (Ariely & Zakay, 2001, p. 187). Human beings carry out all behaviors within the time continuum, and the time matters in its relationships with attitudes, perceptions, and decision making. A number of scholars (Carstensen, 1995; Chapman & Coups, 1999; Joireman, 1999; Joireman, Sprott, & Spangenberg, 2005; Lockenhoff & Carstensen, 2004; Metcalfe & Mischel, 1999; Mischel, 1974; Rothspan & Read, 1996; Strathman et al., 1994; Zimbardo & Boyd, 1999) in various disciplines have researched individual differences in time orientation, and found chronic and systematic differences among individuals. That is, some individuals place greater emphasis on delayed consequences in the future while others attach a higher degree of emphasis to immediate consequences. Scholars have approached

the role time plays in individual motivation to engage in different behaviors with slightly different terms such as delayed gratification (Mischel, 1974), time perspective (Zimbardo & Boyd, 1999), time preference or discount rate (Chapman & Coups, 1999), or consideration of future consequences (CFC, Strathman et al., 1994). For convenience and clarity, time perspective is used to refer to time-related broad concepts in the following.

Time perspective has generally been conceptualized as a relatively stable personality trait. Some scholars described time perspective as a developmental trait. Carstensen's (1995) socioemotional selectivity theory postulates that older adults are more likely to be present-oriented due to their perceived time left while younger adults have a more expansive perception toward time. This theory argues that the old with present-orientation may pay less attention to possible health problems, more attending to current issues (Lockenhoff & Carstensen, 2004).

Other scholars have also attended to relatively stable personality traits related to time perspective. Mischel (1974) theorized the concept of delay of gratification, which is, people who value future rewards greater than that of the present tend to delay gratification (Metcalfe & Mischel, 1999). Chapman and colleagues (1996, 1998, 2005; Chapman & Coups, 1999; Chapman & Winquist, 1998), on the other hand, focused on the discount rate of future events compared to current ones in their discussion of time preference. Time preference refers to the extent to which individuals perceive future outcomes

relative to immediate outcomes whereas temporal discount rates refer to the extent to which future outcomes are weighed relative to immediate outcomes (Chapman, 1996; Chapman & Winquist, 1998). A tradeoff between these outcomes at two time points affects individuals' decision-making. Specifically, a high discount rate means a delayed outcome loses a large portion of its value due to the delay of occurrence, and according to this account, individuals with a high temporal discount rate are less likely to value future outcomes than comparable immediate outcomes.

Zimbardo and Boyd (1999) approached the concept of time perspective from the notion of cognitive bias, which is developed over time depending on a person's emphasis on past, present, or future. They developed the Zimbardo Time Perspective Inventory and categorized dispositional time perspective styles into five, namely, past negative bias, past positive bias, present hedonistic perspective, present fatalistic perspective, and future time perspective. Individuals high in past negative bias tend to filter new experiences with their past negative perceptions, whereas individuals high in past positive bias use the past perception in the opposite way. Individuals high in present hedonistic perspective tend to engage in risky behaviors, ignoring various proactive health behaviors. Individuals high in present fatalistic perspective do not believe in their ability to make impact on the future. Finally, individuals high in future time perspective tend to be concerned about leading to positive future consequences. Depending on

the styles they belong to, individuals cope differently with health problems (Boyd & Zimbardo, 2005). In their inventory, Gonzalez and Zimbardo (1985) found four factors relevant to future orientation, which they labeled as work motivation, goal seeking, daily planning, and pragmatic action for future gain.

Scholars viewed future orientation or future time perspective as "a general concern for future events" (Kastenbaum, 1961, p. 204) or "the length of the future time span over which one conceptualizes personalized future events" (Wallace, 1956, p. 240). Strathman et al. (1994) attended to one of the four factors in Gonzalez and Zimbardo's (1985) future orientation inventory, *pragmatic action for future gain*, and developed the concept of consideration of future consequences. Despite its similarity with pragmatic action for future gain, CFC has a narrower scope and emphasizes the relative weight between immediate versus distant consequences as a result of individuals' current actions.

The Concept of CFC

Strathman et al. (1994) defined CFC as "the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (p. 743). Strathman et al. argued that individuals differ in the extent to which they consider the future outcomes when they make behavioral decisions. Simply put, some people engage in a behavior that enhances immediate gratification but fail to consider its long-term consequences, while other people seek

delayed gratification considering its long-term consequences. According to Strathman et al., individuals high in CFC are more likely to consider the future consequences of their current behaviors while individuals low in CFC are more likely to focus on immediate satisfaction. In extreme cases, those who are extremely low in CFC may not consider future consequences of their behaviors at all while those who are extremely high in CFC may not consider immediate consequences at all.

The CFC Scale

The CFC Scale, developed by Strathman et al. (1994), measures the extent to which individuals consider the future consequences of their immediate behaviors and the extent to which individuals are affected by such potential future consequences. Through a number of exploratory and confirmatory factor analysis, CFC scale was finalized into 12 items. The items on CFC Scale are measured on a Likert-type scale from 1 (extremely uncharacteristic) to 5 (extremely characteristic), and seven out of 12 are reverse-worded. The scale was shown to be reliable demonstrating appropriate internal consistency (i.e., Cronbach's alpha between .80 and .86) and test-retest stability of .72. The scale has been used by other scholars and has proven to have high reliability and validity (e.g., O'Connor, Warttig,

Conner, & Lawton, 2009; Orbell, & Hagger, 2006; Orbell, & Kyriakaki, 2008; Orbell et al., 2004; Strathman et al., 1994)[2].

To demonstrate CFC Scale's utility, Strathman et al. (1994) examined the relationships between conceptually relevant measures and CFC as measured by the CFC Scale. In general, the CFC Scale has shown a good convergent validity with similar time-related concepts such as future orientation (Zimbardo & Boyd, 1999), delay of gratification (Mischel, 1958), or locus of control (Rotter & Mulry, 1965). More specifically, CFC correlates with the Deferment of Gratification Scale (Ray & Najman, 1986) for delay of gratification at .47, $p < .001$; Internal-External Locus of Control Scale (I-E Scale, Rotter, 1966) for locus of control at .25, $p < .01$; and the Stanford Time Perspective Inventory (Zimbardo, 1990) for future orientation at .43, $p < .001$.

In addition, Strathman et al. (1994) examined the scale in four different contexts (i.e., environmental behavior, health concern, alcohol use, and cigarette use) and compared the scale with four other personality traits including the conscientiousness dimension of the Big Five Personality

[2] There have been some controversies over the factor structure of the CFC Scale. Some researchers (Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008; Petrocelli, 2003; Rappange, Brouwer, & van Exel, 2009) have argued that the CFC Scale is not unidimensional, having more than one underlying factor. For example, Petrocelli and Joireman et al. found two underlying factors, and Rappange et al. found three underlying factors. Concerning the internal inconsistency of the CFC Scale, Petrocelli proposed an 8-item scale instead of the original 12-item scale. However, more recently, Hevey et al. (2010) compared different models measuring CFC, including Petrocelli's one-factor 8-item model, Petrocelli's two-factor model, Joireman et al.'s two-factor model, and Strathman's original 12-item one-factor model, and supported a unidimensionality of the original scale. They commented that the multi-factor structure found in CFC Scale may attribute to method effects, because positively-valenced items load on one factor and negatively valenced items load on the other factor in general.

Inventory (Goldberg, 1992), the Hope Scale (Snyder et al., 1991), the Life Orientation Scale (Scheier & Carver, 1985) which measures optimism-pessimism, and the Stanford Time Perspective Inventory (Zimbardo, 1990). Strathman et al. found that CFC had the ability to predict health-related and environmental behaviors over and above the four other personality traits except for the prediction of alcohol use behavior. Specifically, findings evidenced that these measures were related to the CFC Scale respectively: the Big Five Conscientiousness dimension (.49, $p < .01$), the Life Orientation Test (.33, $p < .02$), the Stanford Time Perspective Inventory (.36, $p < .01$), and the Hope Scale (.23, $p < .10$, marginally significant). Using hierarchical multiple regression analysis, they examined how much more variance could be accounted for by CFC over and above the four measures in four different contexts, and findings indicated that CFC proved to make unique contribution in 14 out of 16 (4 measures X 4 contexts) comparisons. When the orders were reversed, only one of the 16 (the Stanford Time Perspective Inventory for the alcohol use measure) proved to significantly predict a behavior beyond the CFC prediction (Strathman et al., 1994).

CFC and Behaviors

Using the CFC Scale, scholars have investigated individuals' different behavioral choices across contexts, including social political behaviors (Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Joireman, van Lange, & van Vugt, 2004; Strathman et al., 1994), consumer behaviors regarding

recycle tendency (Lindsay & Strathman, 1997), consumer attitudes regarding cause-related marketing (Tangari, Folse, Burton, & Kees, 2010), fiscal decision making behavior (Joireman, Kees, & Sprott, 2010; Joireman et al., 2005), educational setting (Joireman, 1999; Peters, Joireman, & Ridgway, 2005), organizational setting (Joireman, Daniels, George-Falvy, & Kamdar, 2006), intergroup conflict setting (Insko et al., 1998), and health behaviors (Costar, 2007; Kees, 2010, 2011; Kees, Burton, & Tangari, 2010; Morison, Cozzolino, & Orbell, 2010; O'Connor et al., 2009; Orbell, & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004). For example, Strathman et al. (1994) compared the level of CFC of college students involved in social activism with those who are not involved in. As expected by the theory, college students involved in activism showed higher CFC scores compared to the counterpart. College students high in CFC, compared to those who are low in CFC, have been found to have higher pro-environmental intentions and behaviors and higher preferences for public transportation (Joireman et al., 2001; Joireman et al., 2004), higher GPAs, regular sleep schedules (Joireman, 1999; Peters et al., 2005), and fewer sexual partners (Rothspan & Read, 1996). Individuals low in CFC tended to demonstrate high levels of impulsive buying behaviors (Verplanken & Herabadi, 2001) and temporal discounting (Kirby, Petry, & Bickel, 1999), and less financial planning for retirement (Howlett, Kees, & Kemp, 2008). In addition, individuals low in CFC used

money for a short term purchase rather than maximizing long term interests (Joireman et al., 2005).

CFC and Health Behaviors

Researchers have tested the utility of CFC within health contexts and it has been proven to be useful in predicting a range of health-related intentions and behaviors (Dorr et al., 1999; Joireman, 1999; Peters et al., 2005; Rothspan & Read, 1996; Strathman et al., 1994). According to utility theory, individuals make decisions based on the probability and utility of behavioral outcomes and the timing of the outcomes (Chapman & Coups, 1999). For example, the cost of a slim body is needed immediately in the form of refraining from eating high-calorie cake, while the benefits of slim body are obtained only later. Preventive health behaviors often involve an immediate cost in return for a delayed benefit. If individuals are low in CFC, they are expected to disregard future benefits due to immediate costs such as inconvenience or loss of pleasure (Chapman, 2005).

Empirically, scholars have found that individuals high in CFC are more likely to engage in preventive health behaviors. Those who are high in CFC have been found to have better sleep schedules (Peters et al., 2005), greater condom usage (Burns & Dillon, 2005), greater concerns on safe sex (Rothspan & Read, 1996), greater intention for vaccine uptake (Morison et al., 2010), less procrastination (Sirois, 2004; Specter & Ferrari, 2000), less cigarette use and greater health concerns (Strathman et al., 1994), and greater

involvement in disease screening (Dorr et al., 1999; Orbell & Hagger, 2006; Orbell et al., 2004). For example, Dorr et al. (1999) examined the utility of CFC using three different samples of college students (i.e., those who are waiting for a HIV test, those who are in for an unrelated medical visit, and those who are from a psychology class). Participants who were waiting to get a HIV test showed significantly higher CFC scores than those who had not considered HIV testing. In addition, participants low in CFC were more likely to engage in risky sexual behaviors than the counterpart. Similarly, individuals low in CFC were less likely to receive colorectal screening (Orbell et al., 2004) and Type 2 diabetes screening (Orbell & Hagger, 2006). Recently, Kees (2011) examined the relationship between individuals' CFC levels and risk perceptions. Findings supported the prior research, indicating a significant relationship between CFC and perceived severity of and perceived vulnerability to the health risks caused by fast food consumption.

Some research, however, failed to find the relationship between CFC and health behaviors. In one of their initial studies on CFC, Strathman et al. (1994) used CFC to predict alcohol use among college students, but it was not significant at the alpha level of .05, even though it showed marginal significance at the level of .10. They explained that college students may regard alcohol use as normative and thus, do not associate excessive drinking with health issues. Their study suggests that individuals need to be aware of the consequences of their behaviors in order for CFC to predict health

behaviors. In general, studies confirmed that present-oriented individuals (i.e., low in CFC) seem to discount future consequences more compared to future-oriented individuals (i.e., high in CFC).

CFC and Health Behaviors in the Vaccination Context

CFC has been examined in the context of vaccination, but findings have not been consistent. Chapman and Coups (1999) expected that CFC would predict vaccinating behaviors, as flu vaccinations, like other types of preventive health behaviors, involve immediate costs (e.g., monetary cost, pain of getting a shot) and delayed benefits. In the context of HPV vaccination, Morison et al. (2010) examined the role of CFC in parental decision-making about HPV vaccination on behalf of their daughters. Findings indicated that individuals high in CFC held more positive attitudes and intentions to get their daughters vaccinated, perceived greater efficacy toward the HPV vaccine, and anticipated greater regret for not having their daughters vaccinated.

Some other studies, however, have found limited association between CFC and vaccinating behaviors. Studies by Chapman and her colleagues (Chapman & Coups, 1999; Chapman et al., 2001) found a small negative relationship between the tendency of discounting future consequences, a concept similar to CFC, and the likelihood of getting a flu vaccine, and Nan and Kim (2014) found no direct effect of CFC on H1N1 vaccine uptake. As Morison et al. (2010) suggested, the inconsistent findings might be due to the

fact that the flu vaccine only remains effective for a flu season, whereas the HPV vaccine has long-term effects on preventing cervical cancer. Accordingly, HPV vaccination, compared to flu vaccination, may show a stronger relationship with CFC.

In the HPV vaccination context, however, a series of hypotheses tested by Costar (2007) also found no significant relationship between CFC and this health behavior. Costar (2007) employed CFC and the theory of planned behavior constructs (Ajzen, 1991; Fishbein & Ajzen, 1975) to predict college women's decision-making processes regarding HPV vaccination. She expected that female students high in CFC would be more likely to intend to get the HPV vaccine, to seek out relevant information, and to write positive thoughts in response to a message about HPV vaccination than female college students low in CFC. Contrary to the expectation, none of the hypotheses were supported.

While theory suggests that individuals high in CFC are expected to be more motivated to seek out HPV vaccination than those who are low in CFC, because the benefits of getting the HPV vaccine typically is long-term in nature and costs tend to be immediate, empirical evidence to date has been somewhat inconsistent. Also, previous research has not examined the relationship between CFC and *actual behavior* related to HPV vaccination. To address these gaps in the literature, the following hypothesis is proposed.

H1: Individuals high in CFC, compared to those low in CFC, are more likely to have received at least one shot of the HPV vaccine.

Potential Mediating Factors based on the Health Belief Model

Prior studies have investigated a number of possible mediating variables in the effects of CFC on behaviors, including cognitive responses (Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004), risk perception (Kees et al., 2010), anticipated affects such as regret (Morison et al., 2010; Orbell & Hagger, 2006), and fear of disease (Orbell & Hagger, 2006) when not complying with promoted behaviors. In particular, constructs from the theory of planned behavior (TPB, Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) such as subjective norm and perceived behavioral control have been used with CFC in health-related contexts (e.g., Orbell & Hagger, 2006).

Despite its relevance, interestingly, few prior studies have incorporated the Health Belief Model (HBM, Becker, 1974; Rosenstock, 1966, 1974) into their examination of CFC and health behavior, even though HBM is by far the most commonly utilized theory in health behavior research (Glanz et al., 2003).

The HBM was developed in the 1950s by a group of social psychologists at the U.S. Public Health Service who were seeking to understand and explain why some people do not accept screening tests or immunization (Becker, 1974). The HBM is based on the idea that expectancy

and value affect behavior. Value refers to what an individual places on a specific goal and expectancy means the estimated likelihood that the goal can be achieved by a certain action (Maiman & Becker, 1974). In the context of health behavior, expectancy is equivalent to perceived threat, which is a function of susceptibility and severity, while value is equivalent to perceived benefits and barriers of taking a certain action (Janz & Becker, 1984).

Specifically, the HBM consists of four core constructs. Perceived susceptibility refers to the one's perceived risk of contracting the disease. Perceived severity refers to the one's perceived seriousness of the disease and its consequences. It includes both medical consequences such as death or pain and social consequences such as the impacts of the disease on work or family life. Perceived benefits refer to the perceived effectiveness of undertaking a course of action. Perceived barriers refer to the perceived costs of undertaking a course of action and perceived obstacles that may hinder his or her performance (Rosenstock, 1974). Individuals' health behaviors are supposed to be driven by cost-benefit analysis of the consequence of taking a given action (Janz & Becker, 1984). These four factors are assumed to work additively. Therefore, as an individual perceives higher levels of susceptibility, severity, benefits, and lower levels of barriers, he or she is more likely to adopt a promoted behavior. In one meta-analysis, Janz and Becker (1984) examined the significance of each HBM construct. Findings indicated that barriers showed the highest predictability, followed by susceptibility,

benefits, and severity in a sequential order. Moreover, scholars have found additional significant constructs in connection with the HBM, such as cues to action (i.e., what triggers actual behaviors), or self-efficacy (i.e., an individual's perceived estimates of being able to successfully perform a behavior to yield a desired outcome; Brewer & Rimer, 2008).

Proven useful in various health contexts, HBM especially has been shown to offer a useful framework for understanding vaccination behavior (Brewer et al., 2007; Brewer & Fazekas, 2007; Chapman & Coups, 1999). In a recent meta-analysis of HPV vaccination research, Brewer and Fazekas (2007) reported that the four main constructs out of five of the model predicted HPV vaccine acceptability. Perceived benefit (i.e., perceived vaccine effectiveness in preventing HPV) was the strongest predictor of HPV vaccine acceptability. Perceived barrier (i.e., the factors that impede one from having vaccination) including psychological concerns (e.g., parents' concerns on promoting adolescent sexual activity), monetary cost, low perceived vaccine safety, and anticipated side effects (e.g., pain of shots) was another predictor of vaccination behavior. Perceived susceptibility (i.e., perceived likelihood that HPV infection to occur) and cues to action (i.e., situational factors that trigger one to take vaccine, such as doctor's recommendation) also predicted HPV vaccine acceptability. Only perceived severity did not seem to be related to acceptability of HPV vaccines. Since perceived cancer severity strongly predicted other health behaviors such as breast cancer screening (McCaul,

Branstetter, Schroeder, & Glasgow, 1996)), the relationship between HPV vaccine acceptability and perceived severity of cervical cancer warrants further investigation

In previous research on CFC, studies (Morison et al., 2010; von Wagner, Good, Smith, & Wardel, 2011) have incorporated parts of the HBM variables. von Wagner et al. (2011) examined the context of colorectal cancer screening and found that the barriers of performing the test (e.g., complicatedness of completing the test or time constraints) were more important for individuals low in CFC, while the benefits of completing the test (e.g., the ability to detect cancer) were more important for individuals high in CFC. In their survey of 245 parents of 11-12-year-old girls, Morison et al. (2010) found that parents high in CFC, compared to those low in CFC, showed higher levels of perceived HPV vaccine efficacy. In addition, mediation analyses indicated that CFC affected thoughts listing generated by reading a message about HPV vaccination, and that the relationships between thoughts listing and vaccinating intention was partially mediated by perceived vaccine efficacy and attitude. Very recently, Nan and Kim (2014) incorporated all four HBM constructs in examining the influence of CFC on H1N1 vaccine uptake and H1N1-related health beliefs, using a survey, and found that CFC had no direct effect on vaccine uptake, but CFC positively predict perceived severity of the H1N1 flu, perceived efficacy of the H1N1 vaccine, and perceived self-efficacy in obtaining the vaccine.

Given previous research showing significant associations between CFC and HBM variables, a research question is asked to clarify CFC's influence on all four core HBM constructs.

RQ1: What impact does CFC have on each of the following HPV-related health beliefs: perceived susceptibility to HPV, perceived severity of HPV, perceived benefits of the HPV vaccine, and perceived barriers to obtaining the HPV vaccine?

Additionally, it is unknown whether these HBM constructs play roles as mediators. In particular, it is important to understand the underlying mechanisms of the effects of CFC on behaviors, because it allows us to interpret how or why certain effects work or not. Only one previous study has investigated the mediating role of HBM constructs in examining the effects of CFC. Nan and Kim's (2014) study suggested that CFC had a significant indirect effect on vaccine uptake through perceived vaccine efficacy. To further assess the mediating role of CFC in the context of HPV vaccination, the following research question is posed.

RQ2: Will CFC have an indirect effect on HPV vaccine uptake through any of the HPV-related health beliefs?

Temporal Framing

Health behaviors often involve both long-term and short-term effects. When developing a health message, one can depict the message emphasizing either the short-term or long-term consequences associated with a health (or

unhealthy) behavior. Both of them are realistic and health campaigners need to understand which one is more effective than the other. Some scholars (e.g., Chandran & Menon, 2004; Kees, 2010, 2011) have contended that temporal distance depicted in a message may influence how individuals perceive the message, and have started examining the effects of temporal framing, defined as "the presentation of a message using a specific reference to time" (Kees, 2011, p. 19).

Whether and how the temporal framing (short-term versus long-term) of a health message might exert its persuasive power has not received much attention by researchers until recently. Two theoretical approaches, however, suggest that short-term messages might have greater persuasive impact than long-term messages. Construal level theory (Liberman & Trope, 1998; Trope & Liberman, 2000) suggests that individuals construe proximal events in more concrete terms and distal events in more abstract terms, because temporal distance affects individuals' reactions to future events by altering individuals' mental representations of these events. As temporal distance gets greater, individuals are more likely to view a distal event in a more abstract manner (i.e., high-level construals) while individuals are more likely to view a proximal event in a more concrete manner (i.e., low-level construals). That is, an event occurring in the distant future tends to be represented in a schematic manner, wherein an event occurring in the near future is often represented in a decontextualized manner. For example, in Liberman and

Trope's (1998) study, moving into a new apartment next year meant starting a new life for people, but the same event happening tomorrow was described as packing and carrying boxes. Such an effect of temporal distance has been argued to translate to temporal framing effects (Chandran & Menon, 2004; Kees, 2011). The outcomes of distal events seem more abstract than the ones of proximal events, and they may have less psychological impact than those expected to occur immediately. Therefore, a message emphasizing the long-term consequences of a given behavior may have less persuasive impacts than the one focusing on the short-term consequences.

Similarly, temporal discounting research (Chapman & Elstein, 1995; Chapman, 1996) suggests that individuals tend to discount distal outcomes to a greater extent than they do proximal outcomes. For example, people may prefer receiving $100 immediately to getting $120 one month later (Green & Myerson, 2004). Since distant consequences are more likely to be discounted, a message focusing on the future outcomes of a given behavior may be less persuasive than a message emphasizing the proximal outcomes.

In general, researchers have operationalized temporal framing in three ways. One operationalization involves presenting risks in the frame of small (e.g., day) or large (e.g., year) time units, and instances of negative consequences of an unhealthy behavior (e.g., deaths) are said to occur either every day (a short time unit) or every year (a long time unit). Studies (e.g., Bonner & Newell, 2008; Chandran & Menon, 2004; Chang & Lee, 2009; Lo,

Smith, Taylor, Good, & von Wagner, 2012) have found that such a unit manipulation results in different levels of risk perceptions and behavioral responses. For example, Chandran and Menon (2004) manipulated the temporal unit in which health-related risk information was presented and found that a "day" frame (e.g., "Every day, a significant number of people fall prey to mononucleosis.") as opposed to a "year" frame (e.g., "Every year, a significant number of people fall prey to mononucleosis.") resulted in increased levels of self-risk estimates and concern, and decreased level of self-positivity bias. In their study of the relative effects of day/year framing in the context of promoting healthy eating, Lo et al. (2012) found a negative "day" frame (e.g., "Every day, a significant number of people…suffer the consequences of eating an unhealthy diet…"), compared to a negative "year" frame (e.g., "Every year, a significant number of people…suffer the consequences of eating an unhealthy diet…"), to result in higher intentions to comply with the "five-a-day" recommendation. Similar findings in the context of charity donation have been reported by Chang and Lee (2009). They examined the relative effects of day/year framing in the context of charity donation and found that a day frame (e.g., "1,250 children die each hour due to poverty") was more effective when it was accompanied by a positive message (e.g., "With your donation, their life could become hopeful."), while a year frame (e.g., "about 11 million children die each year

due to poverty.") was more effective when accompanied by a negative message (e.g., "Without your donation, their life would be hopeless.")

The second operationalization involves conveying behavioral consequences, both positive and negative, as occurring immediately or sometime in the future (e.g., Costar, 2007; Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004; Strathman et al., 2004). These studies included both benefits attained by following a promoted behavior and costs associated with performing a promoted behavior in their messages, and manipulated them at two different time points (e.g., immediate costs and future benefits versus immediate benefits and future costs). For example, in Orbell and Hagger's (2006) study, the message focusing on immediate costs and distant benefits stated "Some people find that taking part in screening means that they have to undergo unpleasant and inconvenient procedures immediately…Some people find that taking part in screening gives them peace of mind about their health for years into the future and they also know that their early diagnosis will prevent complications and illness in years to come." The message focusing on immediate benefits and distant costs stated "Some people find that taking part in screening gives them immediate peace of mind about their health and they also know that getting an immediate diagnosis will ensure that action can be taken immediately when it will be most effective in preventing illness. Some people find that taking part in screening means that they have to undergo unpleasant and inconvenient

procedures for years into the future." However, these scholars found no significant temporal framing effects on attitude, subjective norms, perceived behavioral control, and intention toward Type 2 diabetes screening, and other studies (Orbell & Kyriakaki, 2008) using similar stimuli found no significant effects of temporal framing on attitude, subjective norms, perceived behavioral control, and intention toward sunscreen use.

The third operationalization includes presenting positive behavioral consequences as emerging immediately or sometime in the future (e.g., Gerend & Cullen, 2008; Kees, 2010, 2011). The positive consequences are depicted to be more proximal or distant while the negative consequences are not presented, unlike the second type of operationalization. For instance, Gerend and Cullen (2008) explored drinking behaviors among college students and found that emphasizing the short-term consequences of responsible drinking (e.g., "If you are going to drink, responsible alcohol use can help you avoid immediate negative health consequences."), compared to its long-term consequences (e.g., "If you are going to drink, responsible alcohol use can help you avoid long-term negative health consequences."), resulted in reduced use of alcohol and decreased frequency of binge drinking. In his series of studies, Kees (2010, 2011) described that healthy eating habits could prevent (immediate versus long-term) health risk, altering the time reference where the consequences occurred, for example, "More Healthy Food Choices Help Prevent (Immediate/Long Term) Health Risks… (Within

two hours after the fast food meal/Over time), subjects also had higher blood pressure and reported lower energy levels than those who consumed (a lower-fat meal/lower-fat meals)." His studies have found significant temporal framing effects on message persuasiveness, but not on the intention to comply with a promoted behavior.

The current study subscribes to the third type of operationalization, in which the benefits of a behavior are framed at different time points (short-term versus long-term). Most health messages advocate healthy behaviors for the prevention or detection of diseases. It is common for these messages to emphasize the benefits of following the recommended action. It is rare, however, for these messages to also mention the costs of following the recommended action. For this reason, it makes more sense to adopt the third type of operationalization of temporal framing where only benefits of a recommended behavior are mentioned but are framed either as immediate or distal.

CFC and Temporal Framing

As discussed in previous sections, there are individual differences in how steeply future outcomes are discounted and how much attention people pay to future consequences in decision making, often represented in the notion of CFC. If people differ in the extent to which they discount future outcomes, then the relative effectiveness of short- versus long-term framing may depend on this personality trait.

Indeed, the relative persuasiveness of present- versus future-oriented health messages has been most commonly investigated in conjunction with message recipients' differences in CFC. Prior research has suggested that CFC guides information processing and attitudes and intentions formation with regard to various behaviors. If an individual decides how to act based on the temporal occurrence of outcomes, as research around CFC suggests, the person should be influenced by the time frame in which those outcomes occur depicted in a message. Because high CFC individuals are more likely to concern the future consequences of their current behaviors, they are expected to respond more favorably to future-oriented messages, which focus on the future outcomes. On the other hand, since low CFC individuals are more likely to focus on the immediate satisfaction, they are expected to respond more favorably to present-oriented messages, which emphasize immediate outcomes.

A number of studies (Kees, 2010, 2011; Kees et al., 2010; O'Connor et al., 2009; Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004; Strathman et al., 1994; Tangari et al., 2010) tested how temporal framing interacts with CFC to influence message effectiveness. Strathman et al. (1994) conducted an experiment with college students on attitudes toward increased offshore oil drilling. They manipulated the temporal framing of a message describing the disadvantages and advantages of offshore oil drilling. Findings showed that individuals high in CFC were more persuaded when the

advantages were framed to be distant (e.g., "the pollution caused by oil seepage would not be likely to be seen for many years") and the disadvantages were framed as immediate (e.g., "offshore drilling is likely to lead directly to immediate reductions in gas prices"); in contrast, individuals low in CFC were more persuaded when the disadvantages were framed to be distant (e.g., "gas prices is predicted to drop eventually, but not for several years") and the advantages were framed as immediate (e.g., "oil seepage would lead to immediate increases in pollution").

Several studies, conducted by Orbell and her colleagues (Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004), also evidenced the interaction effects between CFC and temporal framing. By visiting randomly selected 50- to 69-year-old adults in a community, Orbell et al. (2004) examined the interaction effect in a colorectal cancer screening context. Findings indicated that individuals high in CFC were more likely to show positive attitudes and intentions toward colorectal cancer screening when the positive consequences were presented as lasting years and the negative consequences as immediate. Findings among low-CFC individuals showed the opposite pattern. Two additional studies supported such an interaction effect in the context of a detection behavior (i.e., a Type 2 diabetes screening program, Orbell & Hagger, 2006) and a prevention behavior (i.e., sunscreen use, Orbell & Kyriakaki, 2008). Orbell and Kyriakaki (2008), for example, manipulated temporal frames of the message in which positive and negative

consequences of sunscreen use were described. Unlike other studies that measured attitudes and behavioral intention, Orbell and Kyriakaki measured an actual behavior outcome – the number of redeemed vouchers of sunscreen lotion that had been attached to the booklet as a proximal behavioral indicator of motivation for sunscreen use. They found an effect of temporal framing among low-CFC individuals such that a present-oriented message was more effective for these individuals, but no framing effect was found among high-CFC individuals.

Kees (2010, 2011) examined the interaction of temporal framing and CFC in an obesity-related context (i.e., eating behavior and physical activity). In his study, a mock PSA message promoting healthy food choice was developed where the message was one-sided, including only positive consequences of healthy eating, unlike Orbell's stimulus that included two-sides. Kees' findings showed that low-CFC individuals were more likely to be persuaded by the message when it stressed proximal (versus distal) consequences of unhealthy food choices. Specifically, present-oriented individuals were shown to hold higher levels of risk perception and behavioral intentions toward healthy eating when the ad message was framed in short-term consequences. Unlike the findings of Orbell and Hagger (2006) and Orbell et al. (2004), but similar to Orbell and Kyriakaki's (2008) study 2, Kees found no framing effects among high CFC individuals.

A recent study (Zhao et al., forthcoming) revealed a pattern of interaction between temporal framing and CFC in the context of smoking prevention that was opposite to what had been typically found in other health contexts. Zhao et al. (forthcoming) examined smokers' responses to temporally framed graphic warning labels. Interestingly, it was found that among smokers those who were high in CFC consistently favored short-term framing over long-term framing. For smokers low in CFC, temporal framing did not make a clear difference. The authors suggested that smokers' prior extensive considerations of the health effects of smoking might account for these findings.

In the context of HPV vaccination, one study (Costar, 2007) examined the interaction effects between CFC and temporal framing in the HPV vaccination context and found no framing effects or significant interactions. She used message stimuli that included both positive and negative consequences of HPV vaccination and the consequences were either framed as occurring immediately or in the future. In close examination, her manipulation of temporal framing seems problematic. For example, in the immediate-benefit distal-cost condition, the message read "… getting vaccinated against HPV may mean putting up with some hassles in the future. These include scheduling and attending three vaccination appointments extended over a time period of six months. If you choose to get vaccinated, you may also dislike anticipating the discomfort of receiving a series of three

injections and the possibility of later experiencing soreness at the injection site. Getting vaccinated may also mean that over time you will have to pay the $180.00 cost for each of the three injections (the vaccine is covered by some but not all types of insurance)." This manipulation seems unrealistic as all these costs will have to occur prior to the benefits of getting vaccinated.

The other reason for the null findings may have something to do with the public's unfamiliarity with the vaccine at the moment the study was conducted. Costar (2007) conducted her research when Gardasil had been just approved by the FDA in 2006. Thus acceptance of the benefits or costs of the vaccine might be universally low due to unfamiliarity with it. Additionally, as Costar reasoned, high CFC individuals might have considered the negative future consequences of using the not-yet-proven vaccine. In answers to open-ended questions, individuals expressed their concerns of future side-effects.

In sum, review of the literature suggests a mixture of findings concerning the interaction between CFC and temporal framing. As such, to further test CFC's moderating effect on the relationship between temporal framing and persuasion within a HPV vaccination context, the following hypotheses are proposed.

H2: CFC will have a moderating effect on the relationships between temporal framing and attitudes toward HPV vaccination such that:

H2a: Individuals high in CFC will report more favorable attitudes toward HPV vaccination when a health message is framed in future-

oriented terms, compared to when it is framed in present-oriented terms.

H2b: Individuals low in CFC will report more favorable attitudes toward HPV vaccination when a health message is framed in present-oriented terms, compared to when it is framed in future-oriented terms.

H3: CFC will have a moderating effect on the relationships between temporal framing and intentions toward HPV vaccination such that:

H3a: Individuals high in CFC will report more favorable intentions toward HPV vaccination when a health message is framed in future-oriented terms, compared to when it is framed in present-oriented terms.

H3b: Individuals low in CFC will report more favorable intentions toward HPV vaccination when a health message is framed in present-oriented terms, compared to when it is framed in future-oriented terms.

The concept of CFC has been utilized in various contexts. However, in health contexts, specifically, in terms of vaccination behavior, research has been inconsistent. Due to the lack of research asking why and how, prior studies have shown limitations in explaining why such inconsistency exists. Additionally, a very limited number of research studies have examined the moderating effects of CFC on the relationship between temporal framing and persuasion, and results have not been consistent, partly due to the varied manipulations.

The current study, therefore, aims to shed light on the research of persuasive health message design, by (1) applying the concept of CFC to the context of HPV vaccination, (2) delving into the underlying mechanisms whereby CFC exerts its impact on health-related attitudes and intentions, and (3) examining potential moderating effects of CFC on the persuasive effects of temporal framing. This dissertation research is expected to make a theoretical contribution to the realm of persuasive health message designs by further consolidating our understanding around a potential health behavior determinant, CFC, as well as providing practical implications for health campaigners, specifically in the context of HPV vaccination.

Chapter 3: Study 1

The purpose of study 1 is to test H1 and answer RQ1 and RQ2. In specific, the current study aims to contribute to the literature on the relationships between CFC and vaccination behaviors by investigating the role of CFC in young adults' uptake of the HPV vaccine. Based on prior literature, it was predicted that:

H1: Individuals high in CFC, compared to those low in CFC, are more likely to have received at least one shot of the HPV vaccine.

Two research questions were also proposed:

RQ1: What impact does CFC have on each of the following HPV-related health beliefs: perceived susceptibility to HPV, perceived severity of HPV, perceived benefits of the HPV vaccine, and perceived barriers to obtaining the HPV vaccine?

RQ2: Will CFC have an indirect effect on HPV vaccine uptake through any of the HPV-related health beliefs?

Method

Participants and Procedure

A total of 767 undergraduate students from a large Eastern university completed an online survey in exchange for course credit. Participants consisted of 28.9% men (n = 221) and 71.1% women (n = 544) with an age range of 17-36 (M = 19.77, SD = 2.01). Whites constituted 64.2% of the sample,

Blacks 12.8%, Hispanics 5.9%, Asians 16.5%, and others .7%. The study was approved by the university's institutional review board. Participants first visited a web page providing general research information. After reading the informed consent form, subjects were asked if they were willing to participate by clicking the "agree to participate" button. Once they agreed, subjects were taken to the survey page. The whole survey questionnaire (see Appendix A) took approximately 20 minutes to complete.

Key Measures

Unless otherwise noted, all multiple-item constructs were measured with 1-7 Likert scales with "strongly disagree" (1) and "strongly agree" (7) as endpoints. The items, after appropriate reverse-coding, were averaged to form an index for each construct.

Vaccine uptake. Participants were asked if they had ever received any shot of the HPV vaccine. Among all participants, 47.8% had received all three shots, 11.7% had started getting the vaccine but have not completed all three shots, and 40.4% had not received any shot. For the purpose of this research, a dichotomous dependent variable was created by coding those having received at least one shot as "1" and those having not received any shot as "0."

Perceived susceptibility to HPV. Perceived susceptibility to HPV was assessed by three items adapted from Witte's Risk Behavior Diagnosis Scale (RBDS) (Witte, Meyer, & Martell, 2001): (1) "It is likely that I will contract the HPV;" (2) "I am at risk for getting the HPV;" and (3) "It is possible that I will

get the HPV" (Cronbach's α = .78, M = 3.00, SD =1.39). Higher scores indicate greater perceived susceptibility.

Perceived severity of HPV. Perceived severity of the HPV was assessed by three items adapted from Witte et al. (2001): (1) "I believe that the HPV will result in severe health problems;" (2) "I believe that the HPV has serious negative consequences;" and (3) "I believe that the HPV is extremely harmful" (Cronbach's α = .67, M = 4.48, SD = 1.59). Higher scores indicate greater perceived severity.

Perceived benefits of the HPV vaccine. Perceived benefits of the HPV vaccine were operationalized as perceived vaccine efficacy, which was measured by three items adapted from Witte et al. (2001): (1) "I believe the HPV vaccine is effective in preventing the HPV;" (2) "I believe if I get the HPV vaccine, I will be less likely to get the HPV;" and (3) "I believe the HPV vaccine works in preventing the HPV" (Cronbach's α = .86, M = 5.55, SD = 1.17). Higher scores indicate greater perceived benefits.

Perceived barriers to HPV vaccination. Measure of perceived barriers to HPV vaccination was adapted from McRee, Brewer, Reiter, Gottlieb, and Smith (2010) and consisted of six items. The first three items measured perceived vaccine safety by asking (1) "The HPV vaccine might cause short term problems, like fever or discomfort;" (2) "The HPV vaccine might cause lasting health problems;" and (3) "The HPV vaccine is unsafe" (Cronbach's α = .64, M = 3.42, SD = 1.17). The other three items measured perceived

logistic/financial barriers by asking (1) "It is hard for me to find a provider or clinic that is easy to get to;" (2) "It is hard for me to find a provider or clinic that has the vaccine available;" and (3) "I am concerned that the HPV vaccine costs more than I can pay" (Cronbach's a = .79, M = 2.46, SD = 1.26). Higher scores indicate greater perceived barriers.

Consideration of future consequences. CFC was measured with Strathman et al.'s (1994) CFC Scale consisting of 12 items. Sample questions included (1) I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes; (2) I consider how things might be in the future, and try to influence those things with my day to day behavior; and (3) I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date (Cronbach's a = .81, M = 4.74, SD = .78).

Control variables. In addition to gender, age, and race described above, a number of variables that might affect HPV vaccine uptake and HPV vaccination-related health beliefs were measured as control variables. Subjects were asked (1) if they had heard of HPV (89.2% responded "yes" and 10.8% responded "no"); (2) if they had ever heard of the cervical cancer vaccine or HPV shot (88.4% "yes" and 11.6% "no"); (3) if they had been infected by HPV (5.7% "yes" and 94.3% "no"); and (4) if a health care provider such as a doctor or nurse had ever talked to them about a cervical cancer vaccine or HPV shot (71.7% "yes" and 28.3% "no").

Results

Confirmatory Factor Analysis

To examine the validity of dimensionality, the 15 health belief items (i.e., perceived susceptibility, perceived severity, perceived vaccine efficacy, perceived vaccine safety, and perceived logistic/financial barriers) were submitted to a Confirmative Factor Analysis (CFA), specifying a five-factor structure, as shown in Figure 1. Results indicated a very good fit of the measurement model, according to the relative fit indices ($\chi^2 = 299.02$, $p < .001$, RMSEA = .060, CFI = .96, IFI = .96, NFI = .95).

Also, the twelve CFC items, seven of which were reverse-coded, were submitted to a CFA, specifying a one-factor structure. The fit was not very good, even though results yielded a close-to-good fit, according to the fit indices ($\chi^2 = 554.17$, $p < .001$, RMSEA = .13, CFI = .89, IFI = .90, NFI = .89).[3]

Main Results

H1 predicted that individuals high in CFC, compared to those low in CFC, would be more likely to have received at least one shot of the HPV vaccine. To test H1, a binary logistic regression with a 2-block structure was conducted with HPV vaccine uptake as the dependent variable. In the first block, control variables were entered as the predictors. They included gender, age, dummy-coded race variables (Black, Hispanic, and Asian), awareness of HPV and the HPV vaccine, talk with a health care provider about the HPV

[3] According to Mueller and Hancock (2008) and Hu and Bentler (1999), the following target values for fit indices are suggested: RMSEA ≤.06, CFI ≥.95, NFI ≥90.

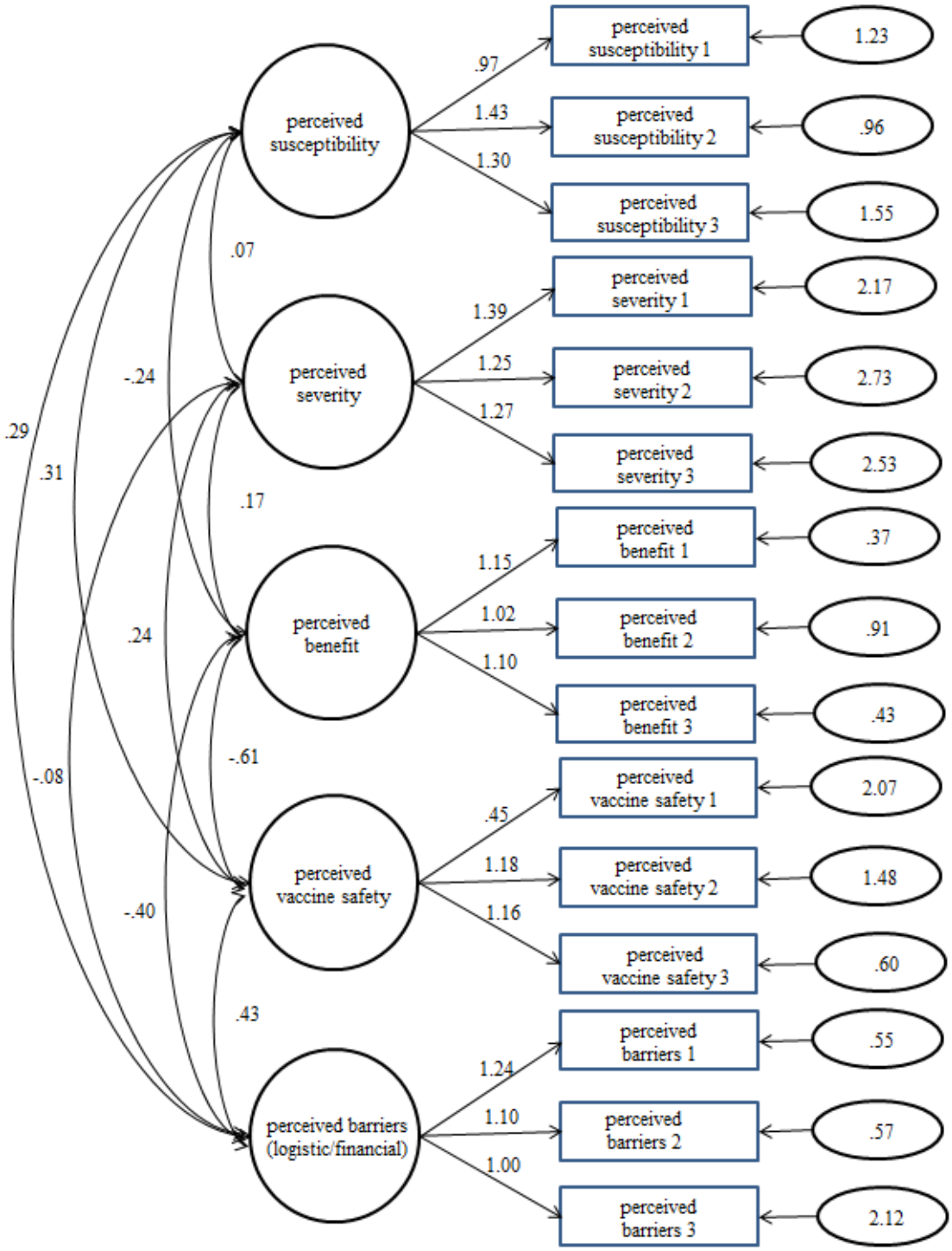

Figure 1

Confirmatory Factor Analysis Model with Five Health Beliefs Constructs

vaccine, and ever had HPV. The second block included the key predictor – CFC. Results of the logistic regression indicated that CFC had an effect on vaccine uptake that approached significance (B = -.220, p = .069, odds ratio = .802). H1 was not supported.

Several control variables emerged as significant predictors, as shown in Table 1. Having talked with a health care provider greatly increased the likelihood of receiving the vaccine (B = 2.644, p < .001, odds ratio = 14.066). Younger people (B = -.145, p = .006, odds ratio = .865) and females (B = -.510, p =.032, odds ratio = .601) were more likely to have received the vaccine. Blacks (B = -.733, p = .007, odds ratio = .480) were less likely to have received the vaccine.

To answer RQ1, a series of multiple regressions with the five HPV-related health beliefs as the dependent variables and CFC as the independent variable were conducted. The relationships between CFC and the health beliefs were tested while the control variables were accounted for. All the regression models had a similar 2-block structure. Seven control variables, including gender, age, dummy-coded race variables (Black, Hispanic, and Asian), awareness of HPV and the HPV vaccine, talk with a health care provider about the HPV vaccine, and ever had HPV, were entered in the first block to control for their possible effects on the dependent variables. CFC was entered in the second block as the key predictor.

Table 1

Predictors of HPV Vaccine Uptake

	Beta	Odds Ratio
Age	-.145**	.865**
Gender	-.510*	.601*
Race (Black)	-.733**	.480**
Race (Hispanic)	-.043	.958
Race (Asian)	-.454	.635
Ever heard of HPV	.194	1.214
Ever heard of HPV vaccine	.238	1.269
Ever had HPV	.573	1.773
Health care provider talked	2.644***	14.066***
CFC	-.220	.802

Note. Gender: female = 0, male = 1; Race (Black): Black = 1, other = 0; Race (Hispanic): Hispanic = 1, other = 0; Race (Asian): Asian = 1, other = 0; Ever heard of HPV: yes = 1, no = 0; ever heard of HPV vaccines: yes = 1, no = 0; ever infected by HPV: yes = 1, no = 0; health care provider talked: yes = 1, no = 0; CFC: higher scores indicate more future-orientation and lower scores indicate more present-orientation. Significance indicated by * $p <= .05$, ** $p <= .01$, *** $p <= .001$.

As shown in Table 2 and Figure 2, results indicated that CFC had significant effects on perceived susceptibility to HPV (β = -.148, p < .001), perceived severity of HPV (β = .142, p < .001), perceived efficacy of the HPV vaccine (β = .194, p < .001), and perceived logistic/financial barriers to obtaining the vaccine (β = -.240, p < .001). Effect on perceived vaccine safety was not statistically significant at the level of .05 (β = -.067, p = .060). Specifically, participants who were higher in CFC perceived less susceptibility to and greater severity of HPV, greater efficacy of the vaccine, less barriers to obtaining the vaccine, and had less safety concerns about the vaccine.

Furthermore, a post-hoc analysis was conducted for those who have been vaccinated and those who had not been vaccinated respectively, as shown in Table 3. The non-vaccinated group has shown weaker relationships with health beliefs, and the non-significant relationship between CFC and perceived safety of HPV vaccine was due to the null relationship of the non-vaccinated group.

A number of control variables emerged as significant predictors for at least one of the health beliefs. Older people perceived greater susceptibility to HPV (β = .097, p = .008), greater barriers regarding vaccine safety (β = .136, p < .001) and financial/logistic issues (β = .100, p = .002), and less efficacy of the vaccine (β = -.093, p = .008). Males, compared to females, perceived greater financial/logistic barriers to receiving the vaccine (β = .149, p < .001).

Table 2

Predictors of HPV-related Health Beliefs

	Perceived susceptibility to HPV	Perceived severity of HPV	Perceived efficacy of the HPV vaccine	Perceived safety of the HPV vaccine	Perceived logistic /financial barriers
Age	.097**	.024	-.093**	.136***	.100**
Gender	-.003	-.071	-.028	-.013	.149***
Race (Black)	-.036	.032	-.064	.128***	.098**
Race (Hispanic)	-.077*	.014	-.020	-.066	.036
Race (Asian)	-.062	.063	.001	.053	.140***
Ever heard of HPV	-.011	-.013	.041	.001	-.072*
Ever heard of HPV vaccine	-.074	.018	.022	-.015	-.078
Ever had HPV	.174***	-.033	-.095**	-.037	.020
Health care provider talked	.013	.054	.218***	-.141**	-.183***

Table 2 (Continued)

	Perceived susceptibility to HPV	Perceived severity of HPV	Perceived efficacy of the HPV vaccine	Perceived safety of the HPV vaccine	Perceived logistic /financial barriers
CFC	-.148***	.142***	.194***	-.067	-.240***
Total R^2	.079***	.042***	.147***	.079***	.284***
Adjusted R^2	.067***	.029***	.136***	.067***	.275***

Note. Numbers are standardized regression coefficients. Gender: female = 0, male = 1; Race (Black): Black = 1, other = 0; Race (Hispanic): Hispanic = 1, other = 0; Race (Asian): Asian = 1, other = 0; Ever heard of HPV: yes = 1, no = 0; ever heard of HPV vaccines: yes = 1, no = 0; ever infected by HPV: yes = 1, no = 0; health care provider talked: yes = 1, no = 0; CFC: higher scores indicate more future-orientation and lower scores indicate more present-orientation. Significance indicated by * $p <= .05$, ** $p <= .01$, *** $p <= .001$.

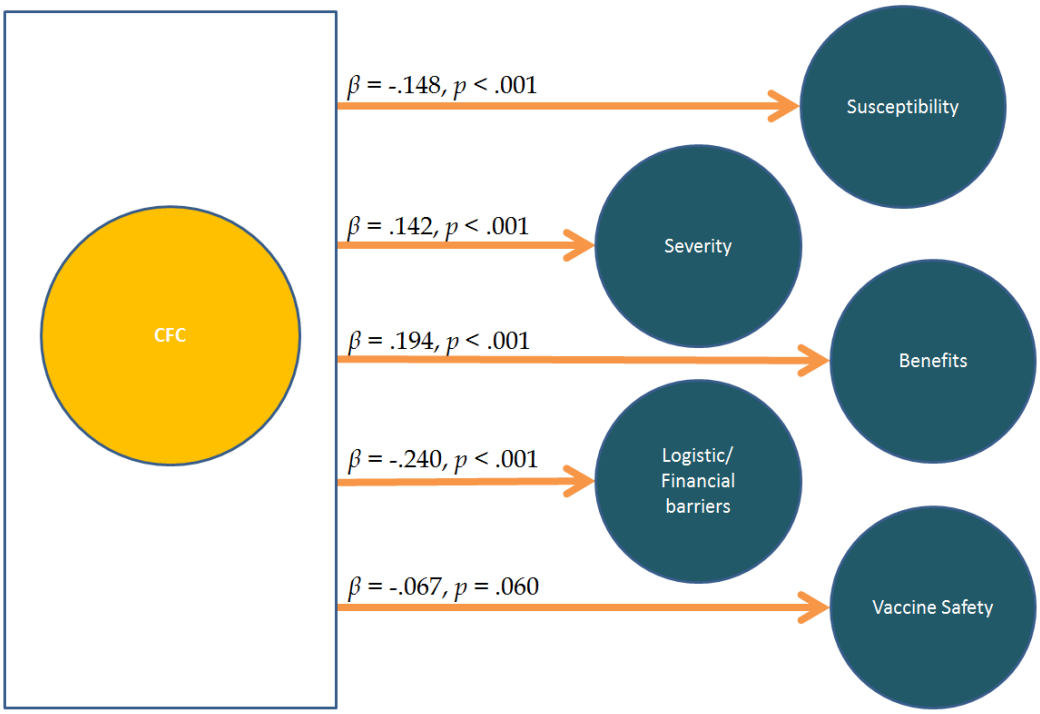

Figure 2

CFC's Impact on the Health Beliefs Constructs

Table 3

The relationships between HPV-related health beliefs and CFC in three groups, all individuals, those who had received the vaccine, and those who had not received the vaccine

	Perceived susceptibility to HPV	Perceived severity of HPV	Perceived efficacy of the HPV vaccine	Perceived safety of the HPV vaccine	Perceived logistic /financial barriers
CFC (all)	-.148***	.142***	.194***	-.067	-.240***
CFC (not-vaccinated)	-.130*	.141*	.183**	.008	-.255***
CFC (vaccinated)	-.161***	.151**	.233***	-.144**	-.267***

Note. Numbers are standardized regression coefficients. CFC: higher scores indicate more future-orientation and lower scores indicate more present-orientation. Significance indicated by * $p <= .05$, ** $p <= .01$, *** $p <= .001$.

Hispanics, compared to other racial groups, perceived less susceptibility to HPV (β = -.077, p = .032). Blacks showed more concerns about vaccine safety (β = .128, p < .001) and financial/logistic barriers (β = .098, p = .002). Asians perceived greater financial/logistic barriers to obtaining the vaccine (β = .140, p < .001).

In addition, greater awareness of HPV (β = -.072, p = .048) and the HPV vaccine (β = -.078, p = .053) decreased perceived financial/logistic barriers. Having had HPV in the past increased perceived susceptibility to HPV (β = .174, p < .001) and decreased perceived efficacy of the vaccine (β = -.095, p = .006). Having talked with a health care provider increased perceived efficacy of the vaccine (β = .218, p < .001) and decreased concerns for vaccine safety (β = -.141, p = .003) and perceived financial/logistic barriers (β = -.183, p < .001).

To answer RQ2, the potential indirect effects of CFC on vaccinating behavior through the health beliefs were examined using Preacher and Hayes' (2008) bootstrap procedure. The results showed that CFC had a significant indirect effect on HPV vaccine uptake through perceived efficacy of the HPV vaccine (*Indirect effect estimate* = .087, 95% CI = [.028, .167]). Specifically, participants higher in CFC perceived greater vaccine efficacy (B = .290, p < .001), which increased the likelihood of receiving the vaccine (B = .300, p = .002). The indirect effect through perceived vaccine safety approached significance (*Indirect effect estimate* = .078, 90% CI = [.001, .161]). Participants

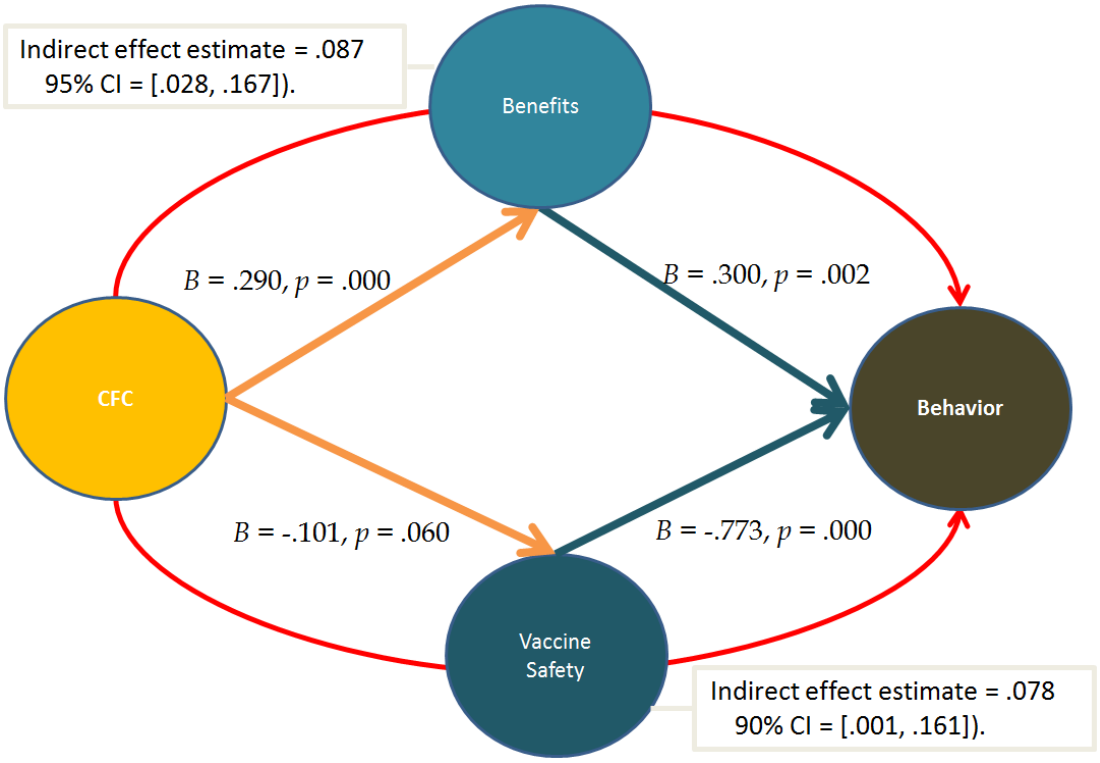

Figure 3

CFC's Indirect Effects on Behavior

higher in CFC showed less concerns about vaccine safety (B = -.101, p = .060), which increased the likelihood of receiving the vaccine (B = -.773, p < .001), as shown in Figure 3. The indirect effects of CFC on vaccine uptake through perceived susceptibility, perceived severity, and perceived logistic/financial barriers were not significant.

Discussion

Understanding psychological determinants of vaccination behaviors is critical to building effective communication aimed at enhancing vaccine uptake. Consideration of future consequences has often been linked to vaccination behaviors or intentions (e.g., Chapman & Coups, 1999; Chapman et al., 2001; Morison et al., 2010), but its role in predicting HPV vaccine uptake specifically has not been fully explored. Additionally, there has been limited research on the mediators of the relationships between CFC and vaccination behaviors. This study attempted to address these critical gaps in the literature.

The hypothesis that individuals high in CFC, compared to those low in CFC, would show a higher rate of HPV vaccine uptake was not supported. This finding was not entirely surprising given that a previous study of college students reported a similar null effect in the context of H1N1 vaccination (Nan & Kim, 2014). Indeed, the association between CFC and vaccination behaviors might be fairly small, as shown in Chapman and colleagues' studies of seasonal flu vaccination (Chapman et al., 2001; Chapman & Coups, 1999). In contrast, Morison et al. (2010) found moderately strong relationships

between CFC and parents' attitudes and intentions toward HPV vaccination of their daughters. Morison et al. argued that flu vaccination might have limited association with CFC because the lasting effect of a flu shot is limited to one season, whereas the effect of the HPV vaccine lasts throughout a person's life, resulting in a stronger association between CFC and HPV vaccination. However, it is also possible that the difference might be due to a difference in measurement; the current study measured actual vaccine uptake (as did Chapman and colleagues) and Morison et al. measured attitudes and intentions toward HPV vaccine uptake. As scholars (Ajzen, 1991; Conner & Armitage, 1998; Sutton, 1998) have repeatedly argued, intention is an important cause of an actual behavior, but not a sufficient factor.

Although CFC appears to exert little direct effect on HPV vaccine uptake, it is important to assess whether it has any indirect effects on vaccine uptake. To explore the indirect effects, this study examined the influence of CFC on a number of HPV-related health beliefs, which might work as mediators. Findings indicated that CFC was a strong predictor of several health beliefs as specified in the health belief model. First, participants higher in CFC, compared to those lower in CFC, perceived less susceptibility to and greater severity of HPV. These findings were partly consistent with a previous study (Kees, 2011), which found people higher in CFC to be more likely to perceive severity of and susceptibility to fast foods' health risks. Indeed, CFC may predispose individuals to imagining future consequences,

increasing the proximity of perceived harms. The inconsistency in the findings regarding perceived susceptibility may be attributable to the self-regulating behaviors of those with high CFC. For example, high CFC individuals may have greater concerns about safe sex and use condoms more frequently compared to those with low CFC, resulting in a lower level of perceived susceptibility to HPV.

Participants high in CFC also perceived the HPV vaccine to be more effective than did those low in CFC, consistent with the findings of Morison et al.'s (2010) study, in which parents with higher CFC perceived the HPV vaccine to be more effective. It seems likely that high CFC individuals are able to more vividly envision themselves benefiting from the vaccine in the future. Results also showed that participants with higher CFC perceived less logistic/financial barriers to obtaining the HPV vaccine. Since high CFC individuals tend to focus on future consequences (e.g., serious negative outcomes, benefits obtained after a preventive behavior), it is possible for them to regard current actions relatively less cumbersome.

An important goal of this research was to explore the mediators of the relationship between CFC and HPV vaccine uptake. The main findings indicated that CFC exerted a significant indirect effect on HPV vaccine uptake through perceived vaccine efficacy. This seems to be a particularly robust finding, given that a previous study (Nan & Kim, 2014) found a similar indirect effect mediated by perceived vaccine efficacy in the context of H1N1

vaccination. Additionally, Morison et al. (2010) found that perceived efficacy of the HPV vaccine mediated the influence of CFC on behavioral intentions toward vaccination. Collectively, these findings provide strong evidence that CFC can influence vaccination behaviors through perceived vaccine efficacy even though the direct effect of CFC on vaccination behaviors might be non-significant. Furthermore, these findings offer insights into the underlying psychological mechanism through which CFC might exert influence on vaccination-related decision-making.

In addition to the above key findings, the study also revealed some interesting patterns of results concerning racial/ethnic differences in perceptions about HPV and the HPV vaccine. Blacks perceived the vaccine to be less effective and generally perceived greater barriers to obtaining the vaccine, including heightened concerns about vaccine safety. Asians showed less perceived susceptibility to HPV and greater financial/logistic barriers to obtaining the vaccine. Blacks had relatively low vaccine uptake rates. Hispanics, on the other hand, perceived less susceptibility to HPV but also showed less concerns regarding vaccine safety.

Chapter 4: Study 2

The purpose of study 2 is to test H2 and H3. The literature review of prior studies suggests that while there is relatively consistent evidence concerning the interaction between CFC and temporal framing in a number of health contexts, findings related to HPV vaccination are inconclusive. To further test CFC's moderating effect on the relationship between temporal framing and persuasion within a HPV vaccination context, the following hypotheses proposed.

H2: CFC will have a moderating effect on the relationships between temporal framing and attitudes toward HPV vaccination such that:

H2a: Individuals high in CFC will report more favorable attitudes toward HPV vaccination when a health message is framed in future-oriented terms, compared to when it is framed in present-oriented terms.

H2b: Individuals low in CFC will report more favorable attitudes toward HPV vaccination when a health message is framed in present-oriented terms, compared to when it is framed in future-oriented terms.

H3: CFC will have a moderating effect on the relationships between temporal framing and intentions toward HPV vaccination such that:

H3a: Individuals high in CFC will report more favorable intentions toward HPV vaccination when a health message is framed in future-

oriented terms, compared to when it is framed in present-oriented terms.

H3b: Individuals low in CFC will report more favorable intentions toward HPV vaccination when a health message is framed in present-oriented terms, compared to when it is framed in future-oriented terms.

Method

Participants and Procedure

A two-group (temporal framing: present-oriented versus future-oriented) randomized experimental design was used, and the second independent variable, CFC, was measured by a scale. Undergraduate students from a large Eastern university were invited to an online survey in exchange for course credit. Only those who have not received any shot of the HPV vaccine were included in the study, resulting in a final sample size of 416. Subjects consisted of 66.3% male (n = 276) and 33.7% female (n = 140) with a mean age of 20.05 (SD = 2.37). Whites constituted 57.2%, Asians 19.5%, Blacks 16.3%, Hispanics 6.3%, and others 0.7%. This study received approval from the university's institutional review board.

Subjects were first invited to a web page providing general research information. After reading the informed consent form, subjects were asked if they were willing to participate. Once they agreed by clicking the "agree to participate" button, subjects were taken to the survey page, which took approximately 20 minutes to complete (see Appendix C). Subjects first

answered general questions measuring their prior knowledge about HPV and the HPV vaccine, and then they read a mock health message promoting HPV vaccination, which was either present-oriented or future-oriented. After reading the health message, participants were asked to fill out a questionnaire including measures of attitudes and intentions toward HPV vaccination, the CFC Scale, manipulation check measures, and demographic questions. At the end of the survey, subjects were debriefed and thanked.

Stimuli

The temporal frame of the message was manipulated by altering the time period in which the benefits of HPV vaccination would be obtained, either in the near future or in the distant future. For all messages, basic information regarding the HPV and the vaccine was provided (e.g., "Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives. HPV is usually spread through sexual contact"). For each temporal frame, two different messages were created to reduce the impact of message-specific effects. The present-oriented messages emphasized the benefits to be obtained in the short term. The message was either in an expository format (e.g., "The HPV vaccine works fast to protect your body. Imagine the huge sense of relief you will feel immediately after you have received the HPV vaccine!") or in a narrative format (e.g., " 'I know the HPV vaccine works fast to protect my body,' said

Ashley, a University of X student who recently got vaccinated against HPV, 'right after I got the HPV vaccine, I felt a huge sense of relief!' "). The future-oriented messages highlighted the benefits to be achieved in the long term. The message was either in expository form (e.g., "The HPV vaccine provides long-lasting protection to your body. Imagine the huge sense of relief you will feel years after you have received the HPV vaccine!") or in narrative form (e.g., " 'I know the HPV vaccine provides long-lasting protection to my body,' said Ashley, a University of X student who got vaccinated against HPV several years ago, 'it has been several years since I got the vaccine, I am still feeling a huge sense of relief!' "; see Appendix B).

Key Measures

Subjects were asked to answer the following questions after their exposure to one of the health messages. Unless indicated otherwise, each construct was measured with three 7-point items, and items measuring each construct were averaged to form an index for each construct (see Appendix C).

Attitudes. Attitudes toward HPV vaccination was measured using three semantic differential items adapted from past research (Ajzen, 2006; Orbell et al., 2004). Toward a statement of "Getting vaccinated against the human papillomavirus (HPV) is," subjects rated on three 7-point bipolar adjective scales: (1) "very harmful-very beneficial," (2) "very foolish-very

wise," and (3) "very bad-very good" (Cronbach's α = .95, M = 5.99, SD = 1.17). Higher scores indicate more positive attitudes toward the vaccination.

Intentions. Intentions to take the HPV vaccine were assessed by six items adapted from past research (Ajzen, 2006; Orbell et al., 2004). Subjects were asked to envision that the HPV vaccine is offered free of charge and respond to the first set of three items. They rated on a 7-point Likert scale ranging from "extremely likely" to "extremely unlikely" for each statement: (1) "How likely would you be to get the HPV vaccine sometime soon?" (2) "If you were faced with the decision of whether to get the HPV vaccine today, how likely is it that you would choose to get the vaccine?" and (3) "How likely would you be to get the HPV vaccine in the future?" (Cronbach's α = .92, M = 4.76, SD = 1.70). Next, subjects were asked to imagine that they would need to pay for the HPV vaccine about $360 and then, respond to the second set of three items, composed of the same items (Cronbach's α = .91, M = 2.94, SD = 1.53). Higher scores indicate greater intention toward the vaccination.

Consideration of future consequences. CFC was assessed by Strathman et al.'s (1994) 12 item of 7-point Likert scale, consistent with previous research (Kees et al., 2010; Kees, 2011). The items include "I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes" and "I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date." After re-

coding of the seven reverse-coded items, an index for CFC was computed by averaging the twelve items (Cronbach's α = .82, *M* = 4.48, *SD* = .81). Participants were grouped as either high CFC group or low CFC group by means of a median split. A one-way ANOVA was conducted to test if these two groups were statistically different in terms of CFC. Results indicated that the high-CFC group (*M* = 5.12, *SD* = .56) held higher CFC scores than the low-CFC group (*M* = 5.12, *SD* = .56; $F_{1,414}$ = 702.36, *p* = .000, η^2 = .63).

Control variables. In addition to gender and age described above, two variables that might affect HPV vaccine-related attitudes and intentions were measured as control variables. Subjects were asked (1) if they have heard of HPV (78.4% responded "yes" and 21.6% responded "no") and (2) if they have ever heard of the cervical cancer vaccine or HPV shot (68.5% "yes" and 31.5% "no").

Manipulation Checks. To verify that the temporal framing made the health benefits of taking the HPV shot more proximal or distal in time, participants rated on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree" for each statement: (1) "The message focuses on the short-term benefits of getting the HPV vaccine." (2) "The message focuses on the long-term benefits of getting the HPV vaccine." The second item was reversed-coded (r = .50), and then, averaged with the first item to form an index for a manipulation check.

Results

Confirmatory Factor Analysis

To examine the validity of dimensionality, the twelve CFC items were submitted to a CFA, specifying a one-factor structure. Like the results of study 1, the fit was not satisfactory ($\chi^2 = 300.96$, $p < .001$, RMSEA = .10, CFI = .90, IFI = .90, NFI = .88).

Manipulation Checks

To check for efficacy of framing manipulation, an ANOVA using the two levels of temporal framing was conducted. Results showed a significant main effect of temporal framing for the measure ($M = 3.45$, $SD = .97$, $F = 4.79$, $p = .03$), confirming manipulation's efficacy.

Main Results

Preliminary analysis showed that message format (i.e., expository or narrative) did not moderate the interaction between temporal framing and CFC. In other words, there was no significant three-way interaction involving temporal framing, CFC, and message format. To conserve power, data were collapsed cross the two message types. To test a series of hypotheses that the effects of messages with different temporal framing on the attitudes and intentions will be moderated by the CFC, a 2 (temporal framing: present-oriented versus future-oriented) X 2 (CFC: low versus high) multivariate analysis of covariance (MANCOVA) with four covariates (i.e., age, gender, having heard of the HPV, having heard of the HPV vaccine) was conducted.

The MANCOVA yielded a multivariate effect of CFC, $F(3, 406) = 4.88$, $p < .01$, partial $\eta^2 = .04$, and a non-significant effect of temporal framing, $F(3, 406) = .35$, *ns*. At the multivariate level, the two-way interaction effect between temporal framing and CFC did not yield a significant effect, $F(3, 406) = 1.87$, *ns*. However, follow-up univariate analyses showed the interaction to be significant on behavioral intention when the vaccine would cost $360 ($F_{1,408} = 4.09$, $p = .04$). Even though it was not statistically significant, the impact approached significance for the behavioral intention when the vaccine would be offered free ($F_{1,408} = 3.36$, $p = .07$) as well as attitudes ($F_{1,408} = 2.66$, $p = .10$)[4].

Interestingly, such interaction effects were not the way predicted in the hypotheses (see Table 4). As shown in Figure 4-6, individuals with high CFC generally reported more positive attitudes and intentions in response to the present-oriented messages, compared to the future-oriented messages. On the other hand, those with low CFC responded similarly to the present- and future-oriented messages. Simple effects analyses confirmed these patterns indicating that individuals with high CFC reported more positive attitudes ($p = .09$) and intentions when the vaccine was offered for free ($p = .05$) in response to the present-oriented messages, compared to the future-oriented messages, but reported no difference when the vaccine cost $360 ($p = .11$).

[4] In addition to the ANOVA, a series of multiple regressions was conducted with CFC as a continuous variable, and temporal framing as a categorical variable to examine any possible differences in interaction effects. But the analyses yielded no significant interaction results of CFC and temporal framing on attitude ($\beta = -.377$, $p > .10$), intention when the vaccine was free of charge ($\beta = -.520$, $p > .10$), and intention when the vaccine cost was $360 ($\beta = -.460$, $p > .10$).

Table 4

Summary of Means and Standard Deviations of Attitudes and Intentions in Experimental Conditions

	CFC	Attitudes		Intention: Free shot		Intention: Paid shot	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Present-oriented message	Low	5.75	1.26	4.70	1.67	2.92	1.43
	High	6.30	.91	4.96	1.62	2.99	1.63
	Total	6.02	1.14	4.83	1.65	2.96	1.52
Future-oriented message	Low	5.89	1.17	4.89	1.56	3.18	1.50
	High	6.03	1.23	4.51	1.91	2.69	1.54
	Total	5.96	1.20	4.69	1.76	2.93	1.54
Total	Low	5.81	1.22	4.78	1.62	3.04	1.46
	High	6.17	1.08	4.75	1.78	2.85	1.59
	Total	5.99	1.17	4.76	1.70	2.94	1.53

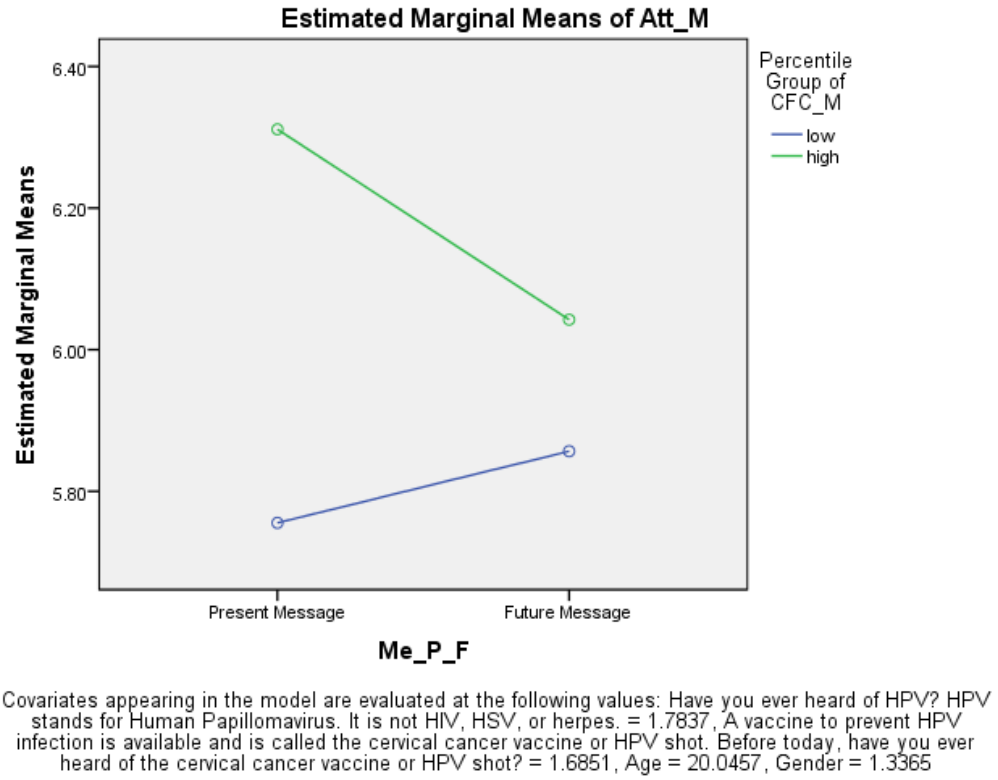

Figure 4

The Effects of CFC and Temporal Framing on Attitudes

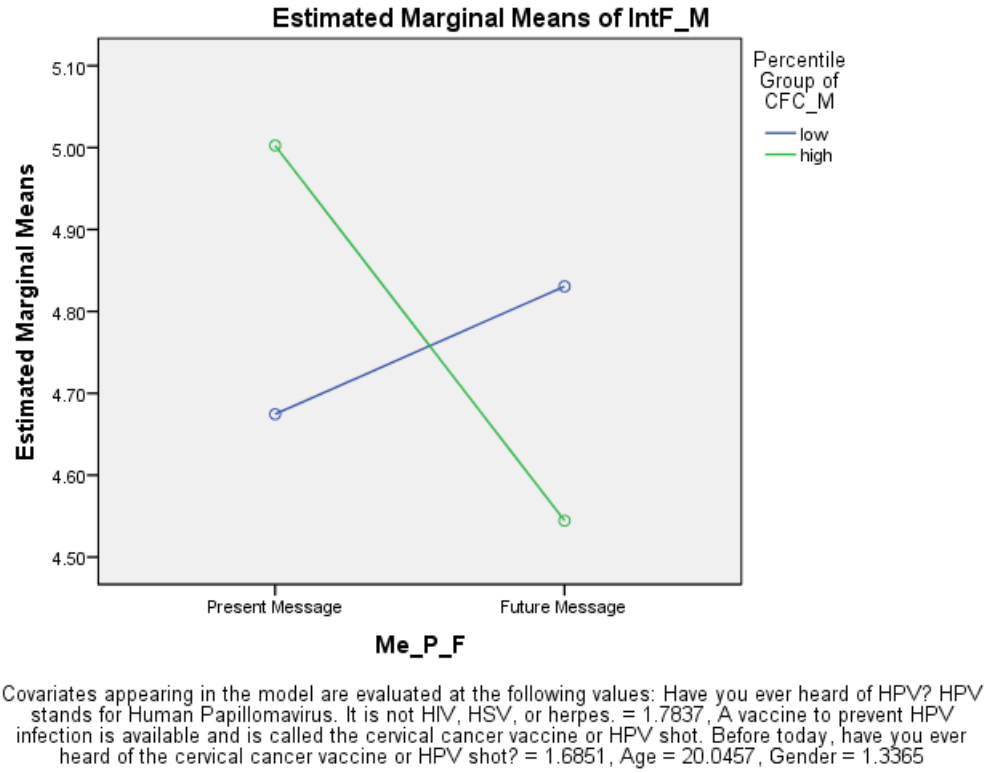

Figure 5

The Effects of CFC and Temporal Framing on Intention when the Vaccine is Offered For Free

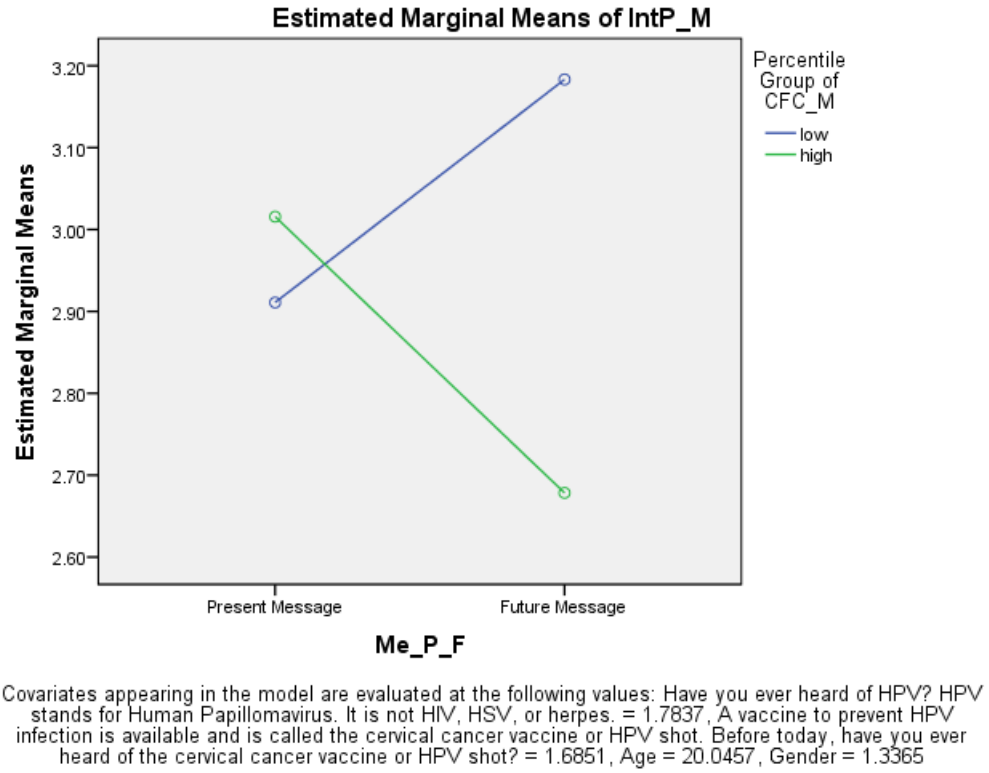

Figure 6

The Effects of CFC and Temporal Framing on Intention when the Vaccine Needs to be Paid

Those with low CFC, on the other hand, responded similarly to the present- and future-oriented messages. Therefore, H2 and H3 are rejected.

Discussion

The current study found a consistent interaction effect of temporal framing and CFC across the three outcome measures. The nature of the interaction, however, revealed findings that were opposite to predicted. High CFC individuals were more persuaded by present-oriented (versus future-oriented) messages, whereas low CFC individuals were relatively nonresponsive to temporal framing. These findings departed from previous research conducted with other health behaviors, which tend to show matched messages to be more persuasive (e.g., Kees, 2010, 2011; Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004).

One potential explanation for the seemingly unexpected findings may be related to the unique characteristics of the sample used in this study – individuals who had not received any shot of the HPV vaccine. This group of individuals chose not to vaccinate despite the fact that approximately 50% of their peers have been vaccinated. Their decisions not to vaccinate might have been made based on extensive consideration of the pros and cons of HPV vaccination: either they believed the benefits of HPV vaccination are not that great or the costs of HPV vaccination are too high. Regardless, those high in CFC were likely to have thought about HPV vaccination mostly in terms of its long-term benefits or costs. They might have also rejected much of the

reasoning based on long-term benefits, given the fact that they had not been vaccinated. Because of such high baseline awareness and/or rejection tendencies, messages couched in the long term might have seemed mundane, uninteresting, or simply unpersuasive to them. Messages emphasizing immediate benefits of HPV vaccination, on the other hand, might have struck them as fresh and informative, leading to more favorable attitudes and intentions toward HPV vaccination.

In contrast, those low in CFC were likely to have been more attentive to the short-term effects of HPV vaccination in their prior considerations. As a result, messages featuring a short-term frame might have again seemed familiar and uninspiring, hence lacking in persuasive power. At the same time, long-term framed messages might have also lacked true uniqueness to them because of the overall emphasis on distal health consequences in the general information environment around vaccination (e.g., campaigns, government sites, etc.). As a result, no clear difference between the framing conditions was observed in this study among low CFC individuals who had not gotten the HPV vaccine.

In fact, a recent study on smokers' responses to temporally framed graphic warning labels (Zhao et al., forthcoming) revealed a pattern of interaction between temporal framing and CFC that was closely aligned with the current findings. Specifically, the interaction among smokers was primarily driven by the effect of temporal framing among high CFC

individuals, who consistently favored short-term framing over long-term framing. For smokers low in CFC, temporal framing did not appear to have made a clear difference. The authors suggested that smokers' prior extensive considerations of the health effects of smoking might account for these findings.

None of the previous studies (Kees, 2010, 2011; Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004), which identified a temporal fit interaction consistent with expectation, focused on individuals who were likely to have shown considerable resistance to the promoted behavior. This key difference between existing studies and the current study is important to consider when interpreting the results.

Another argument could be made on the research design. Kees's (2010, 2011) research has found only low CFC individuals vary depending on experimental conditions, while Orbell's (Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004) research has found both low- and high-CFC individuals vary. Systematically approached, Kees has employed one-sided gain-framed messages promoting a desired behavior while Orbell has used two-sided messages including both negative and positive consequences. Prior research has shown that high CFC individuals are more concerned with possible future negative outcomes compared to low CFC individuals (Kees, 2011), and this may imply that high CFC individuals are more likely to be influenced by loss-framed message because they are more concerned of

negative (versus positive) consequences of their behavior. Since Kees' studies did not include negative consequences of the promoted behavior, high CFC individuals might not have been affected, reporting consistent persuasiveness and intention to comply across the two conditions. Orbell's studies, on the other hand, included both gain- and loss-terms in their messages, and both high- and low-CFC individuals showed different predispositions to different messages.

If the assumption is correct, the current study needs to show the same results with those of Kees (2010, 2011) that high CFC individuals do not differ across the two conditions while low CFC individuals are more affected by present-oriented messages; but, the results were the opposite. It is possible that individuals perceived the stimuli as negative. Even though the message describes the sense of relief after taking the vaccine, participants may already have had pre-assumptions about negative consequences of not taking the vaccine. Compared to the serious negative consequences associated with HPV vaccinating behavior (i.e., having disease), the positive consequence described in this message (i.e., having a sense of relief) may not have been effective enough to be perceived as positive. If participants perceived the message negative, due to the strong association between HPV-related disease and vaccination, high CFC individuals who are more sensitive to negative consequences may have reacted differently depending on experimental

conditions, as shown in the findings. Yet, it is not clear, and requires further research.

In regard to the main effects, previous research has been inconsistent. Kees (2011) found that only temporal framing has a main effect, whereas Orbell and Kyriakaki (2008) found that only CFC has a main effect. The findings of the current study showed a main effect of the CFC and no main effect of temporal framing supporting Orbell and Kyriakaki' research findings. The study indicated that CFC was a strong predictor of attitudes showing that individuals with high CFC held more positive attitudes toward the HPV vaccine.

Chapter 5: General Discussion

This chapter starts with a summary of findings, and theoretical contribution and practical implications are then discussed. Finally, limitations of the current study and future directions are presented.

Summary of Findings

Study 1 examined CFC's predictability of HPV vaccine uptake and health beliefs related to HPV vaccination. CFC's indirect effect on vaccine uptake through various health beliefs was also investigated. Specifically, H1 predicted that individuals high in CFC, compared to those low in CFC, would be more likely to have received at least one shot of the HPV vaccine. Results showed that CFC had an effect on vaccine uptake that approached significance but H1 was rejected at the level of .05. RQ1 investigated the relationships between CFC and various health beliefs, and results indicated that CFC had significant effects on perceived susceptibility to HPV, perceived severity of HPV, perceived efficacy of the HPV vaccine, and perceived logistic/financial barriers to obtaining the vaccine. Effect on perceived vaccine safety approached significance. Participants who were higher in CFC perceived less susceptibility to and greater severity of HPV, greater efficacy of the vaccine, less barriers to obtaining the vaccine, and had less safety concerns about the vaccine. RQ2 further examined the potential indirect effects of CFC on HPV vaccine uptake through the health beliefs, and the

results showed that CFC had a significant indirect effect on HPV vaccine uptake through perceived efficacy of the HPV vaccine. Specifically, participants higher in CFC perceived greater vaccine efficacy, which increased the likelihood of receiving the vaccine. The indirect effect through perceived vaccine safety approached significance. Participants higher in CFC showed less concerns about vaccine safety, which increased the likelihood of receiving the vaccine. To sum up, study 1 findings indicated that CFC did not have a direct effect on HPV vaccine uptake, but had direct effects on health beliefs, parts of which (i.e., perceived benefits, perceived vaccine safety) mediated the relationship between CFC and HPV vaccine uptake.

Study 2 examined whether CFC moderates temporal framing effects on HPV vaccination-related attitudes and intentions. Specifically, H2 and H3 predicted that individuals high in CFC would report more favorable attitudes and intentions toward HPV vaccination when a health message was framed in future-oriented (versus present-oriented) terms, while individuals low in CFC would report more favorable attitudes and intentions toward HPV vaccination when a health message was framed in present-oriented (versus future-oriented) terms.

Results showed that CFC and temporal framing had a significant interaction effect on behavioral intention when the vaccine would cost $360, and marginal effects on the behavioral intention when the vaccine would be offered free and attitudes. Such significant interaction effects, however, were

not the way predicted in the hypotheses, and thus, H2 and H3 were rejected. In particular, individuals with high CFC reported more positive attitudes and intentions in the present-oriented message, while individuals with low CFC reported more positive attitudes and intentions in the future-oriented message, and this pattern was observed across three dependent variables.

Theoretical Contributions

In general, the current research has attempted to better understand the role that CFC plays in the decision making process involving HPV vaccine uptake and in responses to health promotion messages with differential temporal frames. One of the major contributions of the current research can be found in its investigation of underlying mechanisms through which CFC exerts effects on HPV vaccine uptake. Despite the large number of research devoted to studying individual differences in CFC, very few studies have examined *how* this factor influences health behavior. The current research findings suggest that CFC is an important factor that influences several health beliefs and that CFC indirectly affects HPV vaccination behavior through some of these health beliefs.

In terms of influence of CFC on health beliefs, the current research found CFC to exert a unique effect on perceived susceptibility. Prior studies (e.g., Kees, 2011) have shown that high CFC individuals perceived greater levels of susceptibility to health risks, but the current research has shown that high CFC individuals perceived less susceptibility to getting the HPV. The

conflicting findings may be understood in the broader context of the previous literature. High CFC individuals have been found to delay their first sexual intercourse and are less likely to engage in risky sex (Rothspan & Read, 1996), as well as get involved in greater condom usage (Burns & Dillon, 2005). Therefore, for them, HPV may be viewed as easily avoidable, because some of them may not be sexually active or are not engaged in risky sexual behaviors. CFC, as such, may be conversely associated with perceived susceptibility.

Costar (2007), having found no association between CFC and HPV vaccination-related attitudes and intentions, suspected that high CFC individuals might have greater concerns on the side effects of the HPV vaccine due to its relatively new introduction, consequently resulting in low levels of attitudes and intentions toward HPV vaccine uptake. Unlike her reasoning, results of the current research indicated that high CFC individuals have shown less concerns on vaccine safety, although that relationship only approached significance. Perceived vaccine safety was not a barrier for high CFC individuals.

In addition to perceived susceptibility and perceived vaccine safety, CFC was found in this research to be a strong predictor of other health beliefs, including perceived severity, perceived financial/logistic barriers, and perceived vaccine efficacy. These findings generally corroborate previous results obtained by Nan and Kim (2014), which found CFC to be positively associated with all HBM constructs except for perceived susceptibility, or by

Kees (2011), which found a positive correlation between CFC and the perceived severity of the health risks of fast food. Therefore, the current study is generally consistent with prior studies.

Perhaps more important, the current research identified perceived benefits of the HPV vaccine (i.e., perceived efficacy of the vaccine) as a strong mediator of the effect of CFC on HPV vaccine uptake. This finding is consistent with Nan and Kim (2014), which also showed perceived vaccine efficacy as a significant mediator of the relationship between CFC and vaccine uptake, but in the context of H1N1 vaccine. Overall, the pattern of results are in line with previous findings showing perceived benefits as a strong predictor of various health behaviors, including colorectal cancer screening (von Wagner et al., 2011), HPV vaccine acceptability (Morison et al., 2010), and H1N1 vaccine uptake (Nan & Kim, 2014). This research also found perceived vaccine safety to be a notable, but weaker mediator of the relationship between CFC and vaccine uptake. The findings combined generally confirm results from a recent meta-analysis of HPV vaccination research, where Brewer and Fazekas (2007) found perceived benefits of the HPV vaccine to be the strongest predictor of HPV vaccine acceptability and perceived barriers including perceived vaccine safety as another strong predictor of vaccination behavior.

By incorporating various health beliefs, this research helps disclose a rather complicated underlying process through which CFC influences health

behaviors. In light of the inconsistencies and limited effects discovered in previous research regarding the role of CFC in predicting vaccination behavior (e.g., Chapman & Coups, 1999; Chapman et al., 2001; Costar, 2007; Morison et al., 2010; Nan & Kim, 2014), this research suggests that it may not be sufficient to consider direct effects of CFC on behavior alone. The specific indirect effects should also be assessed, particularly within the context of vaccination behaviors.

Moreover, study 1 employed actual behavior, rather than behavioral intention, as the dependent variable. A large portion of health communication research uses behavioral intentions as proximate measures of actual behaviors, because it is often difficult to measure actual health behaviors. However, many scholars (Ajzen, 1991; Conner & Armitage, 1998; Sutton, 1998) have repeatedly argued that intention is an important cause, but not a sufficient factor leading to an actual behavior. By measuring actual vaccine uptake, the current research renders this theory the most relevant test and provides practically meaningful results.

A third major contribution of this research is the assessment of the moderating role of CFC in the effects of temporal framing on HPV vaccination attitudes and behavioral intentions. Although previous research (e.g., Kees, 2010, 2011; Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell et al., 2004) tends to suggest a temporal fit hypothesis such that future-oriented (versus present-oriented) messages will be more effective for

individuals high in CFC , whereas the reverse will be true for those low in CFC, and findings from the current research suggest otherwise. High CFC individuals were more persuaded by present-oriented messages and less persuaded by future-oriented messages. Among those low in CFC, temporal framing did not have an appreciable effect on attitudes or intentions.

Findings of study 1 provide a potential interpretation for study 2 results. Study 1 found that high CFC individuals had lower levels of perceived susceptibility to the HPV, and this may have affected the way high CFC individuals process HPV promotion messages. In other words, high CFC individuals may have perceived that the HPV and HPV vaccination were less relevant to them, and thus, it is possible that such low perceived personal relevance may have overridden the influence of temporal framing in information processing. There is ample evidence that people often lack the motivation to carefully scrutinize every piece of a persuasive message, and get involved in the mechanisms where message receivers rely on simple cues or mental shortcuts, such as an emotional state or arguments strength, as a means of information processing, rather than scrutinizing messages (Chaiken, 1980; Petty, Barden, & Wheeler, 2009; Petty & Cacioppo, 1986). In the current study, high CFC individuals, rather than scrutinizing the message, may have relied on shortcuts that do not involve thoughtful consideration of message content. However, this does not explain why study 2 yielded opposite results as predicted.

As previously argued, two potential explanations exist for the observed unexpected interactions in this research. One was that the current participants, who had not received any shot of the HPV vaccine, might have gone through extensive consideration of the benefits and costs of HPV vaccination as well as rejected much of the reasoning for HPV vaccination mainly focused on the long-term consequences, until they made decisions not to get vaccinated. Due to such high awareness and/or rejection tendencies, future-oriented messages might have been less persuasive, while present-oriented messages might have struck them as fresh and informative, leading to more favorable attitudes and intentions toward HPV vaccination. Research design issues were the other possibility of the unexpected interactions. The current study employed a one-sided gain-framed message, following Kees's (2010, 2011) manipulation. Due to the strong association between HPV-related disease and vaccination, participants may have viewed the gain-framed stimuli as negative and, consequently, high CFC individuals who are possibly more sensitive to negative consequences may have reacted differently depending on experimental conditions. Yet, it requires more examinations.

Last, the current study incorporated various demographic information as the control variables. In addition to the main analyses reported in the results section, additional analyses were conducted to examine potential relationships between demographics and CFC. No statistically significant

relationships with CFC were found in age ($F_{1,763}$ = .163, p > .10) and race/ethnicity ($F_{5,759}$ = 1.558, p > .10), except for gender ($F_{1,763}$ = 9.132, p < .01) where females (M = 4.80, SD = .78) have shown higher levels of CFC than males (M = 4.61, SD = .78). With student samples, Petrocelli (2003) found that CFC was elevated in women, relative to men, but Zimbardo et al. (1997) did not find any difference. Toepoel (2010), using a web-based household sample, found that age, gender, and income had significant relationships with CFC in a univariate analysis, but these had disappeared when the variables were entered with education. Only education was statistically significant. The current study supports Petrocelli's study and partially supports Toepoel's study. Future research is suggested to systematically examine different socioeconomic and demographic variables in relations with CFC, as a better understanding of such associations would further help enhance the effectiveness of message design. In lieu with this, potential effect modifiers, such as nationality (U.S. versus other countries), culture, health contexts, different time reference (e.g., one month versus one year versus five years) may need to be further researched.

Practical Implications

In addition to these theoretical contributions, the current study also provides some implications for the design of HPV vaccine-related communication messages. First, this study revealed no main effect of temporal framing. Consequently, designing health messages to favor one

time frame over the other in general is not advisable. CFC, on the other hand, had main effects on HPV vaccine uptake-related attitudes and intentions, implying that message designers need to consider how people with different levels of CFC would react to communication messages and develop their attitudes, intentions, and behaviors, leading to the following implication.

Second, CFC can be used as the basis for audience segmentation when promoting HPV vaccination among young adults. Study 1 suggests that messages targeting low CFC individuals need to emphasize vaccine efficacy or address concerns about vaccine safety, in order to increase vaccine uptake rates. On the other hand, because high CFC individuals perceived less susceptibility to HPV, messages targeting this specific audience may need to heighten perceived risk of the HPV to further boost vaccine uptake. Furthermore, health educators may want to foster appropriate health beliefs. In particular, as study 1 findings indicated, efficacy of the HPV vaccine needs to be communicated clearly, as it mediates CFC's influence on vaccine uptake behaviors. Study 2 also suggests the utility of CFC in designing health communication messages. Messages targeting low CFC individuals may not need to worry about temporal framing while messages targeting high CFC individuals need to emphasize immediate benefits of the HPV vaccination, in order to increase vaccine uptake rates, even though the underlying factors that may affect this process need to be further researched to better develop effective health messages.

Third, the current study revealed that HPV vaccination campaigns need to increase the levels of intentions, rather than making efforts to foster positive attitudes toward the HPV vaccine. Findings reported a high level of attitudes (M = 5.99, SD = 1.17) and relatively low levels of intentions—when the shot was offered for free (M = 4.76, SD = 1.70) and the shot cost $360 ($M$ = 2.94, SD = 1.53). That means, there is little room for attitude improvement because young people already have very positive attitudes toward the HPV vaccine. However, the intentions, especially, when individuals needed to pay for the vaccine, were very low, and the difference between the two intentions shows that monetary cost is one of the key barriers that deter individuals from getting the HPV vaccine. This suggests health communication researchers and campaign practitioners need to better understand the barriers that hold people back from getting vaccinated and find ways to remove such barriers in order to boost the vaccine uptake.

Fourth, findings suggest that different message strategies may need to be used to target different age, gender, racial/ethnic groups for the promotion of HPV vaccination. For instance, Blacks and Asians perceived greater logistic/financial barriers in obtaining the vaccine, resulting in lower vaccine uptake rates. To remove or minimize these perceived barriers, campaign messages may inform them of the step-by-step processes for getting the vaccine or possible ways of financial supports such as insurance coverage. In addition, messages targeting Black communities need to make an

effort to relieve the concerns on vaccine safety, while massages targeting Hispanic communities need to emphasize the high risk of HPV.

Additionally, older people perceived greater susceptibility to HPV, greater barriers regarding vaccine safety and financial/logistic issues, and less efficacy of the vaccine, while males, compared to females, perceived greater financial/logistic barriers to receiving the vaccine. Such an age and gender difference may be attributed to the fact that previous HPV vaccination campaigns have mainly targeted girls and women aged 9 through 26, even though HPV vaccination is recommended for males and women through 26 with its ability to prevent genital warts and anal cancer. Males in this age group are one of the core targets to be reached because only a very small percentage (2.8% of males aged 19-21 and 1.7% of those aged 22-26) have received at least one shot (CDC, 2013b), and it is important to better understand about this group of people. Therefore, health communication messages may attempt to convey new information and change their prior knowledge and beliefs.

Last, health communication practitioners may need to consider several variables in designing their campaigns in general. Having talked with a health care provider not only increased perceived efficacy of the vaccine and decreased concerns for vaccine safety and perceived financial/logistic barriers, but also greatly increased the actual vaccine uptake. This implies the importance of interpersonal communication between health care providers

and people in the HPV vaccination context. Also, greater awareness of HPV and the HPV vaccine decreased perceived financial/logistic barriers, implying the need for an awareness campaign from which people can learn step-by-step instructions on how to receive the vaccine.

Limitations

Despite its contribution to the area of health communication, the current research has some limitations. First, the present study used college students as a sample with overrepresentations of certain demographic groups (e.g., Whites). Even though both studies included a number of control variables to control for their effects, it is not clear whether these findings could be applied to different groups of people. Also, possible confounding variables need to be examined. Education has been found to have a strong association with CFC (Toepoel, 2010) and this may work as a confounder when using a more general sample with different educational levels.

Second, the study used self-report as a mode of measurement, and the response validity may have been affected by this study design. In particular, the questions and messages of the present study concerned about sexual behavior and sexually transmitted diseases (STDs) and thus, they might have caused discomfort to some participants and led them to under- or over-reporting. However, both of the studies (i.e., study 1 and study 2) were online surveys that participants could take anytime and anywhere they felt comfortable. In addition, in one recent meta-analysis on the college students'

self-reports and collateral information (e.g., assessments obtained by friends), Hagman, Clifford, Noel, Davis, and Cramond (2007) found good agreement between these two modes of measurement.

Third, CFC measurement items did not yield good fits in both studies. Like some existing studies (e.g., Joireman et al., 2008; Petrocelli, 2003; Rappange et al., 2009) that argued for multi-factor structure of CFC, the current study result did not yield a good fit model of one-factor structure. Future research is required to re-examine the dimensionality of CFC.

Fourth, study 1 involves some limitations. A cross-sectional research method was employed in study 1. A number of control variables were controlled for in the analysis, but still, a causal relationship between CFC and HBM constructs as well as HPV vaccine uptake cannot be proclaimed. Alternative explanations to the current findings might be argued. Also, study 1 only explored health beliefs as mediators of the relationship between CFC and HPV vaccine uptake, but it is unclear whether other variables such as anticipated regret or fear may play roles as mediators. Future research may wish to investigate other mediators that are potentially relevant.

Moreover, the current study has limitations in interpreting the relationships between CFC and different health beliefs, because having been vaccinated against the HPV or not may have affected the current results. Especially, a causal relationship between HPV-related health beliefs and vaccinating behavior cannot be argued due to the cross-sectional nature of the

study. In answering RQ1 and RQ2, perceived susceptibility to HPV and perceived safety of the vaccine have shown to have greater associations with CFC among those who have been vaccinated than those who have not been vaccinated (please see Table 3). Those who have been vaccinated may think they are free from the HPV and the vaccine is safe, because they have already got the vaccine. Future research is suggested to use an experimental design to test a causal relationship between CFC, different health beliefs, and health behaviors.

Fifth, study 2 involves some limitations as well. The framing manipulation in study 2, although consistent with that used in previous research, is relatively simple. More elaborate framing with supporting details of the health consequences may be considered for future research to further enhance the effectiveness of the manipulation. In addition, high CFC and low CFC were grouped by median split. However, study 2 only involved those who had not received any HPV vaccines, meaning that these groups of people were already relatively low in their levels of CFC. A simple t-test indicated a significant difference ($t = 5.40$, $p < .05$) in their levels of CFC between the study 1 participants ($M = 4.74$, $SD = .78$) and the study 2 participants ($M = 4.48$, $SD = .81$), and this implies that the interaction effects of CFC and temporal framing may have been attenuated due to study 2 participants' little variation in CFC. In addition, the study focused on only immediate message reactions, attitudes, and intentions toward HPV

vaccination. Longitudinal designs with behavioral outcomes would enable a more rigorous test of the theory with clearer implications for practice.

Future Research Directions

Future research directions are suggested in four ways. First, the unexpected findings in opposite directions of the current study need to be further examined to see if the current pattern of results can be replicated. The explanations addressed above are also speculative and circumstantial. In particular, the role of current behavior (e.g., vaccine uptake status) appears to be a critical factor in the current study and is worth close attention in future theorization of CFC, temporal framing, and their interaction. The results suggest that it might be fruitful to examine the hypothesized temporal fit interaction in the context of a novel health behavior, which people do not hold strong previous attitudes to and do not differ in their current behavioral status with. Moreover, other factors, such as prior knowledge, prior attitudes, prior consideration of the HPV and HPV vaccines, may need to be incorporated in future research.

Second, the dependent variables or mediators also need to be expanded to better understand the mechanisms through which CFC influences health behaviors. Other factors, such as emotions (e.g., anxiety, anticipated regret of not receiving the vaccine, fear) or psychological factors (e.g., self-efficacy, perceived social norms) may also help understand the underlying process of decision-making in HPV vaccination.

Third, it is strongly suggested that future research uses different samples. Time perspectives (i.e., a similar concept with CFC) has been shown to be correlated with educational level (Peetsma, 2000) and income (Koenig, Swanson, & Harter, 1980), and thus, it is expected that the current sample of college students who are more educated will show higher levels of CFC. Therefore, applying the current research design to other contexts with different samples is suggested. Also, prior studies (e.g., Morison et al., 2010) have suggested the importance of parental decision-making in the context of HPV vaccination, especially, when young girls and women are strongly recommended to get the vaccine. Even though the current study did not measure parents' possible impacts on these participants' vaccine uptake, future studies are suggested to take consideration of parents' influence on their children's vaccination behaviors.

Fourth, a more sophisticated research design is also recommended. Instead of self-report methods or a cross-sectional correlational study design, future studies may involve directly assessing actual behaviors. For example, Orbell and Kyriakaki (2008), in their sunscreen lotion promotion message experiments, provided survey participants with a voucher redeemable for a sunscreen lotion. Then, redeemed vouchers served as the dependent measure in their study to reflect a proximal behavioral indicator of motivation to use sunscreen. Additionally, as described in the previous section of limitations,

longitudinal designs may help elucidate the long-term effects of temporal framing.

Appendices

Appendix A: Study 1 Measures

Questionnaire

Background

1. Have you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes. (1=`yes', 2=`no')
2. A vaccine to prevent HPV infection is available and is called the cervical cancer vaccine or HPV shot. Before today, have you ever heard of the cervical cancer vaccine or HPV shot? (1=`yes', 2=`no')
3. Where have you heard about HPV?
   DOCTOR, NURSE OR OTHER HEALTH CARE PROFESSIONAL..... 1
   FAMILY OR FRIENDS 2
   NEWSPAPER OR MAGAZINE..... 3
   AD ON TELEVISION..... 4
   TELEVISION NEWS 5
   OTHER TELEVISION (i.e., Oprah or ER).... 6
   INTERNET..... 7
   RADIO..... 8
   DON'T REMEMBER..... 9
   OTHER (SPECIFY)..... 10
4. Have you ever been told by a health care provider that you had a human papillomavirus or HPV infection? (1=`yes', 2=`no')
5. Has a health care provider such as a doctor or nurse ever talked to you about a cervical cancer vaccine or HPV shot? (1=`yes', 2=`no')
6. Which of the following best describes your current situation?
   Have completed the series of 3 shots for the HPV vaccine..... 1
   Have started, but not completed, the series of 3 shots for the HPV vaccine..... 2
   Have not received the HPV vaccine, not even one shot..... 3
7. Do you currently have health insurance, either on your own or under the insurance plan of another person? (1=`yes', 2=`no')

Health Beliefs Measures

Strongly Disagree	Mostly Disagree	Slightly Disagree	Moderate	Slightly Agree	Mostly Agree	Strongly Agree
1	2	3	4	5	6	7

A. Perceived susceptibility

1. It is likely that I will contract the HPV.
2. I am at risk for getting the HPV.
3. It is possible that I will get the HPV.

B. Perceived severity

4. I believe that the HPV will result in severe health problems.
5. I believe that the HPV has serious negative consequences.
6. I believe that the HPV is extremely harmful.

C. Perceived benefits

7. I believe the HPV vaccine is effective in preventing the HPV.
8. I believe if I get the HPV vaccine, I will be less likely to get the HPV.
9. I believe the HPV vaccine works in preventing the HPV.

D. Perceived barriers regarding vaccine safety

10. The HPV vaccine might cause short term problems, like fever or discomfort.
11. The HPV vaccine might cause lasting health problems.
12. The HPV vaccine is unsafe.

E. Perceived barriers (financial/logistic)

13. It is hard for me to find a provider or clinic that is easy to get to.
14. It is hard for me to find a provider or clinic that has the vaccine available.
15. I am concerned that the HPV vaccine costs more than I can pay.

<u>The CFC Scale</u>

For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" to the left of the question; if the statement is extremely characteristic of you (very much like you) please write a "5" next to the question. And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below.

1. I consider how things might be in the future, and try to influence those things with my day to day behavior.

2. Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.

3. I only act to satisfy immediate concerns, figuring the future will take care of itself.

4. My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.

5. My convenience is a big factor in the decisions I make or the actions I take.

6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.

7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.

8. I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.

9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.

10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.

11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur.

12. Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes.

Extremely Uncharacteristic	**Very Uncharacteristic**	**Somewhat Uncharacteristic**	**Uncertain**	**Somewhat Characteristic**	**Very Characteristic**	**Extremely Characteristic**
1	2	3	4	5	6	7

Demographic/Socioeconomic Variables

1. Age:
2. Gender: female male
3. Ethnicity/Race:
   WHITE/ BLACK/ ASIAN/ AMERICAN INDIAN/Hispanic/ Pacific Islander/ Other
4. What is your current occupational status?

Employed/Unemployed/Homemaker/Undergraduate student (year: Freshman/Sophomore/Junior/Senior)
Graduate student/Retired/Disabled/Other (specify)

5. What is your relationship status:
   Single with no committed relationship/ Single with committed relationship (6 months or longer)/ Married/ Divorced/ Widowed/ Separated/ Living with a partner/ Other (Please specify)
6. What is the highest grade or level of schooling you completed?
   LESS THAN 8 YEARS
   8 THROUGH 11 YEARS
   12 YEARS OR COMPLETED HIGH SCHOOL
   POST HIGH SCHOOL TRAINING OTHER THAN COLLEGE (VOCATIONAL OR TECHNICAL
   SOME COLLEGE
   COLLEGE GRADUATE
   POSTGRADUATE
7. How many children under the age of 18 live in your household?
   1
   2
   3
   More than 4
8. Are any of the children in your household female? (1=`yes', 2=`no')
9. What is your {combined} annual household income?
   Less than $25,000
   $25,000 - $35,000
   $35,000 - $50,000
   $50,000 - $75,000
   $75,000 - $100,000
   $100,000 - $200,000
   Over $200,000
10. Do you currently rent or own your home?
    OWN
    RENT
    OCCUPIED WITHOUT PAYING MONETARY RENT

Appendix B: Study 2 Temporal Framing Manipulation

Present-Oriented Message Version A:

Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives. HPV is usually spread through sexual contact.

Clinical trials showed that the HPV vaccine was highly effective against high-risk HPV types, which are responsible for cervical cancer in females and anal cancer in both males and females.

The HPV vaccine works fast to protect your body. Imagine the huge sense of relief you will feel immediately after you have received the HPV vaccine!

Present-Oriented Message Version B:

Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives. HPV is usually spread through sexual contact.

Clinical trials showed that the HPV vaccine was highly effective against high-risk HPV types, which are responsible for cervical cancer in females and anal cancer in both males and females.

"I know the HPV vaccine works fast to protect my body," said Ashley, a University of Maryland student who recently got vaccinated against HPV, "right after I got the HPV vaccine, I felt a huge sense of relief!"

Future-Oriented Message Version A:

Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives. HPV is usually spread through sexual contact.

Clinical trials showed that the HPV vaccine was highly effective against high-risk HPV types, which are responsible for cervical cancer in females and anal cancer in both males and females.

The HPV vaccine provides long-lasting protection to your body. Imagine the huge sense of relief you will feel years after you have received the HPV vaccine!

Future-Oriented Message Version B:

Genital human papillomavirus (HPV) is the most common sexually transmitted virus in the United States. More than half of sexually active men and women are infected with HPV at some time in their lives. HPV is usually spread through sexual contact.

Clinical trials showed that the HPV vaccine was highly effective against high-risk HPV types, which are responsible for cervical cancer in females and anal cancer in both males and females.

"I know the HPV vaccine provides long-lasting protection to my body," said Ashley, a University of Maryland student who got vaccinated against HPV several years ago, "it has been several years since I got the vaccine, I am still feeling a huge sense of relief!"

Appendix C: Study 2 Measures

Questionnaire

Background

1. Have you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes. (1=`yes', 2=`no')
2. A vaccine to prevent HPV infection is available and is called the cervical cancer vaccine or HPV shot. Before today, have you ever heard of the cervical cancer vaccine or HPV shot? (1=`yes', 2=`no')
3. Where have you heard about HPV?
   DOCTOR, NURSE OR OTHER HEALTH CARE PROFESSIONAL..... 1
   FAMILY OR FRIENDS 2
   NEWSPAPER OR MAGAZINE..... 3
   AD ON TELEVISION..... 4
   TELEVISION NEWS 5
   OTHER TELEVISION (i.e., Oprah or ER).... 6
   INTERNET..... 7
   RADIO..... 8
   DON'T REMEMBER..... 9
   OTHER (SPECIFY)..... 10
4. Have you ever been told by a health care provider that you had a human papillomavirus or HPV infection? (1=`yes', 2=`no')
5. Has a health care provider such as a doctor or nurse ever talked to you about a cervical cancer vaccine or HPV shot? (1=`yes', 2=`no')
6. Do you currently have health insurance, either on your own or under the insurance plan of another person? (1=`yes', 2=`no')
7. Which of the following best describes your current situation?
   Have completed the series of 3 shots for the HPV vaccine..... 1
   Have started, but not completed, the series of 3 shots for the HPV vaccine..... 2
   Have not received the HPV vaccine, not even one shot..... 3

Attitudes toward HPV vaccination

1. Getting vaccinated against the human papillomavirus (HPV) is:						
Very Harmful	**Mostly Harmful**	**Slightly Harmful**	**Moderate**	**Slightly Beneficial**	**Mostly Beneficial**	**Very Beneficial**
1	2	3	4	5	6	7

2. Getting vaccinated against the human papillomavirus (HPV) is:						
Very Foolish	**Mostly Foolish**	**Slightly Foolish**	**Moderate**	**Slightly Wise**	**Mostly Wise**	**Very Wise**
1	2	3	4	5	6	7

3. Getting vaccinated against the human papillomavirus (HPV) is:						
Very Bad	**Mostly Bad**	**Slightly Bad**	**Moderate**	**Slightly Good**	**Mostly Good**	**Very Good**
1	2	3	4	5	6	7

Intentions toward HPV vaccination*

1. How likely would you be to get the HPV vaccine sometime soon?

2. If you were faced with the decision of whether to get the HPV vaccine today, how likely is it that you would choose to get the vaccine?

3. How likely would you be to get the HPV vaccine in the future?

Extremely Unlikely	**Mostly Unlikely**	**Somewhat Unlikely**	**Moderate**	**Somewhat Likely**	**Mostly Likely**	**Extremely Likely**
1	2	3	4	5	6	7

*Asked twice – free of charge or with cost

The CFC Scale

1. I consider how things might be in the future, and try to influence those things with my day to day behavior.

2. Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.

3. I only act to satisfy immediate concerns, figuring the future will take care of itself.

4. My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.

5. My convenience is a big factor in the decisions I make or the actions I take.

6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.

7. I think it is important to take warnings about negative outcomes seriously

even if the negative outcome will not occur for many years.

8. I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.

9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.

10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.

11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur.

12. Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes.

Extremely Uncharacteristic	Very Uncharacteristic	Somewhat Uncharacteristic	Uncertain	Somewhat Characteristic	Very Characteristic	Extremely Characteristic
1	2	3	4	5	6	7

Manipulation Checks: Temporal framing's manipulation efficacy

1. The message focuses on the short-term benefits of getting the HPV vaccine.

2. The message focuses on the long-term benefits of getting the HPV vaccine.

Strongly Disagree	Mostly Disagree	Slightly Disagree	Moderate	Slightly Agree	Mostly Agree	Strongly Agree
1	2	3	4	5	6	7

Demographic/Socioeconomic Variables

1. Age:
2. Gender: female male
3. Ethnicity/Race:
   White/ Black/ Asian/ American Indian/Hispanic/ Pacific Islander/ Other
4. What is your current status?
   Freshman/Sophomore/Junior/Senior/Other (specify)
5. What is your relationship status:

Single with no committed relationship/ Single with committed relationship (6 months or longer)/ Married/ Divorced/ Widowed/ Separated/ Living with a partner/ Other (Please specify)

6. What is your {combined} annual household income?
   Less than $25,000
   $25,000 - $35,000
   $35,000 - $50,000
   $50,000 - $75,000
   $75,000 - $100,000
   $100,000 - $200,000
   Over $200,000
7. Do you currently rent or own your home?
   OWN
   RENT
   OCCUPIED WITHOUT PAYING MONETARY RENT

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