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Using Construal Level Theory to Promote HPV Vaccine Uptake Among College Males

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Thesis/Dissertation Acceptance**

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Using Construal Level Theory to Promote Vaccination Uptake among College Males

For the degree of Master of Arts

Is approved by the final examining committee:

Hyunyi Cho

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Glenn Sparks

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USING CONSTRUAL LEVEL THEORY TO PROMOTE HPV VACCINE UPTAKE
AMONG COLLEGE MALES

A Thesis

Submitted to the Faculty

of

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TABLE OF CONTENTS

	Page
LIST OF TABLES	v
ABSTRACT.....	vi
CHAPTER 1 INTRODUCTIONS	1
1.1 Introduction.....	1
1.2 Theoretical Framework.....	5
1.3 Review of Literature	8
1.4 Summary of Hypotheses.....	16
CHAPTER 2 METHODOLOGY	18
2.1 Research Design.....	18
2.2 Stimulus Materials	18
2.3 Instruments.....	20
2.4 Protection of Human Subjects	22
CHAPTER 3 EXPERIMENT 1 RESULTS.....	23
3.1 Design and Participants.....	23
3.2 Manipulation Check.....	24

3.3	Hypothesis Testing.....	30
3.4	Experiment 1 Conclusion.....	55
CHAPTER 4 EXPERIMENT 2 RESULTS		58
4.1	Design and Participants.....	58
4.2	Manipulation Check.....	59
4.3	Hypothesis Testing.....	64
4.4	Experiment 2 Conclusion.....	89
CHAPTER 5 DISCUSSION		93
CHAPTER 6 LIMITATIONS AND FUTURE RESEARCH.....		93
CHAPTER 7 CONCLUSION.....		99
CHAPTER 5 DISCUSSION.....		102
REFERENCES		104
APPENDICES		
Appendix A: Stimulus Materials		116
Appendix B: Hypothetical Distance		120
Appendix C: Perceived Barriers		121
Appendix D: Stage of Change		122
Appendix E: Behavior Identification From		123
Appendix F: Descriptions of Construal Level Dimensions Experiment 1		125
Appendix G: Descriptions of Construal Level Dimensions Experiment 2.....		126

LIST OF TABLES

Table	Page
Table 1: Local and Global Barriers to HPV Vaccination per Gerend et al. 2013.....	11
Table 2: Means of Construal Dimensions Experiment 1	25
Table 3: T-Tests Construal Dimensions in Low and High Construal Experiment 1	27
Table 4: T-Test Hypothetical Distance and Vaccination Status Experiment 1	29
Table 5: T-Tests Outcome Variables and Message Conditions Experiment 1	32
Table 6: Means and Standard Deviations of Outcome Variables Experiment 1	33
Table 7: Total Variance Explained: Factors of Barrier Questionnaire Experiment 1.....	40
Table 8: Summary of Items and Factor Loadings for Barrier Questionnaire	42
Table 9: Descriptives for Construal Level Barriers and Stages of Change	46
Table 10: Descriptives for Construal Level Scale Dimensions and Interactivity.....	59
Table 11: T-test Construal Dimensions and Perceived Interactivity Experiment 2.....	61
Table 12: T-test Outcome Variables and Vaccination Status	63
Table 13: T-test Outcome Variables and Message Conditions Experiment 2.....	66
Table 14: Total Variance Explained: Factors in Barrier Questionnaire Experiment 2.....	74
Table 15: Summary of Items and Factor Loadings for Barrier Questionnaire	75
Table 16: Summary of Hypothesis Testing	91

ABSTRACT

Cannon, Julie S. M.A., Purdue University, August 2016. Using Construal Level Theory to Promote HPV Vaccine Uptake Among College Males. Major Professor: Hyunyi Cho.

College males' uptake of human papilloma virus (HPV) vaccination is low. Prior research indicates perceived susceptibility to HPV among college males is also low. Construal level theory may offer a framework to alter perceived susceptibility and intention to vaccinate, but little research has examined this potential. Construal level theory provides foundational elements including that low construal level of perceptions is associated with more proximal psychological distance (hypothetical, social, temporal and spatial). Research indicates a disparity in college males' susceptibility estimates which suggests high hypothetical distance. A reduction in hypothetical distance should be indicated by a measured increase in perceived susceptibility. Additionally, if construal level primed by messages is consistently associated with stage of change, then movement through stages of change might be promoted by influencing construal level such that perceived hypothetical distance is reduced. Additionally, the impact of interactivity on construal level and associated outcomes was explored. This study included two online experiments. In the first, a message was presented in components based on construal level dimensions. The second experiment was a 2x2, including high construal interactive message low construal interactive message, high construal non-interactive message,

and low construal non-interactive message conditions. The outcome variables of interest in both cases are hypothetical distance, barrier construal, stage of change and intention to vaccinate for HPV. Construal level dimensions did not offer explanatory value to the relationship between barriers and stage of change, a temporal measure of vaccination intention. However, the results indicate that perceptions of messages as lower construal are associated with increases in perceived susceptibility and intention to vaccinate for HPV. Perceived interactivity was associated with reduced social distance and increase in intention to vaccinate. This study suggests that construal level theory may be useful in the formative evaluations for HPV-related campaigns targeting males. This study also supports the addition of interactive elements to health campaigns, however the exact type of interactivity warrants further research. Limitations and directions for future research are discussed.

CHAPTER 1. INTRODUCTION

1.1 Introduction

Fontenot et al. (2014) discovered half of the college male participants in their human papilloma virus (HPV) study "had never heard of HPV, did not know about the HPV vaccine, nor were they aware that the vaccine even existed" (p. 189). Similarly, less than 2% of males in Patel et al.'s (2011) study had received the first round of immunization. Low vaccine uptake among college males is problematic as HPV may be associated with 72% of oropharyngeal, 91% of anal, and 63% of penile cancers according to the Centers for Disease Control and Prevention (2015).

Part of the problem with vaccine uptake may stem from college males' perceptions of HPV as a distal health issue conceived at a high construal level. According to construal level theory (Trope & Liberman, 2010), construal refers to a person's interpretation of an object, event, concept, person, or action. High construal perceptions are associated with abstract ideas, while low construal perceptions are associated with more concrete details; these associations are described as heuristics or mental shortcuts (Chaiken, 1987; Trope & Liberman, 2010).

Additionally, there are several types of perceived psychological distance associated with construal level. There are four types of psychological distance: hypothetical, spatial, social and temporal (Trope & Liberman, 2010). Psychological distance describes the individual's perception of the interval between themselves and the concept in question (Trope & Liberman, 2010). In accordance with construal level theory, psychological distance increases along a spectrum in tandem with construal level of interpretations.

Construal level theory also posits that high construal level increases hypothetical distance between the self and any given object or event (Trope & Liberman, 2010). Hypothetical distance refers to perceived likelihood that an event will occur or that an object is real (Trope & Liberman, 2010). At proximal distance the perceived likelihood and realism increase (Trope & Liberman, 2010). At low construal level, hypothetical distance between self and an event, like contracting HPV or getting vaccinated for HPV, will also be lower than at high construal level (Trope & Liberman, 2010). This study posits that low construal level perception of HPV and reducing hypothetical distance between males and contracting HPV may facilitate college males' uptake of HPV vaccination.

Perceived hypothetical distance may be particularly important in the context of HPV because of male misperceptions of susceptibility documented by extant research. Specifically, research found that there is dissonance between the perceived and factual likelihood of contracting HPV among college males. In other words, according to prior studies males perceive the risk of contracting HPV as low, improbable (Fontenot, Fantasia, Charyk, & Sutherland, 2014, Mcpartland, Weaver, Lee, & Koutsky, 2010; Patel

et al., 2011; Zimet & Rosenthal, 2010) or hypothetically distal. However, according to Partridge et al.'s, (2007) study college male incidence of new HPV infection is actually greater than that of college females, possibly due to a more susceptible immune response to infection. To provide scope, roughly 63% of males in the study had acquired one or more strains of HPV within a two-year period (Partridge et al., 2007).

This study may contribute to facilitating male HPV vaccine uptake by examining the potential role of construal levels and hypothetical distance in intention to vaccinate. Little research has explored methods of changing vaccine behaviors through a construal level framework. Additionally, Soderberg, Callahan, Kochersberger, Amit, and Ledgerwood (2015) performed a meta-analysis on psychological distance manipulations and found such a dearth of research on hypothetical distance that the construct could not be included in analysis. Aside from Wakslak and Trope (2009), it appears the exploration of construal level effects on hypothetical distance is equally lacking. Soderberg et al. (2015) reference that generally speaking a meta-analysis of construal level priming on psychological distance awaits further contributions to available research. This study may contribute to this lesser explored direction in construal level theory.

Oh and Sundar (2015) suggest interactivity may play a role in persuasion by overcoming apathy and enhancing elaboration and absorption in content. Given extant research on college males indicating an almost total lack of knowledge (Fontenot et al., 2014), college males may be characterized as an apathetic audience who may benefit from the addition of interactive elements to targeted health campaigns. Additionally, Lee and Jeong (2014) posit in their serious games framework that construal level and

interactivity may be connected through reduced social distance. This study explores this potential connection, such that the effect of the desired construal level might be enhanced.

Furthermore, by examining several dimensions of susceptibility including varying levels of severity of health consequence due to HPV, this study contributes to literature on the potential enhancement of formative evaluations through an emphasis on elements of the extended parallel process model (Cho & Witte, 2005). Cho and Witte (2005) describe the importance of understanding susceptibility, severity, self and response efficacy in making major decisions on targeted campaign design. This study considers how construal level dimensions and interactivity may influence perceptions of these important theoretical components and their relationship to intention to vaccinate. The outcome of this investigation may contribute an additional formative evaluation measure to enhance the desired effect of campaign message.

This study investigates methods to reduce the dissonance between perceived and actual likelihood of contracting HPV by priming construal levels with messages. This study posits lower construal messages will be associated with more proximal hypothetical distance. Additionally, intention to vaccinate may be higher among males who report more proximal hypothetical distance given that intention is also indicative of the perceived likelihood of the immunization event. A general explanation of the logic follows in the theoretical framework provided below.

1.2 Theoretical Framework

Construal level theory posits that there is a bidirectional relationship between construal levels and perceived psychological distances, such that as either one increases or decreases the other follows a parallel pattern (Trope & Liberman, 2010)(see Figure 1). The two primary components of construal level theory, construal level and psychological distance, will be reviewed individually, followed by a brief discussion of the relationship between the two.

Construal Levels

Construal refers to mental representations of concepts, items, people, and events (Trope & Liberman, 2010). Within construal level theory, construal levels are categorized as either high or low (Trope & Liberman, 2010). The construal level describes the level of abstraction (Trope & Liberman, 2010). Moving towards abstraction involves omitting incidental object features while contributing new, value-laden meanings based on mental schema (Trope & Liberman, 2010). High construal refers to an emphasis on ends, whereas low construal refers to an emphasis on means (Trope & Liberman, 2010).

Psychological Distance

Within construal level theory, perceived psychological distance refers to the proximity of an event, person or item to the self; it is an egocentric measure (Trope & Liberman, 2010). Bar-Anan, Liberman, and Trope (2006) identify four dimensions of psychological distance: "spatial, temporal, social and hypotheticalist" (p. 609). Temporal and spatial distance are likely familiar concepts, referring to time and space. Social refers to how closely the concept relates to the personal network. Hypotheticality, heretofore termed hypothetical distance, is oriented around certainty and perceived realism of an

event. For example, attending a party becomes hypothetically closer once you receive an invitation suggesting the party is real.

Hypothetical distance has not received as much attention among researchers as the other types (Soderberg et al., 2015). In addition to filling this gap in the literature, hypothetical distance is applicable to a health context. Susceptibility refers to the perception of relevancy and vulnerability to a threat (Cho & Witte, 2005). Perceived hypothetical distance in an HPV context could be defined as perceived likelihood of contracting the disease which easily translates to vulnerability to HPV. Thus, perceived hypothetical distance will be operationalized as a susceptibility measure within the current study. Perceived susceptibility to risk is a precursor to behavior change (Cho & Witte, 2005). Additionally, intention to vaccinate is measured as the likelihood of immunization behavior taking place, thus it is posited that susceptibility and intention to vaccinate will be correlated with each other and with the lower construal condition.

Construal Level and Psychological Distance

Generally, construal level theory suggests that higher construal is heuristically associated with greater psychological distances (Trope & Liberman, 2010). In an experimental setting, Bar-Anan, Liberman, and Trope (2006) demonstrated that when pairing stimuli, participants performed at a faster pace when the construal level and distance of the stimuli were similar versus dissimilar. Trope and Liberman (2010) contend that this demonstrates the automaticity of these associations.

Association between construal level and hypothetical distance, a form of psychological distance, was also found. Previous work exploring the connections between construal level and hypothetical distance inform the design of this study.

Priming for a low-construal mindset, Wakslak and Trope (2009) asked participants to describe the goal of staying healthy in progressive why or how terms then measured their perceived likelihood of unrelated events taking place. The findings of that study suggest that high-level construal orientation primed with why terms decreased the perceived likelihood of an event taking place, while low level construal orientation was associated with greater perceived likelihood of events taking place (Wakslak & Trope, 2009). In terms of hypothetical distance, more proximal events are more likely, so low construal priming resulted in lower hypothetical distance than high construal priming. Campaigns surrounding health behaviors often compete with personal fable among young adults (Greene et al., 2000). Personal fable refers to a sense of invulnerability (Goossens, Beyers, Emmen, & van Aken, 2002), while susceptibility refers to the perception of relevancy and vulnerability to a threat (Cho & Witte, 2005). If the belief is that an individual is invulnerable, then their estimate of susceptibility will be low. The aforementioned findings by Wakslak and Trope (2009) suggest that priming for low-construal orientation may reduce hypothetical distance which increases perceived likelihood of an event taking place. So, effective low construal messages should be associated with higher perceived susceptibility. The elements of construal level theory will be further contextualized to HPV among college males in the review of literature to follow this section.

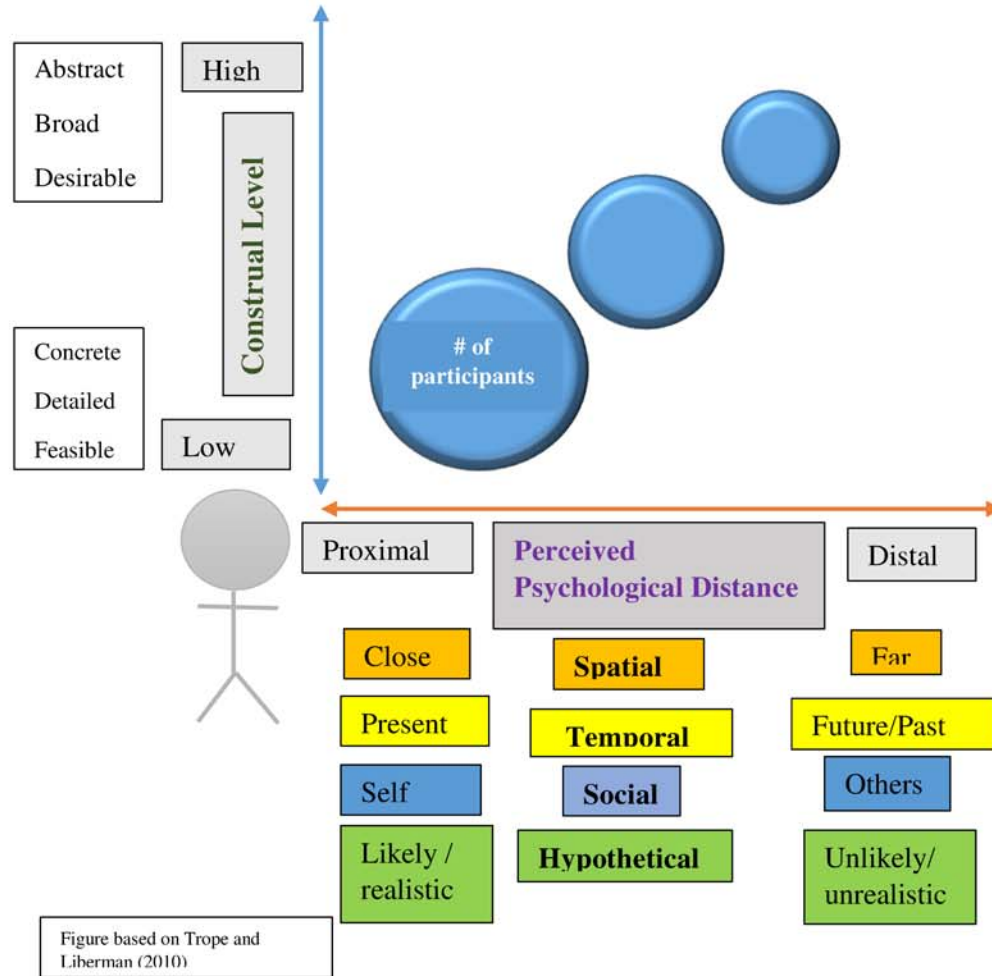


Figure 1 Principles of Construal Level Theory

1.3 Review of Literature

This study will explore the relationships among perceived construal level of HPV messages, state construal level of participant, perceived interactivity of messages, perceived hypothetical distance between males and HPV, construal level of perceived barriers, and the intention of college males to vaccinate. If this study finds evidence supporting the hypothesis that lower construal level messages are associated with higher

intention to vaccinate in the context of HPV among males, then it provides an additional framework for vaccine campaigns designed to promote progress through stages of change.

Stage of Change and HPV among College Males

A temporal version of intention to vaccinate will be assessed through stage of change framework (Prochaska et al., 1992). This framework has been applied in a plethora of health contexts as a measure of success or in some instances as formative for campaign development (Maciejewski, Zhang, Block, & Prigerson, 2007; Patel et al., 2011). There are five stages of change: pre-contemplation, contemplation, preparation, action and maintenance (Prochaska et al., 1992). Pre-contemplation includes those individuals who do not plan to vaccinate in the next six months, contemplation includes those who intend to vaccinate in six months, preparation includes those who plan to vaccinate within 30 days (Fernandez, Amoyal, Paiva, & Prochaska, 2014). Due to the nature of vaccination, maintenance is unnecessary and can be combined with action wherein participants who report they have already been immunized would fit into this final stage (Fernandez et al., 2014). Patel et al. (2011) found that most college aged males in their study were in the contemplation stage of HPV vaccination, although they note a selection bias may have occurred exaggerating the number of males who had moved beyond pre-contemplation. Fernandez, Amoyal, Paiva, and Prochaska's, (2014) findings support the concept of a selection bias in Patel et al.'s (2011) study.

Fernandez et al. (2014) found that over half of their college male sample were in pre-contemplation stage and only 14% had reached contemplation stage. There are a number of explanations for why males may not be moving toward vaccine acceptance, the obstacles they must overcome are described as barriers.

Barriers

According to prior studies barriers to HPV may be construed at high or low level, and lower construal level of barriers may be positively associated with higher intention to vaccinate (Gerend, Shepherd, & Shepherd, 2013). Barriers are obstacles to behavior change or adoption and may refer to elements of self and response efficacy. Self efficacy refers to feasibility of a complying to a health behavior and response efficacy refers to perceptions that the health behavior will actually have the desired effect (Cho & Witte, 2005).

Gerend et al. (2013) performed a factorial analysis to designate barriers to vaccination among women as local or global. Table 1 displays the resultant categorization of barriers. Liberman and Förster (2009) found the local concepts were perceived at low construal and global at high construal, so these barriers can easily be translated into construal level terms. Additionally, many of the same barriers have been expressed in research among males. Brewer and Fazekas's (2007) systematic review found that barriers to HPV vaccination included low level, concrete barriers like cost, as well as value-oriented barriers like potential promiscuity, vaccine safety, and anticipated side effects among a broad range of populations. Daley et al. (2012) found that among males potential cost (low-level) and side effects (high-level) were the most commonly

reported barriers in a choose all that apply list format. Cost in that case was describes as “too high for me to pay” (p. 779) and side effects were undefined in the list (Daley et al. 2012). Since side effects were undefined and general, factor analysis should indicate an association with high construal level.

Table 1

Local and Global Barriers to HPV Vaccination

Local	Global
Too expensive	Low need for vaccine
Insurance coverage issues	Not sexually active
Cannot get to a clinic	Monogamous relationship
Do not have time to make appointment	Safety concerns
Do not have time for multiple appointments	Not enough research
	Vaccine too new
	Uneducated about HPV

(Gerend et al., 2013, p. 15)

Liddon, Hood, Wynn, and Markowitz's review (2010) found that high construal barriers such as potential side effects, and a belief the vaccine is unnecessary due to lack of risk, and lack of evidence to “prove benefit of the vaccine to men” (p.118) were associated with vaccine rejection by males. However, none of these studies directly assessed an association between construal level of barrier and the temporal element of stage of change. This study seeks to examine the association between construal levels of barriers and temporality of stage of change.

Although Gerend et al. (2013) suggest testing an association between temporal priming and stage of change, Soderberg, Callahan, Kochersberger, Amit, and Ledgerwood's (2015) meta-analysis indicated a dearth of research related to hypothetical distance. In order to offer a more substantial contribution to the literature, this study will address the challenge of applying construal level concepts to stage of change and intention to vaccinate, including terms of hypothetical distance.

Relationship between Hypothetical Distance and HPV Vaccination among College Males

Perceived lack of risk or susceptibility to HPV is one reason males may believe the vaccine is inapplicable to men. In other words, HPV may be perceived as a hypothetically distal issue among college males. Two reasons for this perception include missing information (Daley et al., 2012; Madden, Nan, Briones, & Waks, 2012) and feminization of HPV (Mcpartland et al., 2010; Palefsky, 2010; Patel et al., 2011; Petrovic et al., 2011). Based on the principles of construal level theory these obstacles to proximity can be overcome by priming lower construal level mindsets (Wakslak & Trope, 2009), such that there is a matching effect between the issue and the construal (Lee & Jeong, 2014). Matching effects refer to congruency between content and construal level (Fujita & Carnevale, 2012). Matching effect should enhance the effect of construal level in decision making (Fujita & Carnivale, 2012).

Susceptibility as indicative of perceived hypothetical distance.

Hypothetical distance may be operationalized as probability assessments in relation to an event (Todorov, Goren, & Trope, 2007). Concerning HPV, high hypothetical distance may mean perceived low probability of contracting HPV.

Inaccurate, low susceptibility estimates have been documented among men regarding HPV (Fontenot, Fantasia, Charyk, & Sutherland, 2014; Mcpartland et al., 2010; Patel et al., 2011). For instance, Fontenot et al. (2014) reported that college men in their study showed low HPV vaccine awareness, knowledge, perceived severity, and perceived susceptibility" (p.190). These low susceptibility estimates suggest low perception of likelihood i.e. high hypothetical distance between men and HPV.

Hypothetical distance and missing information regarding HPV.

Greater hypothetical distance creates uncertainty about whether an event will realistically take place and uncertainty generates greater hypothetical distance (Wakslak, Trope, Liberman, & Alony, 2006). The perception of missing information surrounding male HPV also contributes to high hypothetical distance. Daley et al. (2012) found that missing information regarding the HPV vaccination in male contexts influenced the decision to vaccinate to a greater degree than knowledge level about HPV itself. Unavailable information about HPV creates a sense of uncertainty and uncertainty increases hypothetical distance (Glaser, Lewandowski, & Düsing, 2015). However, Wakslak et al. (2006) state that perceived distance can operate independent of knowledge level. If this is the case, then indirectly reducing hypothetical distance by manipulating construal level could compensate for missing or unavailable information in the vaccination decision-making process.

Association between Feminization of HPV and high hypothetical distance.

The feminization of HPV creates psychological distance between men and HPV. Feminization of HPV refers to the association between the vaccine and women's health rather than health in general. Patel et al. (2011) suggests that both the media and CDC

contributed to the feminization of the HPV vaccine, obfuscating the benefits of immunization among males causing men to disassociate the vaccine from their own health promotion. Ruiz and Barnett, (2015) confirmed via semantic analysis of HPV websites that references to men and boys are far fewer than to women. All of this despite a 20% higher incidence of HPV infection among college males than college females (Partridge et al., 2007).

Theoretically, the four types of psychological distance also impact perceptions of one another (Trope & Liberman, 2010). For example, a hypothetically proximal event should be related to perceptions of the event as temporally, spatially and socially closer as well (Trope & Liberman, 2010). Likewise, a socially distal event may enhance hypothetical distance. Men in Mcpartland et al.'s, (2010) HPV attitude study did not feel they were highly susceptible to HPV nor that it posed a severe threat to themselves. However, many men did understand the severity of the threat to their female partners (Mcpartland et al., 2010). If men construe HPV as something that happens to the other i.e. women, then it is socially distal and may influence the documented lack of perceived susceptibility as well. Since changing one distance can impact the others, addressing hypothetical distance through priming low construal mindsets may overcome this obstacle to HPV vaccination.

Interactivity may enhance the influence of social distance on hypothetical distance. Modality interactivity extends beyond a threaded exchange to include various attributes of the media interface (Guillory & Sundar, 2014). According to Guillory and Sundar (2014) functional interactivity relies on peripheral attraction and can override content quality in perception formation, similar to the way Wakslak and Trope (2009)

suggest construal level can overcome barriers. In an anti-smoking study modality interactivity improved perceived quality of content and persuasive appeal of the message, in addition to perceptions of smoking as less attractive, among participants (Oh & Sundar, 2015). Oh and Sundar (2015) suggest testing the impact of different forms of interactivity on persuasion. Additionally, according to Lee and Jeong (2014) changes in attitude are affective learning outcomes and may lead to behavioral outcomes. They also suggest that affective components in serious games may be associated with lower construal processing styles (Lee & Jeong, 2014). Incorporating interactivity may influence social distance. According to Lee & Jeong's (2014) construal level based serious games design framework, interactivity enhances self-reference by positioning the participant in an agentic role. This study proposes that interactivity with a message may also enhance identification and reduce social distance, thus influencing perceived hypothetical distance. This relationship would be in accordance with the construal level theory proposition that all forms of psychological distance are interdependent.

If hypothetical distance can be manipulated by message construal level then perceived susceptibility and progress through stages of change may be enhanced by manipulating construal. Additionally, this study will assess if Gerend et al's (2013) finding that lower construal level barriers were associated with intention to vaccinate holds true among males. A summary of hypotheses follows this section.

1.4 Summary of Hypotheses

Hypothesis 1: Intention to vaccinate for HPV among college males will be greater when exposed to low construal rather than high construal messages.

Hypothesis 2: Low construal message exposure will predict lower hypothetical distance between self and HPV when compared to high construal message exposure.

Hypothesis 3: Lower hypothetical distance will be more strongly associated with lower construal barriers to HPV vaccination when compared to higher construal barriers.

Hypothesis 4: Lower construal barriers will be more strongly associated with temporally proximal intention to vaccinate within stage of change than to temporally distal intention to vaccinate (4a) and higher construal barriers will be more strongly associated with temporally distal intention to vaccinate within stage of change than to temporally proximal intention to vaccinate (4b).

Hypothesis 5: Exposure to low construal message will be associated with later stages of change (5a) and exposure to high construal message will be associated with earlier stages of change (5b).

Hypothesis 6: Lower hypothetical distance will be associated with higher intention to vaccinate for HPV.

Hypothesis 7: Interactive conditions will be associated with lower perceived social distance (7a) and lower perceived social distance will be associated with lower hypothetical distance (7b).

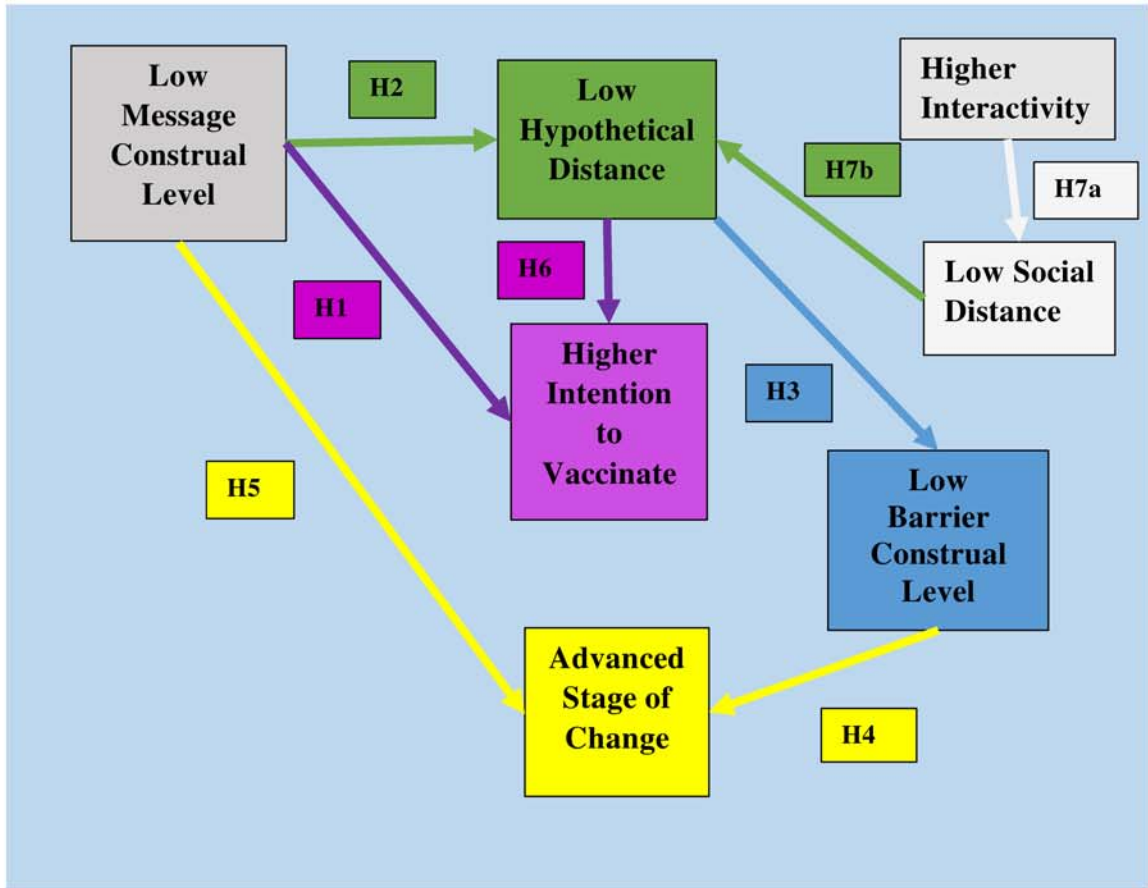


Figure 2: Model of Hypotheses

CHAPTER 2. METHODOLOGY

2.1 Research Design

Two online experiments explored the hypotheses in this study. The first experiment took the form of a two-condition, between-subject construct priming experiment followed by a post-test assessment. In the second experiment, a two-by-two factorial experiment isolated the effect of interactivity and tested the messages as a whole. The two-by-two experiment included low and high construal messages, with and without an interactive element. The construal level of the message was the independent variable. In the event that the primes were ineffective, a secondary measure of the participant's perceived message construal level acted as the independent variable. Outcome variables of interest are hypothetical distance, perceived barriers, stages of change, and intention to vaccinate.

2.2 Stimulus Materials

The messages were designed to appear as infographics, often associated with social media marketing campaigns. This format was selected since a low-involvement population like college males in the HPV context are unlikely to actively seek information, but may be exposed passively on platforms they engage with for other reasons.

The construal level of the messages was manipulated through four constructs, temporality, abstractness, means versus ends oriented framing and social distance. The constructs were manipulated emphasized in a number of ways.

Temporally, a year-long frame was used in the high construal condition and a 20 minute frame in the low construal condition (Stephan, Liberman, & Trope, 2011).

Abstractness was increased by using medical terminology (Sherman, Cialdini, Schwartzman, & Reynolds, 1985), abstract imagery of the HPV virus itself (Amit, Wakslak, & Trope, 2013), and a bar graph representation of susceptibility. To reduce abstractness, a photograph of a male with oral HPV (Amit et al., 2013), common language (Sherman et al., 1985), and pictorial representation of susceptibility were employed.

Means oriented concepts were incorporated in the prevention portion of the low construal message and ends oriented concepts were incorporated in the high construal message. In accordance with Trope and Liberman (2010) low construal information is concrete, so the message for the low construal groups contained information on where and how to get vaccinated, in addition to information regarding how HPV can be contracted and identified. Conversely, the high construal message expressed the 'why' concepts of vaccination including herd immunity and prevention of cancer (Palefsky, 2010).

In experiment 1, social distance was manipulated by offering interactivity in the low construal condition, but not the high construal condition. In experiment 2, this interactivity manipulation was tested in a 2x2, where both high and low construal messages were presented as either interactive or not. These conditions are in congruence with operationalization of construal level tested within construal level literature (Fujita,

Trope, Liberman, & Levin-Sagi, 2006; Lee & Jeong, 2014; Soderberg et al., 2015; Wakslak & Trope, 2009).

Interactivity was manipulated using the hot spot feature in Qualtrics. This feature allows participants to click to select portions of the message they thought should or should not be included in the final message. In the interactive condition participants were invited to click once on any section of the infographic, text or image, they “liked”, twice on those they “disliked”, and a third time to clear their response. In the non-interactive condition, participants were simply directed to review the message. Both groups were instructed that their input would be valuable in developing the messages.

2.3 Instruments

There were several components to the online questionnaire due to the complexity of the hypotheses. A list of items pertaining to each topic are included in the appendices as indicated following each component description. All survey questions used a 7-point Likert-type scale unless otherwise noted.

Hypothetical Distance

Hypothetical distance was operationalized in terms of likelihood, in this case as susceptibility. Susceptibility was assessed using the same measures Carcioppolo et al., (2013) adapted from Witte (2000) to explore message framing in a severity context along with varying ratios of threat to efficacy among college-aged women. The most pertinent example is “It is likely that I will contract HPV”. The relationship between susceptibility as an operationalization of hypothetical distance is apparent in the use of probability-oriented terms i.e. likelihood in assessing this construct. Additionally, characterizing HPV as genital warts, may help to assess susceptibility among those with lower

knowledge of the virus so every participant received questions pertaining to both “HPV” and “genital warts”. Additionally, Carcioppolo et al., (2013) suggested cancer may be viewed as a more distal issue than warts as a result of HPV. By including HPV phrasing, cancer phrasing and genital wart phrasing the claim that either symptom is more distal may be evaluated. See appendix B for a list of items and reliability measures.

Intention to Vaccinate

Intention to vaccinate was assessed with a simple Likert-type scale describing likelihood of seeking HPV vaccination. The difference between this item and those assessing stage of change is that stage of change items included a temporal element. Participants could also indicate if they were already fully vaccinated.

Perceived Barriers

Multidimensional perceived barriers were derived from the results of the closed-ended survey evaluated by Gerend et al., (2013) to assess barriers to HPV vaccination among young adult women. They differentiated between practical and global barriers, which can be understood as low and high construal respectively (Lieberman & Förster, 2009). The most important concept to this study is high construal, ‘no need’ for vaccination. This barrier was common among non-intenders in Gerend et al.'s, (2013) study and likely associated with low susceptibility perception. In addition to those barriers included in their survey, this study also tested lack of HPV knowledge as a perceived high construal barrier, in the original study it was phrased as ‘not enough information’. This addition is in accordance with Zimet and Rosenthal (2010), who identify one of the greatest barriers to male HPV vaccination is lack of education among males regarding "HPV infection, morbidity, transmission and prevention" (p.S30).

Participants received the entire list of potential barriers and were asked to assess how much each impacts their decision to pursue vaccination for HPV. Following data collection a factor analysis was performed to group these variables into low or high construal categories.

See appendix C for a list of items.

Stage of Change

Stage of change was assessed using the same items as Fernandez, Amoyal, Paiva, and Prochaska's (2014) exploration of male motivation to vaccinate for HPV. The participants will be presented with four mutually exclusive statements regarding temporal intention to vaccinate, and will be asked to indicate which statement best describes their current state. Also, in accordance with (Fernandez et al., 2014) the stages of action and maintenance will be combined because action is characterized as fully vaccinated, with all three doses and one cannot become unvaccinated. See appendix D for a list of items.

2.4 Protection of Human Subjects

The author has completed CITI training and IRB approval was obtained prior to the conduct of the study.

CHAPTER 3. EXPERIMENT 1 RESULTS

3.1 Design and Participants

This experiment was designed to test the individual constructs to be included in the composite messages in experiment 2 and to examine the predicted relationships between construal level of messages and intention to vaccinate (H1), hypothetical distance (H2), stage of change (H5), in addition to the predicted relationship between lower hypothetical distance and increased intention to vaccinate (H6). An additional goal of experiment 1 was to evaluate the relationship between barrier construal level, hypothetical distance (H3) and stage of change (H4). Lastly, experiment 1 investigated the relationship between perceived interactivity and social distance (H7a), as well as the relationship between social distance and hypothetical distance (H7b).

This study recruited male college students from a large U.S. Midwestern university via an online research participation system within the communication department. All participants received communication course credit in exchange for their participation. Following recruitment, which entailed providing contact information, the sixty-one male participants (N=61) were presented with an electronic informed consent form via a link to the study through the research participation system.

The age range of sample was 18-25. The participants identified as predominantly White (63.9%) and Asian (23%), very few identified as African American (3.3%), Hispanic or Latino (3.3%) and other (6.6%). Nearly all participants identified as heterosexual (96.7%) and single (100%).

Each group was presented with either low or high construal HPV vaccination information (Appendix A) procured from the CDC (2015) website. Each group viewed a series of six components of a message, each including one dimension of the construal level construct. At the end of the series they were presented with a compilation message, which was interactive in the low construal condition and non-interactive in the high construal condition. A dimension specific scaled response question appeared with each portion of the message. Individual assessments of construal dimensions were later compiled into a measure of perceived message construal level. Participants were told that their feedback for improving the message was important in its early stages of development.

The online questionnaire followed, including a Behavioral Identification Form (BIF) (Vallacher & Wegner, 1989), and a series of questions assessing hypothetical distance operationalized as susceptibility, barriers, stage of change, and intention to vaccinate.

3.2 Manipulation Check

Independent sample T-tests were conducted to compare individuals exposed to low construal or high construal message using a composite construal scale. This scale included several dimensions associated with construal levels. Dimensions included close/far temporal distance, concrete versus abstract imagery and language, broad or

specific graphic representations, goal versus means oriented vaccination information, interactive and non-interactive message design, and social distance. Two items, one assessing goal orientation, and the other abstractness were removed due to reliability of the scale ($\alpha=.63$), resulting in an 8-item construal level composite scale ($\alpha=.72$). The construal level composite scale made up of items signifying each dimension represents perceived construal level of the message. It should be noted that a higher score on the scale is associated with lower construal responses, such that positive correlation would indicate support for the hypotheses.

Descriptive statistics of each dimension of the composite construal level measure are summarized in Table 2, while results from the independent sample t-tests are described below and summarized in Table 3.

Table 2

Means of Construal Dimensions Experiment 1

Dimension	N		M	SD
	Valid	Missing		
Composite Construal	61	0	4.57	.892
Temporal	61	0	5.13	1.16
Imagine	61	0	3.97	1.68
Clarity	61	0	4.10	2.01
Specificity	61	0	4.38	1.44
Means-orientation	61	0	5.52	1.26
Interactivity	60	1	4.28	1.63
Social Distance	61	0	4.20	1.30
Concreteness	60	1	5.02	1.26

Note. Items were measured using a Likert-type scale of 1-7. Where one (1) corresponded with high construal perception and seven (7) corresponded with low construal perceptions.

There was a significant difference between low construal condition ($M=4.82$, $SD=.87$) and high construal condition ($M=4.33$, $SD=.86$); $t(59)=-2.21$, $p=.031$ when comparing the composite construal scores. The effect size ($d=.56$) demonstrates that between the two groups the magnitude of the difference was medium per Cohen (1988); and individuals exposed to low construal are likely to have higher composite construal scores. Recall that questions were scaled such that higher scored responses were associated with low construal concepts, thus the messages had the desired effect on composite construal score. There was also a significant difference between the mean responses to the concrete image ($M=5.00$, $SD=1.64$) and abstract image ($M=3.23$, $SD=1.96$); $t(59)=$, $p<.001$. The effect size ($d=.98$) demonstrates that between the groups the magnitude of difference was large, per Cohen (1988). The response associated with the images described clarity of understanding of HPV based on the images. In accordance with CLT, strong clarity would be associated with low construal perceptions of HPV. Additionally, there was a significant difference in perceived social distance in the high construal ($M=3.84$, $SD=1.42$) and low construal ($M= 4.57$, $SD= 1.07$) message conditions. The effect size ($d=.56$) demonstrates that between the two groups the magnitude of the difference was medium per Cohen (1988). There was also no significant difference between the high and low message groups in scores on the alternative measure of state construal, the Behavior Identification Form (BIF) (Vallacher & Wegner, 1989) ($\alpha=.69$).

Table 3

Independent Sample T-Test: Mean Differences in Construal Dimensions in Low and High Construal Message Conditions Experiment 1

Dimension	High Construal Message n=31		Low Construal Message n=30		df	t	p	Cohen's d
	M	SD	M	SD				
Composite								
Construal	4.33	0.86	4.82	0.87	59	-2.21	.031*	-0.57
Temporal	4.97	1.33	5.30	0.99	59	-1.11	.273	-0.38
Imagine	4.00	1.79	3.93	1.60	59	0.15	.879	0.04
Clarity	3.23	1.96	5.00	1.64	59	-3.83	.000**	-0.98
Specificity	4.19	1.28	4.57	1.59	59	-1.01	.316	-0.26
Means- oriented	5.68	1.11	5.37	1.40	59	0.96	.340	0.24
Interactivity	4.03	1.79	4.53	1.43	58	-1.19	.237	-0.31
Social								
Distance	3.84	1.42	4.57	1.07	59	-2.26	.028*	-0.58
Concreteness	4.77	1.31	5.27	1.17	58	-1.56	.124	-0.40

Notes. All items were measured using a Likert-type scale of 1-7. Where one (1) corresponded with high construal perception and seven (7) corresponded with low construal perceptions.
 * Mean differences statistically significant at $p < .05$
 ** Mean differences statistically significant at $p < .005$

Vaccination Status as Covariate

A dummy variable was created where 1=vaccinated and 0=not vaccinated, such that vaccination status could be controlled where relevant. The measure of intention to vaccinate included the option to indicate one had already received the vaccination and the final stage of change includes having been vaccinated as well. From a construal level perspective the experiential proximity of having received the HPV vaccine competes with

the conceptual proximity to the risk of HPV itself. Thus, vaccination status becomes relevant when analyzing intention and stage of change as outcomes. Vaccination status did not correlate with measures of susceptibility directly, but does function as a covariate when evaluating the relationships intention to vaccinate holds with susceptibility, composite construal, and barriers. Thus, there may be an indirect relationship between vaccination status and susceptibility perceptions. Both the controlled and uncontrolled results will be included throughout this study.

An independent-samples t-test was run to determine if there were differences in hypothetical distance operationalized as susceptibility to HPV between participants who had been vaccinated for HPV and those who had not, the results of these tests are summarized in Table 4. Susceptibility to HPV was higher among participants who had not vaccinated ($M = 2.76$, $SD = 1.17$) than those who had vaccinated ($M = 2.14$, $SD = 0.78$). The mean difference was statistically significant, $M = -.617$, $SE = .288$, $t(21.3) = -2.15$, $p = .044$. The assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p = .049$). The effect size ($d = .75$) demonstrates that between the two groups the magnitude of the difference was medium, per Cohen (1988). This difference suggests that inoculation provides a sense of invulnerability, as it should. It is interesting that the magnitude of the effect is not very large, this is likely due to the relatively low sense of vulnerability among those who had not vaccinated as well.

Table 4

Independent Sample T-Test: Mean Differences in Hypothetical Distance in Vaccinated and Un-Vaccinated Participants Experiment 1

Hypothetical Distance	Un-Vaccinated n=50		Vaccinated n=11		df	T	p	Cohen's d
	M	SD	M	SD				
Composite Susceptibility Likelihood	2.76	1.17	2.14	0.78	21.30 ^b	2.15	.044*	0.75
Possible Susceptibility Worried	2.26	1.11	1.72	0.49	35.93 ^c	2.49	.018*	0.63
Susceptibility HPV	2.94	1.46	2.51	1.21	59	0.90	.372	0.32
Wart Susceptibility ^a	3.14	1.57	2.15	1.38	59	1.94	.057	0.67
Cancer Susceptibility	3.00	1.23	2.29	0.82	59	1.80	.076	0.68
	2.69	1.34	1.98	0.78	57	1.63	.109	0.65
	2.56	1.26	2.23	1.15	59	0.80	.424	0.27

Note. Susceptibility refers to the operationalization of hypothetical distance. Composite susceptibility refers to the 9-point scale, the other types of susceptibility refer to the phrasing of the item. See appendix for full phrasing of each item.

^a Un-vaccinated ($n=49$), vaccinated ($n=10$)

^b The assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p = .049$).

^c The assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p = .037$)

* $p < .05$

An independent-samples t-test was run to determine if there were differences in hypothetical distance operationalized as likelihood-phrased susceptibility to HPV between participants who had been vaccinated for HPV and those who had not. Likelihood-phrased susceptibility to HPV was higher among participants who had not

vaccinated ($M = 2.26$, $SD = 1.11$) than those who had vaccinated ($M = 1.73$, $SD = .49$). The difference was statistically significant $M = -.536$, $SE = .216$, $t(35.93) = -2.49$, $p = .044$. The assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p = .037$). The effect size ($d = .63$) demonstrates that between the two groups the magnitude of the difference was medium, per Cohen (1988). Once again, inoculation appropriately reduced the perception that HPV contraction is a likely event.

Vaccination status did not demonstrate a statistically significant mean difference among the remaining phrasings of HPV-susceptibility. This may be due to the very low susceptibility perceptions among those who have not vaccinated.

The preceding T-tests provided additional support for where it may be appropriate to control for vaccination status due to the hypothetical proximity of HPV once the experiential memory of vaccination is in place.

3.3 Hypothesis testing.

In order to examine the hypotheses, three statistical techniques were applied to the data. First T-tests were conducted to assess differences in means of groups exposed to the low construal message and high construal messages in relation to outcome variables, including hypothetical distance, operationalized as susceptibility, barriers to vaccination, position within stage of change, and intention to vaccinate. Next, bivariate correlation was computed to assess the relationships between the composite construal score, a continuous variable reflecting participant's perceptions of the construal level of the message they had been exposed to, and the aforementioned outcome variables (H1; H2;

H5). Bivariate correlation analysis was also employed to explore the relationships between hypothetical distance, construal level of barriers (H3), stage of change (H5), intention to vaccinate (H6), and social distance (H7b). Additionally, bivariate correlation was computed to determine the relationships between construal level of barriers and stage of change (H4). Bivariate correlation analysis was also applied to assess the relationship between perceived message interactivity (continuous) and social distance (H7a). Partial correlations, controlling for vaccination status, were also computed to assess the relationships described above. Lastly, hierarchical regression analysis determined the proportion of extra variation in the outcome variables was attributable to perceived construal level, construal level of barriers, and hypothetical distance.

Independent sample T-tests were conducted to compare participant's perceived susceptibility, perceived barriers, intention to vaccinate, and position in stage of change when participants were in either low construal or high construal conditions. There were no significant differences between individuals exposed to the low construal messages and the high construal messages with regards to susceptibility measures, intention to vaccinate, stage of change, or composite barriers as summarized in Table 5. Hypothesis 1 predicted that intention to vaccinate would be higher in the group exposed to the low construal message than the group exposed to the high construal message; the direction of the means supports this prediction. Hypothesis 2 predicted that hypothetical distance would be lesser in the low construal message group than the high construal message group. Low hypothetical distance is operationalized as higher perceptions of susceptibility. With the exception of possible-phrased susceptibility, the means between groups differed in the predicted direction. Hypothesis 5 predicted that low construal

message exposure would be associated with later stages of stages of change than would be high construal message exposure; the means between the groups differed in the predicted direction.

Thus, predictions that lower construal messages would be associated with increased intention to vaccinate (H1), decreased hypothetical distance (H2), and later stage of change (H5) were not supported with statistical significance by T-test analyses of the data, however the means were generally in the anticipated directions.

Table 5

Independent Sample T-Test: Mean Differences in Outcome Variables in Low and High Construal Message Conditions Experiment 1

Outcome Variable	High Construal Condition n=31		Low Construal Condition n=30		Df	t	p	Cohen's d
	M	SD	M	SD				
Composite								
Susceptibility	2.54	1.17	2.76	1.09	59	-0.77	.447	-0.19
Likelihood								
Susceptibility	1.97	0.99	2.37	1.07	59	-1.53	.131	-0.39
Possible								
Susceptibility	2.89	1.57	2.83	1.26	59	0.16	.872	0.04
Worried								
Susceptibility	2.81	1.57	3.12	1.58	59	-0.74	.461	-0.22
HPV								
Susceptibility	2.69	1.10	3.06	1.28	59	-1.20	.236	-0.31
Wart								
Susceptibility	2.51	1.47	2.64	1.08	57	-0.40	.692	-0.10
Cancer								
Susceptibility	2.42	1.40	2.58	1.07	59	-0.51	.609	-0.13
Composite								
Barriers	3.44	0.91	3.46	0.78	59	-0.07	.947	-0.02

Table 5 continued

HC Barriers	3.28	1.91	3.22	0.95	59	0.20	.839	0.04
LC Barriers	3.61	0.79	3.67	1.13	59	-0.26	.799	-0.06
Stage of Change Intention to Vaccinate	1.97	1.20	2.00	1.17	59	-0.11	.916	-0.03
	4.29	2.34	5.20	2.19	59	-1.57	.122	-0.40

Note. Susceptibility refers to the operationalization of hypothetical distance. Composite susceptibility refers to the 9-point scale, the other types of susceptibility refer to the phrasing of item. See Appendix B for full phrasing of each item. Stage of Change was evaluated with a four point ordinal scale (see Appendix D). All other outcome variables were measured with 7-point Likert-type scales. *There were no significant differences in the means of the two groups*

Correlation and hierarchical regression analyses using the composite construal scale to indicate perceived construal level (continuous variable) as the independent variable provided support for the notion that perceptions of the messages as high or low construal were associated with some of the aforementioned outcome variables. Means and standard deviations of all outcome variables are summarized in Table 6. Findings from correlation and regression analyses are presented in the sections that follow.

Table 6

Means and Standard Deviations of Outcome Variables Experiment 1

Outcome Variable	N		M	SD
	Valid	Missing		
Composite Susceptibility	61	0	2.65	1.13
Likelihood Susceptibility	61	0	2.17	1.04
Possible Susceptibility	61	0	2.86	1.42
Worried Susceptibility	61	0	2.96	1.57
HPV Susceptibility	61	0	2.87	1.19
Wart Susceptibility	59	2	2.57	1.29

Table 6 continued

Cancer Susceptibility	61	0	2.50	1.24
Composite Barriers	61	0	3.54	0.84
Low Construal Barriers	61	0	3.64	0.97
High Construal Barriers	61	0	3.25	1.07
Stage of Change	61	0	1.98	1.18
Intention to Vaccinate	61	0	4.74	2.29

Note. Susceptibility refers to the operationalization of hypothetical distance. Composite susceptibility refers to the 9-point composite scale, the other types of susceptibility refer to the phrasing of individual items. See appendix for full phrasing of each item. Low Construal Barriers and High Construal Barriers are products of a factor analysis, the details of which are available in Stage of Change was evaluated with a four point ordinal scale, with 1 representing the earliest stage and 4 representing the latest stage. All other outcome variables were measured with 7-point Likert-type scales.

Hypothesis 1.

Hypothesis 1 predicted that lower construal messages would be associated with higher intention to vaccinate.

Composite construal score as a predictor intention to vaccinate. Bivariate correlation analysis demonstrated that Perceived message construal, operationalized with the composite construal score, was associated with intention to vaccinate ($r(59)=.387$, $p=.002$). This finding suggests that when perceived message construal is lower, intention to vaccinate increases.

The relationship held even after controlling for vaccination status, $r(58)=.491$, ($p<.001$). Additionally, hierarchical regression was run to determine if the addition of perceived construal level based on the composite construal construct scale improved the prediction of intention to vaccinate over and above vaccination status. The full model of perceived message construal level and vaccination status to predict intention to vaccinate

(Model 2) was statistically significant, $R^2 = .584$, $F(2, 58) = 40.74$, $p < .001$; adjusted $R^2 = .570$. Model 1 accounted for 44.3% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 57% of the variability, as indexed by the adjusted R^2 statistic. The addition of perceived message construal level to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .132, $F(2,58) = 18.40$, $p < .001$. The variable of vaccination status, as indexed by its β value of .659 ($p < .001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while perceived message construal level, as indexed by its β value of .218 ($p < .001$), had a weaker statistically significant relationship to intention to vaccinate. Although no significant difference was found in the means of groups exposed to either high or low messages, the correlation analysis indicates that a lower construal message interpretation is associated with a higher intention to vaccinate for HPV. Therefore, the data lends moderate support to the prediction that lower construal messages would be associated with higher intention to vaccinate (H1).

Clarity of understanding as a predictor intention to vaccinate. One of the dimensions included in composite construal score was “clarity of understanding what HPV is”, this item was paired with either a photograph of a male oral cavity filled with warts or an artist rendering of the HPV virus itself. Clarity of understanding may be interpreted as a single item indicator of construal level associated with the concept of HPV. There was a significant difference between low construal message condition ($M=5.00$, $SD=1.64$) and high construal message condition ($M=3.23$, $SD=1.96$); $t(59)=-3.826$, $p < .001$ when comparing perceived clarity of understanding. Although the Pearson’s correlation between clarity of understanding and intention to vaccinate was not

significant, when controlling for vaccination status on the relationship between clarity of understanding and intention to vaccinate, the following partial correlation was found $r(58) = .322, p = .012$.

Additionally, hierarchical regression was run to determine if the addition of clarity of understanding improved the prediction of intention to vaccinate over and above vaccination status. The full model of clarity of understanding and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .509, F(2, 58) = 30.06, p < .001$; adjusted $R^2 = .492$. Model 1 accounted for 44.3% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 49.2% of the variability, as indexed by the adjusted R^2 statistic. The addition of clarity of understanding to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .057, $F(1, 58) = 6.69, p < .012$. The variable of vaccination status, as indexed by its β value of .714 ($p < .001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while perceived message construal level, as indexed by its β value of .242 ($p = .012$) had a weaker statistically significant relationship to intention to vaccinate. The correlation analysis indicates that clarity of understanding, an indicator of low construal, is associated with a higher intention to vaccinate for HPV when controlling for vaccination status. Therefore, the data lends mild support to the prediction that lower construal messages would be associated with higher intention to vaccinate (H1).

Social distance as a predictor of intention to vaccinate. Construal level theory posits that lower psychological distances are associated with lower construal level

mindsets. Thus, social distance may function as an indicator of reduced construal level. Additionally, the manipulation check indicated a statistically significant difference in perceived social distance between the means of those exposed to high and low construal messages (refer to Table 3). Bivariate correlation analysis demonstrated that social distance was associated with intention to vaccinate ($r(61)=.352, p=.005$). Moreover, when controlling for vaccination status the partial correlation between social distance and intention to vaccinate maintained significance ($r(58)=.512, p<.001$).

Additionally, hierarchical regression was run to determine if the addition of perceived social distance improved the prediction of intention to vaccinate over and above vaccination status. The full model of perceived social distance and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .596$, $F(2, 58) = 42.71, p < .001$; adjusted $R^2 = .582$. Model 1 accounted for 44.3% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 58.2% of the variability, as indexed by the adjusted R^2 statistic. The addition of perceived social distance to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .143, $F(1,58) = 20.56, p < .001$. The variable of vaccination status, as indexed by its β value of .687 ($p<.001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while perceived social distance, as indexed by its β value of .379 ($p<.001$), had a weaker statistically significant relationship to intention to vaccinate. Correlation and hierarchical regression analysis provide indirect support for the prediction that low construal message exposure would be associated with higher intention to vaccinate (H1).

Overall perceived construal level of message, clarity of understanding related to the message, and perceived social distance all provide indirect support to the prediction that lower construal message exposure would be associated with higher intention to vaccinate (H1).

Hypothesis 2.

Hypothesis 2 posited that low construal message exposure would predict lower hypothetical distance between self and HPV when compared to high construal message exposure.

Perceived message construal and hypothetical distance. In the context of the present study, hypothetical distance was operationalized as susceptibility. Hypothetical distance refers to the perceived likelihood or realism associated with an event (Trope & Liberman, 2010), such as contracting HPV, HPV exhibiting as genital warts, and HPV presenting as cancer. Susceptibility refers to the perceived likelihood of vulnerability to a risk (Cho & Witte, 2005), in this case HPV, genital warts, and HPV-related cancer. Bivariate correlation analysis demonstrated that composite construal score representing perceived message construal was not associated directly with composite susceptibility or any individual dimension of susceptibility. Controlling for vaccination status did not result in a statistically significant partial correlation between perceived construal level of message and hypothetical distance. Thus, the data did not provide direct support for the prediction that lower construal level messages would be associated with reduced hypothetical distance operationalized as susceptibility (H2).

Clarity of understanding and hypothetical distance. Bivariate correlation analysis demonstrated that clarity of understanding was not associated with composite susceptibility. However, clarity of understanding did demonstrate a statistically significant correlation with susceptibility items using likelihood-phrasing ($\alpha=.79$) e.g. “It is likely that I will contract HPV;” ($r(61)=.263, p=.041$). When controlling for vaccination status the partial correlation between clarity of understanding and likelihood-phrased susceptibility maintains statistical significance ($r(56)=.266, p=.043$). Hierarchical regression was run to better understand the relationship between clarity of understanding, vaccination status, and likelihood-phrased susceptibility. The analysis did not render significant models, indicating that vaccination status was not a statistically significant predictor of likelihood-phrased susceptibility. Thus, based on the Pearson correlation results, the relationship between clarity of understanding and likelihood-phrased susceptibility offers indirect support for the prediction that lower construal messages would be associated with lower hypothetical distance (H2).

The data yielded by this study conditionally supported hypothesis 2, dependent upon the phrasing of susceptibility items. It should be noted that hypothetical distance usually denotes a likelihood estimate of an event taking place (Trope & Liberman, 2010), so the phrasing of likelihood-susceptibility items have the closest fit to construal level theory definitions of hypothetical distance.

Hypothesis 3.

Hypothesis 3 predicted that lower hypothetical distance would demonstrate a stronger association with lower construal barriers to HPV vaccination when compared to higher construal barriers.

Principal Axis Factoring to distinguish construal level of barriers. Seventeen potential barriers to HPV vaccination (Gerend et al., 2013) were subjected to principal axis factoring to distinguish between high and low construal barriers. Bartlett's Test of Sphericity ($p < .001$) in addition to a Kaiser-Meyer-Olken (.779) above .6 indicate the correlations were substantial enough for exploratory analysis. In accordance with best practices (Osbourne & Costello, 2009), factor loadings above .3 were considered adequate. Additionally, factor analysis was repeated several times until each factor retained had an eigenvalue of above 1 (see Table 7), more than three adequately loaded items, and reduced cross-loading. The remaining cross-loaded item was excluded from further analysis. The final pattern matrix consisted of two factors (see Table 8).

Table 7

Total Variance Explained for Factors of the 17—item Vaccination Barrier Questionnaire Experiment 1

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
	1	5.67	33.36	33.36	5.11	30.06	30.06
2	2.03	11.92	45.28	1.43	8.41	38.47	3.87

Table 7 continued

3	1.64	9.64	54.92
4	1.28	7.52	62.44
5	1.01	5.91	68.35
6	0.88	5.15	73.50
7	0.78	4.58	78.08
8	0.62	3.66	81.74
9	0.53	3.13	84.87
10	0.52	3.07	87.94
11	0.46	2.71	90.65
12	0.34	1.99	92.64
13	0.32	1.86	94.51
14	0.31	1.80	96.31
15	0.25	1.46	97.77
16	0.19	1.14	98.91
17	.186	1.095	100.000

Note. Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

In accordance with Gerend et al., (2013), the two factors could be delineated as global (Factor 1) and practical barriers (Factor 2), where global barriers refer to higher construal concepts and practical barriers refer to lower construal concepts. High construal barriers refer to concerns about side effects and the need for the vaccine, while low construal barriers refer to concrete concepts like cost and logistical access. Differences in sample size and sex of the participants may explain the lesser dimensionality in the present study in comparison to Gerend et al. (2013) who found five distinct factors, which were then further defined by category. More important to this study, however, is whether the construal of the barriers is associated with perceived hypothetical distance (H3) and stage of change (H4).

Table 8

Summary of Items and Factor Loadings for Promax Rotated, Two-Factor Solution for the Vaccination Barrier Questionnaire^a (N=61)

Item	Factor	
	1	2
1. I have concerns about whether the HPV vaccine is safe.	.862	-.026
13. I don't think I need the HPV vaccine.	.664	-.092
2. I have concerns about whether the HPV vaccine is effective.	.648	.000
15. I do not need to vaccinate because I plan to only have one sexual partner in my lifetime.	.638	-.152
6. My parents don't want me to get the HPV vaccine.	.605	.077
4. The HPV vaccine may have long-term side effects.	.600	.214
5. There has not been enough research done on the HPV vaccine.	.596	.107
14. I do not need to vaccinate because I plan to be abstinent (not have sex) until marriage.	.577	-.132
3. I have concerns about possible side effects of the HPV vaccine.	.447	.192
8. The vaccine only protects against some types of HPV. ^b	.107	.106
10. My insurance does not cover HPV vaccine.	-.074	.725
7. I don't know enough about HPV.	-.224	.705
9. The vaccine cost is too high.	.026	.619
16. Getting the HPV shot takes too much time.	.052	.615
17. I'm not sure where to get the HPV shot.	-.052	.605
11. My insurance does not cover enough of the vaccine.	.207	.530
12. I'm not sure how to file the insurance claim to get reimbursed.	.129	.377

Note. Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Numbering of items indicates position in the un-rotated matrix.

a. Rotation converged in 3 iterations.

b. This item was excluded from further analysis of construal level of barriers.

Hypothetical distance operationalized as susceptibility and low construal barriers. In order to evaluate the relationship between hypothetical distance and low construal barriers, data was analyzed with Pearson's correlation. A statistically significant bivariate correlation was found between low construal barriers and hypothetical distance using the composite susceptibility scale ($r(61)=.259, p=.044$). There was no statistically significant correlation between hypothetical distance and high construal barriers, thus perceived vulnerability to HPV is not related to a change in value-based, global barriers.

This correlation analysis indicates that as hypothetical distance decreases and the threat of HPV becomes more real, the barriers related to vaccination are also perceived in a more concrete sense. The data yielded by this study provides evidence that lower hypothetical distance is associated with lower construal barriers, as predicted (H3).

Hypothesis 4a/b.

Hypothesis 4a predicted lower construal barriers would be more strongly associated with temporally proximal intention to vaccinate within stage of change than to temporally distal intention to vaccinate.

In order to evaluate hypothesis 4, correlations between lower construal barriers and each stage of change were compared with one another, and then to correlations between higher construal barriers in each stage of change (see Table 9). The most temporally proximal stage of change in relation to intention is preparation (intention to vaccinate within 30 days), followed by contemplation (intention to vaccinate within the next six months), and pre-contemplation (no intention to vaccinate in the next six months) (Fernandez et al., 2014). The final stage of change refers to action/maintenance

(already having vaccinated) (Fernandez et al., 2014). These four choices were listed in single ordinal item. However, given that Gerend et al.'s (2013) excluded vaccinated participants when they found that lower construal barriers were positively associated with intentions to vaccinate and higher construal barriers were negatively associated with intentions, partial correlation analyses were also run controlling for vaccination status and limiting inquiry into just pre-contemplation, contemplation, and planning stages which all refer to temporal intention.

Gerend et al. (2013) suggested that their findings may be indicative of construal level theory, but could not verify the relationship since they did not include a temporal element in intention. This study provides the opportunity for participants to express a sense of temporality in relation to their intention to vaccinate so that it may be analyzed in relation to construal level of barriers. Hypothesis 4a supports the assumption that lower construal conceptualizations should be associated with reduced temporal distance. The results follow with and without control for vaccination status.

Relationships between lower construal barriers and each stage of change. Lower construal barriers did not demonstrate a statistically significant correlation or partial correlation with preparation, contemplation, or pre-contemplation stages. The correlation analyses of lower construal barriers in did not support the prediction that lower construal barriers would have stronger associations with intention as temporal proximity increases (H4a).

Hypothesis 4b predicted that higher construal barriers would be more strongly associated with temporally distal intention to vaccinate within stage of change than to temporally proximal intention to vaccinate.

Relationships between higher construal barriers and each stage of change.

Bivariate correlation analysis demonstrated that higher construal barriers were not associated directly with the preparation stage of change. However, when controlling for vaccination status higher construal barriers demonstrated a statistically significant negative partial correlation with preparation stage ($r(58) = -.354, p = .005$). This partial correlation indicates that when perceived higher construal barriers increase, the intention to vaccinate within the next 30 days decreases.

Higher construal barriers also did not demonstrate a statistically significant correlation or partial correlation with contemplation stage. The relationship, though not significant, got weaker as temporality became more distal. Additionally, as perceived higher construal barriers increase, intention to vaccinate within six months decreases similarly to the preparation stage.

Bivariate correlation analysis demonstrated that higher construal barriers were associated with pre-contemplation stage ($r(61) = .531, p < .001$). Additionally, when controlling for vaccination status the partial correlation maintains significance ($r(58) = .387, p = .002$). This correlation indicates that as perceived higher construal barriers increased, so did the indication that the participant had no intention to vaccinate in the next six months.

If just the two statistically significant stages are compared, preparation and pre-contemplation, then the partial correlation between higher construal barriers and the most temporally distal stage is stronger than that between higher construal barriers and the more proximal stage. Additionally, the negative correlation with preparation indicates that higher construal barriers consistently deter intention to vaccinate. Partial correlation analysis provides menial support for the prediction that higher construal barriers would demonstrate a stronger relationship with temporally distal intentions in the stage of change (H4b).

The relationship between construal level of barriers and ordinal stage of change.

Bivariate correlation analysis demonstrated that lower construal barriers were associated with stage of change ordinal item ($r(61) = -.340, p = .007$), thus increases in lower construal barriers are associated with backward, not forward, movement in stage of change.

Table 9

Means, Standard Deviations, Pearson Correlations Coefficients, and Partial Correlation Coefficients among Higher and Lower Construal Level Barriers and SOC

Measure	M	SD	Pearson Correlation		Partial Correlation ^a	
			HC Barriers	LC Barriers	HC Barriers	LC Barriers
HC Barriers	3.25	1.07	1	.438**	1	.287*
LC Barriers	3.64	0.97	.438**	1	.287*	1
Ordinal SOC	1.98	1.18	-.607**	-.340**	-.384**	.003
Action/Maintenance	-	-	-.477**	-.391**	.023	.025
Preparation	-	-	-.230	.105	-.354**	.051

Table 9 continued

Contemplation	-	-	-.030	.031	-.193	-.088
Pre-Contemplation	-	-	.531**	.228	.387**	.042

Note. HC refers to higher construal. LC refers to lower construal. Barrier items were measured with a 7-point Likert-type scale, where a higher score indicates higher relevance of the barrier to decision-making. SOC refers to stage of change, measured with a 4-point ordinal scale. Pearson correlation $n=61$. Partial correlation $df=58$.

^a Controlling for vaccination status on the relationship between construal level of barrier and stage of change

** Coefficient is significant at $p<.001$

* Coefficient is significant at $p<0.05$ level

When controlling for vaccination status the relationship was no longer statistically significant. Higher construal barriers also negatively and more substantially correlated with the stage of change ordinal item ($r(61) = -.607, p<.001$), even when controlling for vaccination status ($r(58) = -.384, p=.002$). Suggesting that higher construal barriers have a stronger association with backward movement through stage of change than lower construal barriers. As participants move to a later stage of change increases, lower and higher construal barriers both decrease. This means neither barrier type is associated with forward movement through stage of change, contradicting Gerend et al. (2013) finding that lower construal barriers have a positive association with intentions to vaccinate.

Construal level of barrier and continuous scale of intention. For the sake of further comparison to Gerend et al.'s (2013) study of multidimensional barriers and intention to vaccinate a hierarchical multiple regression was run to distinguish the amount of variance in intention to vaccinate explained by construal level of barrier, over and above vaccination status. The variables were entered in the order of hypothesized impact

on intention to vaccinate controlling for vaccination status, Model 2 contained vaccination status and lower construal perceived barriers, Model 3 contained vaccination status, lower construal perceived barriers, and higher construal perceived barriers. The full model of construal level of barriers and vaccination status to predict intention to vaccinate (Model 3) was statistically significant, $R^2 = .517$, $F(3, 57) = 20.369$, $p < .001$; adjusted $R^2 = .492$. Model 1 accounted for 44.3% of variability, Model 2 accounted for 43.3% of variability, and Model 3 accounted for 49.2% of variability as indexed by the adjusted R^2 statistics. The addition of lower construal variables to the prediction of intention to vaccinate (Model 2) did not lead to a statistically significant increase in R^2 ($p = .987$). The addition of higher construal barriers to the prediction of intention to vaccinate (Model 3) led to a statistically significant increase in R^2 of .065, $F(3, 57) = 7.692$, $p = .007$. The variable of vaccination status, as indexed by its β value of .549, was shown to have the strongest statistically significant relationship to intention to vaccinate ($p < .000$), while higher perceived barriers, as indexed by its β value of -.310 had a weaker statistically significant relationship to intention to vaccinate ($p = .007$). Lower construal barriers was not statistically significant predictor of intention to vaccinate ($p = .439$).

Overall this exploration indicates that among college males, higher construal barriers have a stronger explanatory power than do lower construal barriers when it comes to position in stage of change. Lower construal barriers did not demonstrate a statistically significant explanatory relationship with intention to vaccinate, however the sign of the relationship was similar to that found in the Gerend et al. (2013) study of college women.

Hypothesis 5.

Hypotheses 5a/b predicted exposure to low construal message would be associated with later stages of change, while exposure to high construal message would be associated with earlier stages of change.

Perceived construal level and stage of change. Perceived message construal level, as indexed by the composite construal scale, did not correlate with ordinal stage of change. Perceived construal also did not significantly correlate or partially correlate with any individual stage of change. The data gathered does not suggest a relationship between construal level of messages and stage of change. Thus, neither hypothesis 5a nor 5b were supported by the data.

Clarity of understanding and stage of change. Clarity of understanding did not significantly correlate or partially correlate with ordinal stage of change or any categorical stage of change. The data yielded by this study does not support a relationship between construal level of message and stage of change. Thus, neither hypothesis 5a nor 5b were supported by the data.

Social distance and stage of change. Social distance did not significantly correlate or partially correlate with ordinal stage of change or any categorical stage of change. The data yielded by this study does not support a relationship between construal level of message and stage of change. Thus, neither hypothesis 5a nor 5b were supported by the data.

Hypothesis 6.

Hypothesis 6 predicted lower hypothetical distance, operationalized as susceptibility, would be associated with higher intention to vaccinate for HPV.

Composite susceptibility and intention to vaccinate for HPV. Bivariate correlation analysis demonstrated that hypothetical distance was not associated with intention to vaccinate. Nor was there any statistically significant correlation between vaccination status and susceptibility. However, when controlling for vaccination status intention to vaccinate and composite susceptibility were partially correlated ($r(58) = .367, p = .004$). The data indicates vaccination status may function as a covariate in the relationship between hypothetical distance and intention to vaccinate.

A hierarchical multiple regression was also run to determine if the addition of perceived hypothetical distance operationalized as susceptibility improved the prediction of intention to vaccinate over and above vaccination status. The full model of perceived hypothetical distance and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .526, F(2, 58) = 32.210, p < .001$; adjusted $R^2 = .510$. Model 1 accounted for 44.3% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 51% of the variability, as indexed by the adjusted R^2 statistic. The addition of perceived hypothetical distance to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .074, $F(2, 58) = 9.055, p < .001$. The variable of vaccination status, as indexed by its β value of .731, was shown to have the strongest statistically significant relationship to intention to vaccinate ($p < .000$),

while hypothetical distance, as indexed by its β value of .278 had a weaker statistically significant relationship to intention to vaccinate ($p=.004$).

Thus, the prediction that lower hypothetical distance would be associated with higher intention to vaccinate (H6) was conditionally supported, when controlling for vaccination status.

Specified measures of susceptibility and intention to vaccinate for HPV. When controlling for vaccination status, statistically significant partial correlations were found between intention to vaccinate and each of the following dimensions of hypothetical distance: risk-phrased susceptibility ($r(56)=.300$, $p=.022$), likelihood-phrased susceptibility ($r(56)=.366$, $p=.005$), worried-phrased susceptibility ($r(56)=.529$, $p<.005$), HPV-phrased susceptibility ($r(56)=.468$, $p<.001$) and cancer-phrased susceptibility ($r(56)=.375$, $p=.004$). The only two dimensions of hypothetical distance that did not demonstrate a partial correlation with intention to vaccinate were possible-phrased susceptibility and wart-phrased susceptibility. The data provides additional conditional support for the prediction that reduced hypothetical distance would be associated with increased intention to vaccinate (H6).

Hypothesis 7.

Hypothesis 7a predicted interactive conditions would be associated with lower perceived social distance.

Although only one message was interactive, all participants were asked to scale the perceived interactivity of the message they viewed. Bivariate correlation analysis demonstrated that perceived interactivity was associated with perceived self-reference, a

measure of social distance ($r(58)=.426, p=.001$). Furthermore, when controlling for vaccination status the partial correlation between perceived interactivity and social distance was statistically significant and slightly stronger than the Pearson's correlation; ($r(57)=.434, p=.001$).

Additionally, a hierarchical multiple regression was run to determine if the addition of perceived interactivity improved the prediction of perceived social distance over and above vaccination status. The full model of perceived interactivity and vaccination status to predict perceived social distance (Model 2) was statistically significant, $R^2 = .189, F(2, 57) = 6.624, p=.003$; adjusted $R^2 = .160$. Model 1 was not statistically significant, $p=.771$. The addition of perceived interactivity to the prediction of perceived social distance (Model 2) led to a statistically significant increase in R^2 of $.187, F(2,57) = 13.143, p =.003$. The variable of perceived interactivity, as indexed by its β value of $.435, p=.001$, was shown to have the strongest statistically significant relationship to perceived social distance, while the variable vaccination status did not have a statistically significant relationship to perceived social distance ($\beta =-.084, p=.489$). It should be noted that the standardized residual fell just outside of range at -3.515 , indicating that normality was not fully achieved. The degree to which participants felt the message made them think of themselves was better predicted by perceived interactivity than vaccination status.

Correlation and post hoc analysis of the data lend support to the prediction that increased interactivity would be associated with increased social proximity (H7a).

Hypothesis 7b predicted that lower perceived social distance would be associated with lower hypothetical distance.

Perceived social distance and composite susceptibility. Social distance was not correlated with composite susceptibility representing hypothetical distance. Data did not provide support for a positive relationship between perceived social distance and hypothetical distance (H7b).

Perceived social distance and HPV-phrased susceptibility. Bivariate correlation analysis demonstrated that social distance was associated with measures of hypothetical distance when phrased in terms of HPV ($r(58)=.258, p=.045$). When controlling for vaccination status on the relationship between social distance and HPV-phrased susceptibility, the following partial correlation was found ($r(58)=.256, p=.049$).

Moreover, a hierarchical regression was run to determine if the addition of perceived social distance improved the prediction of perceived susceptibility to HPV (using HPV phrasing, not warts or cancer), over and above vaccination status. The full model of perceived social distance and vaccination status to predict perceived susceptibility to HPV (Model 2) was statistically significant, $R^2 = .114, F(2, 58) = 3.742, p = .030$; adjusted $R^2 = .084$. Model 1 was not statistically significant, indicating vaccination status alone was not an explanatory variable. The addition of perceived social distance to the prediction of perceived susceptibility to HPV (Model 2) led to a statistically significant increase in R^2 of .062, $F(2,58) = 4.060, p=.049$. The variable of perceived social distance, as indexed by its β value of .249, $p=.049$, was shown to have the strongest statistically significant relationship to perceived susceptibility to HPV,

while the variable vaccination status did not have a statistically significant relationship to perceived social distance ($\beta = -.219$, $p=.082$). With specific HPV-specific phrasing a relationship exists between social distance and hypothetical distance operationalized as susceptibility, providing conditional support to Hypothesis 7b.

Perceived social distance and cancer-phrased susceptibility. Bivariate correlation analysis demonstrated that social distance was associated with cancer-phrased susceptibility ($r(58)=.255$, $p=.044$). When controlling for vaccination status on the relationship between social distance and cancer-phrased susceptibility, the following partial correlation was found ($r(58)=.256$, $p=.048$).

Furthermore, a hierarchical regression was run to determine if the addition of perceived social distance improved the prediction of perceived susceptibility to HPV-related cancer (using cancer phrasing, not warts or simply HPV), over and above vaccination status. However, the full model of perceived social distance and vaccination status to predict perceived susceptibility to HPV-related cancer (Model 2) was not statistically significant. However, the variable of perceived social distance, as indexed by its β value of $.255$, $p=.048$, was shown to have a statistically significant relationship to perceived susceptibility to HPV-related cancer, while the variable vaccination status did not have a statistically significant relationship to perceived social distance ($\beta = -.219$, $p=.082$). With specific cancer-phrasing a relationship exists between social distance and hypothetical distance operationalized as susceptibility, providing conditional support to Hypothesis 7b.

Perceived social distance and wart-phrased susceptibility. Perceived social distance did not significantly correlate or partially correlate with wart-phrased susceptibility. The data related to this particular susceptibility phrasing does not support the prediction that social distance would be associated with hypothetical distance (H7b).

Social distance was associated with HPV-phrased and cancer-phrased susceptibility items, but not with composite susceptibility or wart-phrased items. The data yielded by correlation analysis provides conditional support, depending on susceptibility item phrasing, for the prediction that social distance would be positively associated with hypothetical distance (H7b).

3.4 Experiment 1 Conclusion

Experiment 1 demonstrated a lack of direct support for an association between exposure to low construal messages and increased intention to vaccinate (H1), decreased hypothetical distance (H2), and position in stage of change (H5). Although message condition did not have a direct effect, the dimensions of CLT were still explored using a composite construal scale. The interpretation of the composite construal scale as indicative of perceived message construal indicated that perceiving a message as low construal is associated with increased intention to vaccinate and decreased hypothetical distance. Although perceived construal level of message was associated with both intention to vaccinate (H1) and decreased hypothetical distance (H2), interestingly, they were not correlated with each other without controlling for vaccination status. The data from this experiment did not suggest perceptions of message construal are related to stage of change (H5). Correlation analysis demonstrates conditional support for the prediction

that decreased hypothetical distance, operationalized as increased perceived susceptibility, should be associated with increased intention to vaccinate (H6). Additionally, although barriers could indeed be split into high and low construal dimensions, the low construal barriers did not offer any insight into stage of change (H4a). However, high construal barriers did demonstrate stronger association with temporally distal intentions (H4b). Decreased hypothetical distance correlated with lower construal barriers, suggesting that as perceptions of the threat of HPV become more realistic the barriers are conceived in more concrete terms (H3).

Additionally, social distance predicted hypothetical distance under certain susceptibility phrasing conditions (H7b). Meaning that when the HPV message made them think of themselves, their perceived susceptibility to HPV increased. Interestingly, perceived susceptibility to warts did not correlate with intention to vaccinate or with social distance. Suggesting that even when an HPV message promotes thoughts of the self, warts remain distal. Participants reported highest susceptibility to HPV in general, followed by warts, then cancer. Despite higher susceptibility to warts than to cancer this risk seems to have little relationship with intentions to protect against the virus. Perhaps college males understand the risk of contracting the disease is high, but still believe they are essentially immune to symptomatic consequences This directly contrasts the conclusion of Carcioppolo et al., (2013) study of college women vaccine uptake relative to threat-to-efficacy ratios in messages. College women in their study seemed to believe that the vaccine was more efficacious in preventing warts than cancer, thus it was suggested campaigns target risk of warts. This study provides preliminary evidence that

college males may not be motivated by their fear of genital warts, even if perceived susceptibility is marginally higher than that to cancer.

Lastly, perceived interactivity demonstrated a strong association with social distance (H7a), as predicted by the serious games framework (Lee & Jeong, 2014). The interactive element in the case of this study was not elaborate or targeted, suggesting the benefit of reduced social distance can be achieved even in campaigns with limited funding. The results of experiment 2 follow in the next section. The goal of experiment 2 was to test these same hypotheses under a single, composite message condition more attune to what participants might encounter on a social media feed. Additionally, experiment 2 was designed to isolate the effect of the interactive component of the message.

CHAPTER 4. EXPERIMENT 2 RESULTS

4.1 Design and Participants

Experiment 2 followed a 2x2 factorial design wherein there were four message conditions: high construal interactive, low construal interactive, high construal non-interactive, and low construal non-interactive. The message content was adjusted based on feedback from experiment 1, but the construal level constructs emphasized remained the same. In experiment 2, participants were exposed only to the final composite message rather than viewing each construal level dimension of the message individually. After participants were exposed to their assigned message condition they received the construal construct scale questions (see Appendix G), the BIF form (Vallacher & Wegner, 1989), and questions related to the outcome variables. Participants (N=94) were recruited through the online research participation system at a large U.S. university and received a link to both the study and a consent form. Participants received course credit for participation. The age range of the sample was 18-27 years old with 90.4% in the 18-22 age group. Once again the participants identified as predominantly White (55.3%) and Asian (33%), few participants identified as African American (6.4%), Latino or Hispanic (2.1%), Native Hawaiian or Pacific Islander (1.1%), and other (2.1%). The participants identified as predominantly single (96.8%) and heterosexual (86.2%).

4.2 Manipulation Check

Experiment 2 was designed to test the message effect as a whole (H1-H6) rather than divided by each construct and to isolate the connection between interactivity, social distance, and hypothetical distance (H7). There were two scales used to assess construal level following exposure. One was a series of scaled response questions and the other was a Behavioral Identification Form (BIF) exercise (Vallacher & Wegner, 1989). The Behavioral Identification Form consisted of 17 items ($\alpha=.665$). Originally, 12 scaled items were included to assess the construal level of the participant following message ($\alpha=.602$), due to low reliability items assessing the desirability of vaccination, understanding of why to vaccinate, and level of perceived abstractness were removed. Thus, a 9 item scale ($\alpha=.795$) was used for analyses. Interactivity was measured using a single item, a directly phrased question to rate the interactivity of the preceding message. Descriptive statistics for each dimension of the composite construal scale and interactivity are located in Table 10.

Table 10

*Means and Standard Deviations for Construal Level Scale Dimensions and Interactivity
Experiment 2*

Dimension	N		Mean	SD
	Valid	Missing		
Composite Construal	94	0	4.91	0.83
Concreteness	92	2	4.98	1.18
Means oriented	93	1	4.97	1.32
Social Distance	94	0	4.21	1.41
Feasibility	94	0	5.37	1.28
Temporal Vaccination	94	0	5.27	1.38

Table 10 Continued

Temporal HPV	94	0	5.00	1.31
Imagine	94	0	4.76	1.38
Clarity	94	0	4.97	1.36
Specificity	94	0	4.68	1.27
Interactivity	92	2	4.18	1.63

Note. Items were measured using a Likert-type scale of 1-7. Where one (1) corresponded with high construal perception and seven (7) corresponded with low construal perceptions.

An independent sample T-test was conducted to compare individuals exposed to low construal and high construal message using a composite construal scale of 9 items ($\alpha = .795$) and each dimension, see Table 11 for a summary of results. The measure includes the following dimensions of the construct: close/far temporal distance (temporal), complex versus simple language (imagine), concrete versus abstract imagery (clarity), understanding how to get vaccinated (means-oriented), broad or specific graphic representations (specificity), perceived feasibility, and social distance, items assessing each measure are described in Appendix G. The T-test found no significant difference between the high and low message conditions on the composite construal scale. However, with the exception of the specificity measure, all of the means differed in the anticipated direction. The one individual dimension that demonstrated a statistical significant difference between the high ($M=4.46$, $SD=1.429$) and low ($M=5.07$, $SD=1.272$) message conditions was “how easy was it to imagine getting HPV”; $t(92)=-2.172$, $p=.032$. The effect size ($d=.451$) demonstrates that between the two groups the magnitude of the difference between the means was medium per Cohen (1988).

Table 11

Independent Sample T-Test: Mean Differences in Construal Dimensions and Perceived Interactivity in Low and High Construal Message Conditions Experiment 2

Dimension	High Construal Condition n=48		Low Construal Condition n=46		df	t	p	Cohen's d
	M	SD	M	SD				
Composite Construal	4.79	0.76	5.03	0.88	92	-1.44	.154	-0.29
Temporal V	5.10	1.39	5.43	1.36	92	-1.17	.247	-0.24
Temporal HPV	4.77	1.19	5.24	1.40	92	-1.75	.084	-0.36
Imagine	4.46	1.43	5.07	1.27	92	-2.17	.032*	-0.45
Clarity	4.88	1.28	5.07	1.45	92	-0.67	.502	-0.14
Specificity	4.69	1.21	4.67	1.35	92	0.05	.959	0.02
Means- oriented	4.81	1.23	5.13	1.41	91	-1.17	.244	-0.24
Feasibility	5.33	1.16	5.41	1.41	92	-0.30	.764	-0.06
Social Distance	4.21	1.37	4.22	1.47	92	-0.03	.975	-0.01
Concreteness	4.85	1.22	5.11	1.13	90	-1.06	.293	-0.22
Interactivity	4.15	1.69	4.23	1.58	90	-0.24	.812	-0.05

* Mean differences statistically significant at $p < .05$

An independent sample T-test was conducted to compare individuals exposed to low construal and high construal message using a Behavioral Identification Form (BIF) score (Vallacher & Wegner, 1989), scores were a summed item between 0 and 17 with higher scores associated with higher construal level. No significant difference was found

between the two groups. As a result of T-test analysis and low reliability, the BIF scale was dropped as a measure of construal level in this study.

An independent sample t-test was conducted to compare individuals exposed to interactive and non-interactive messages, no significant differences were found in how participants rated the interactivity level of the messages. However, mean differences in perceived interactivity were in the predicted direction between the non-interactive ($M = 4.04$, $SD = 1.56$) and interactive ($M = 4.33$, $SD = 1.7$) conditions; $t(90) = -.830$, $p = .409$.

In experiment 2, neither of the message manipulations proved effective. As a result support for hypotheses may not be drawn from T-test analysis of the data. However, analysis of perceived construal of message (continuous variable) and perceived interactivity (continuous variable) may still be explored and offer valuable insights into the relationship between interactivity, perceived construal levels, and HPV vaccination intentions among college males.

Vaccination as Potential Covariate

Vaccination status was included in the intention and stage of change items. In experiment 2, independent sample T-tests revealed statistically significant differences in means of construal level perceptions of messages and in perceptions of barriers, the results from these tests are summarized in Table 12. The differences in means between vaccinated ($M=5.49$, $SD=0.49$) and unvaccinated ($M=4.75$, $SD=0.83$) participants in perceived construal level may be due to the realism of vaccination based on whether the participant had experienced vaccination themselves; $t(51.84)=-5.10$, $p<.001$. The effect size ($d= -1.09$) demonstrates that between the two groups the magnitude of the difference

between the means was large, per Cohen (1988). Differences in means between vaccinated ($M=2.44$, $SD=0.67$) and unvaccinated ($M=3.76$, $SD=0.73$) participants regarding barriers ($t(94)=7.28$, $p<.001$) to vaccination may be due to their having overcome the barriers. The effect size ($d=1.88$) demonstrates that between the two groups the magnitude of the difference between the means was large, per Cohen (1988). Interestingly, the mean differences in hypothetical distance, operationalized as susceptibility, between vaccinated and unvaccinated participants were not statistically significant. This may be due to perceived susceptibility being low among all participants. When intention or stage of change were used as outcome variables in analysis, vaccination status was controlled. Additionally, when perceived construal level and barriers are evaluated, vaccination status was controlled. Both controlled and uncontrolled results are included in the sections that follow.

Table 12

Independent Sample T-Test: Mean Differences in Outcome Variables in Vaccinated and Un-Vaccinated Participants Experiment 2

Outcome Variable	Un-Vaccinated n=74		Vaccinated n=20		<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Composite construal	4.75	0.83	5.49	0.49	51.84	-5.10	.000**	-1.09 ^a
Composite Susc	3.35	1.14	3.50	1.45	92	-0.48	.636	-0.12
HPV Susc	3.48	1.26	3.73	1.63	92	-0.72	.472	-0.17
Wart Susc	3.31	1.33	3.51	1.54	92	-0.59	.554	-0.14
Cancer Susc	3.27	1.27	3.25	1.58	91	0.07	.944	0.01
Risk Susc	3.25	1.36	3.92	1.76	92	-1.83	.071	-0.43
Likelihood Susc	2.97	1.21	2.97	1.56	92	0.01	.996	0.00
Possible Susc	3.51	1.31	3.70	1.37	92	-0.56	.577	-0.14

Table 12 continued

Worried Susc	3.68	1.52	3.40	1.69	92	0.73	.470	0.17
Barriers	3.76	0.73	2.44	0.67	92	7.28	.000**	1.88 ^a
Safety Barriers	3.82	1.14	2.41	1.01	92	5.01	.000**	1.31 ^a
Cost Barriers	3.89	0.76	2.69	0.77	92	6.24	.000**	1.57 ^a
No Need Barrier	3.36	1.17	2.11	1.04	92	4.34	.000**	1.13 ^a
Interactivity	4.25	1.61	3.95	1.73	92	0.73	.470	0.18
Social Distance	4.22	1.45	4.20	1.32	92	0.05	.964	0.01
Clarity	4.80	1.42	5.60	0.88	90	-3.12	.003**	-0.68

Note. Susc abbreviates susceptibility. Susceptibility refers to the operationalization of hypothetical distance. Composite susceptibility refers to the 9-point scale, the other types of susceptibility refer to the phrasing of the item. See Appendix B for full phrasing of each item.

^a Denotes a large effect size.

** difference in means significant at the $p < .001$

4.3 Hypothesis Testing

In experiment 2, the six dimensions of construal level were presented in one composite message. There were four possible conditions: high construal interactive, low construal interactive, high construal non-interactive or low construal non-interactive. The interactive element involved the opportunity to indicate with clicks if the certain portions of the message were “liked” or “disliked”. Message exposure was followed by several scaled items assessing message construal perceptions and one item assessing perceived interactivity.

Data was analyzed first by T-test to assess mean differences in outcome variables based on message conditions. Then bivariate correlation analyses were performed to assess the relationships between perceived construal level (continuous) and intention to vaccinate (H1), hypothetical distance (H2), and stage of change (H5). Bivariate

correlation analyses were also performed to assess the relationship between construal level of barrier, hypothetical distance (H3), and stage of change (H4). Additionally, bivariate correlation was computed to explore the relationship between interactivity and social distance (H7a), as well as the relationship between social distance and hypothetical distance (H7b). Next partial correlation was computed to control for vaccination status in each of the aforementioned relationships. Lastly, the amount of extra variation contributed to outcome variables by related independent variables was assessed through hierarchical regression analysis.

First, T-test analysis was applied to assess mean differences in outcome variables based on message condition. Independent sample T-tests did not show significant differences in means between groups exposed to low and high construal messages on any outcome variable including susceptibility (H2), stage of change (H5), or intention to vaccinate (H1). However, means between low and high condition groups differed in the hypothesized directions for all outcome variables (see Table 13). Low construal message conditions were related to higher intention to vaccinate (H1), higher susceptibility (H2), later stage of change (H5).

Additionally, hypothesis 7a predicted that interactive conditions would be associated with decreased social distance. Although the mean differences between non-interactive ($M = 4.19$, $SD = 1.41$) and interactive ($M = 4.23$, $SD = 1.43$) conditions were not statistically significant they were in the predicted directions; $t(92) = -.145$, $p = .885$. Thus, T-test analysis of the data offered limited support to hypothesis 7a.

Although means differed in the hypothesized directions, neither manipulation demonstrated a statistically significant difference in means among outcome variables. Thus, relationships discussed in the hypotheses could not be evaluated from a causal perspective.

In lieu of evaluating direct effects of message manipulations, correlation analysis was applied to perceptions of interactivity (continuous) and perceptions of message construal level (continuous) with hypothesized outcome variables. The associations between perceived construal level, perceived interactivity (H7a), hypothetical distance(H2), construal level of barriers (H3; H4), stage of change (H4; H5) and intention to vaccinate (H1; H6) may still provide valuable insights into how construal level theory functions in this health context.

Table 13

Independent Sample T-Test: Mean Differences in Outcome Variables in Low and High Construal Message Conditions Experiment 2

Outcome Variable	High Construal Message n=48		Low Construal Message n=46		df	t	p	Cohen's d
	M	SD	M	SD				
Composite								
Susceptibility	3.28	1.26	3.48	1.15	92	-0.80	.426	-0.17
Likelihood								
Susceptibility	2.94	1.32	2.99	1.25	92	-0.18	.856	-0.04
Possible								
Susceptibility	3.57	1.44	3.54	1.19	92	0.12	.904	0.02
Worried								
Susceptibility	3.40	1.58	3.86	1.50	92	-1.42	.159	-0.30

Table 13 continued

HPV								
Susceptibility	3.48	1.36	3.59	1.34	92	-0.39	.700	-0.08
Wart								
Susceptibility	3.21	1.39	3.50	1.35	92	-1.02	.308	-0.21
Cancer								
Susceptibility	3.17	1.36	3.38	1.31	91	-0.76	.448	-0.16
Stage of Change	2.06	1.19	2.41	1.13	92	-1.46	.147	-0.30
Intention to								
Vaccinate	4.67	2.36	5.37	2.08	92	-1.53	.130	-0.31

Note. Susceptibility refers to the operationalization of hypothetical distance. Composite susceptibility refers to the 9-point scale, the other types of susceptibility refer to the phrasing of the item. See appendix for full phrasing of each item. Stage of Change was evaluated with a four point ordinal scale, with 1 representing the earliest stage and 4 representing the latest stage. All other outcome variables were measured with 7-point Likert-type scales.

There were no statistically significant differences in the means of the two groups.

Hypothesis 1.

Hypothesis 1 predicted that lower construal messages would be associated with higher intention to vaccinate.

Composite construal score as a predictor of intention to vaccinate. Bivariate correlation analysis demonstrated that perceived message construal, operationalized with the composite construal score, was associated with intention to vaccinate ($r(94)=.543$, $p<.001$), the partial correlation maintains significance when controlling for vaccination status ($r(91)=.428$, $p<.001$). This finding suggests that when perceived message construal is lower, intention to vaccinate increases.

Hierarchical regression was run to determine if the addition of perceived construal level based on the composite construal construct scale improved the prediction of

intention to vaccinate over and above vaccination status. The full model of perceived message construal level and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2=.579$, $F(2, 91) = 62.52$, $p < .001$; adjusted $R^2 = .570$. Model 1 accounted for 47.8% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 57% of the variability, as indexed by the adjusted R^2 statistic. The addition of perceived message construal level to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .095, $F(2,91) = 20.46$, $p < .001$. The variable of vaccination status, as indexed by its β value of .573 ($p < .001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while perceived message construal level, as indexed by its β value of .331 ($p < .001$), had a weaker statistically significant relationship to intention to vaccinate.

Correlation and regression analysis of the perceived message construal and intention to vaccinate indicate that lower construal message perceptions correlate with higher intention to vaccinate (H1).

Imagine dimension as predictor of intention to vaccinate. Bivariate correlation analysis demonstrated that the imagination dimension of construal level correlated was associated with intention to vaccinate ($r(94)=.413$, $p < .001$), the partial correlation maintains significance when controlling for vaccination status ($r(91)=.436$, $p < .001$). This finding evidences a positive association between lower construal message perception and intention to vaccinate.

Hierarchical regression was run to determine if the addition of the imagine dimension of construal level improved the prediction of intention to vaccinate over and

above vaccination status. The full model of perceived message construal level and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2=.582$, $F(2, 91) = 63.37$, $p < .001$; adjusted $R^2 = .573$. Model 1 accounted for 47.8% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 57.3% of the variability, as indexed by the adjusted R^2 statistic. The addition of perceived message construal level to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .098, $F(2,91) = 21.35$, $p < .001$. The variable of vaccination status, as indexed by its β value of .648 ($p < .001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while perceived message construal level, as indexed by its β value of .317 ($p < .001$), had a weaker statistically significant relationship to intention to vaccinate.

Hypothesis 1 was supported.

Hypothesis 2.

Hypothesis 2 predicted low construal message exposure would predict lower hypothetical distance between self and HPV when compared to high construal message exposure.

Perceived message construal and hypothetical distance. Hypothetical distance was assessed using the same measures of susceptibility as in experiment 1 (see Appendix B). Correlation analysis did not demonstrate a statistically significant positive correlation between lower construal perceptions and composite susceptibility, nor a statistically significant partial correlation between perceived message construal and composite susceptibility.

However, bivariate correlation analysis demonstrated that perceived message construal was associated with HPV-phrased susceptibility ($r(94)=.224$, $p=.030$). Partial correlation analysis did not demonstrate the same association. Additionally, hierarchical regression was run to determine if the addition of perceived message construal improved the prediction of HPV-phrased susceptibility over and above vaccination status.

Hierarchical regression analysis demonstrated that perceived message construal was a significant predictor of risk-phrased susceptibility as indexed by its β value of $.227$ ($p=.042$) above and beyond vaccination status. Vaccination was not a significant predictor of risk-phrased susceptibility as indexed by its β value of $-.009$ ($p=.935$).

Additionally, bivariate correlation analysis demonstrated that perceived message construal was associated with risk-phrased susceptibility ($r(94)=.255$, $p=.013$). The partial correlation between perceived message construal and risk-phrased susceptibility, controlling for vaccination status, did not demonstrate statistical significance.

Additionally, hierarchical regression was run to determine if the addition of perceived message construal improved the prediction of risk-phrased susceptibility over and above vaccination status. Hierarchical regression analysis demonstrated that perceived message construal was a significant predictor of risk-phrased susceptibility as indexed by its β value of $.215$ ($p=.050$) above and beyond vaccination status. Vaccination was not a significant predictor of risk-phrased susceptibility as indexed by its β value of $.108$ ($p=.324$).

Correlation and hierarchical regression analyses of perceived message construal and susceptibility provide indirect support for the prediction that lower construal messages would be associated with more proximal hypothetical distance (H2).

Imagine dimension and hypothetical distance. Bivariate correlation analysis revealed a positive association between the imagine dimension of construal level perception and composite susceptibility ($r(94)=.259$, $p=.012$), partial correlation analysis maintained the statistical significance of this association ($r(90)=.253$, $p=.015$). Additionally, hierarchical regression was run to determine if the addition of the imagine dimension improved the prediction of composite susceptibility over and above vaccination status. Hierarchical regression analysis demonstrated that the imagination dimension was a significant predictor of composite susceptibility as indexed by its β value of .258 ($p=.014$) above and beyond vaccination status. Vaccination was not a significant predictor of composite susceptibility as indexed by its β value of .011 ($p=.915$).

Bivariate correlation analysis also demonstrated that the imagine dimension of construal level was associated with HPV-phrased susceptibility ($r(94)=.249$, $p=.016$), partial correlation analysis maintained the statistical significance of this association ($r(90)=.236$, $p=.023$). Additionally, hierarchical regression was run to determine if the addition of the imagine dimension improved the prediction of HPV-phrased susceptibility over and above vaccination status. Hierarchical regression analysis demonstrated that the imagination dimension was a significant predictor of HPV-phrased susceptibility as indexed by its β value of .243 ($p=.020$) above and beyond vaccination status. Vaccination

was not a significant predictor of HPV-phrased susceptibility as indexed by its β value of .039 ($p=.707$).

Additionally, bivariate correlation analysis demonstrated that the imagine dimension of construal level was associated with wart-phrased susceptibility ($r(94)=.252$, $p=.014$), partial correlation analysis maintained the statistical significance of this association ($r(90)=.253$, $p=.015$). Additionally, hierarchical regression was run to determine if the addition of the imagine dimension improved the prediction of wart-phrased susceptibility over and above vaccination status. Hierarchical regression analysis demonstrated that the imagination dimension was a significant predictor of wart-phrased susceptibility as indexed by its β value of .248 ($p=.018$) above and beyond vaccination status. Vaccination was not a significant predictor of wart-phrased susceptibility as indexed by its β value of .025 ($p=.810$).

Bivariate correlation analysis also demonstrated that the imagine dimension of construal level was associated with risk-phrased ($r(94)=.279$, $p=.006$) and worried-phrased susceptibility ($r(94)=.214$, $p=.038$), partial correlation analysis maintained the statistical significance of these associations ($r(90)=.255$, $p=.014$; $r(90)=.240$, $p=.021$, respectively).

Additionally, hierarchical regression was run to determine if the addition of the imagine dimension improved the prediction of risk-phrased susceptibility over and above vaccination status. Hierarchical regression analysis demonstrated that the imagination dimension was a significant predictor of risk-phrased susceptibility as indexed by its β value of .257 ($p=.012$) above and beyond vaccination status. Vaccination was not a

significant predictor of risk-phrased susceptibility as indexed by its β value of .149 ($p=.142$).

Additionally, hierarchical regression was run to determine if the addition of the imagine dimension improved the prediction of worried-phrased susceptibility over and above vaccination status. Hierarchical regression analysis demonstrated that the imagination dimension was a significant predictor of worried-phrased susceptibility as indexed by its β value of .231 ($p=.028$) above and beyond vaccination status. Vaccination was not a significant predictor of worried-phrased susceptibility as indexed by its β value of $-.110$ ($p=.288$).

Correlation and hierarchical regression analyses of the imagine dimension of construal and susceptibility provide indirect support for the prediction that lower construal messages would be associated with more proximal hypothetical distance (H2).

Hypothesis 3.

Hypothesis 3 predicted that lower hypothetical distance would demonstrate a stronger association with lower construal barriers to HPV vaccination when compared to higher construal barriers.

Principal Axis Factoring to distinguish construal level of barriers. Seventeen potential barriers to HPV vaccination (Gerend et al., 2013) were subjected to principal axis factoring to distinguish between high and low construal barriers. Bartlett's Test of Sphericity ($p<.001$) in addition to a Kaiser-Meyer-Olken (.835) above .6 indicate the correlations were substantial enough for exploratory analysis. In accordance with best

practices, factor analysis was repeated until each factor retained had an eigenvalue of above 1 (see Table 14), more than three adequately loaded items, and reduced cross-loading (Osbourne & Costello, 2009). The remaining cross-loaded item was excluded from further analysis. The final pattern matrix consisted of three factors (see Table 15).

The three factors were categorized as safety ($\alpha=.83$), no need ($\alpha=.77$), and cost ($\alpha=.78$) oriented barriers. Although factor analysis did not demonstrate the dimensionality of Gerend et al. (2013) analysis of HPV vaccination barriers to women, the loadings are carried in a similar way across factors. The present study will evaluate both safety and no-need barriers separately as dimensions of higher construal barriers, while cost will represent low construal barriers. These categorizations are in accordance with Gerend et al. (2013) global versus practical categorization which can be contextualized to construal level theory as abstract, value oriented barriers and concrete, logistical barriers (Liberian & Förster, 2009).

Table 14

Total Variance Explained for Factors of the 17—item Vaccination Barrier Questionnaire Experiment 2

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.03	35.49	35.49	5.53	32.52	32.52	4.61
2	1.77	10.43	45.92	1.26	7.40	39.91	4.49
3	1.34	7.86	53.77	0.89	5.23	45.13	3.26
4	1.15	6.74	60.51				
5	0.96	5.63	66.14				

Table 14 continued

6	0.77	4.63	70.77
7	0.75	4.39	75.16
8	0.68	4.00	79.16
9	0.63	3.69	82.85
10	0.55	3.25	86.09
11	0.50	2.91	89.01
12	0.44	2.59	91.60
13	0.42	2.46	94.06
14	0.32	1.87	95.93
15	0.28	1.65	97.58
16	0.23	1.35	98.93
17	0.18	1.07	100.00

Note. Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 15

Summary of Items and Factor Loadings for Promax Three-Factor Solution for the Vaccination Barrier Questionnaire^a (N=94)

	Factor		
	1	2	3
I have concerns about whether the HPV vaccine is safe.	.992	-.077	-.089
The HPV vaccine may have long-term side effects.	.917	-.141	.044
I have concerns about possible side effects of the HPV vaccine.	.538	.043	.113
There has not been enough research done on the HPV vaccine.	.490	.159	.027
I have concerns about whether the HPV vaccine is effective. ^b	.405	.375	.065
I don't know enough about HPV.	.060	.654	-.138
My insurance does not cover HPV vaccine.	.039	.651	.035

Table 15 Continued

My insurance does not cover enough of the vaccine.	-.218	.635	.142
I'm not sure how to file the insurance claim to get reimbursed.	-.082	.560	-.126
The vaccine cost is too high.	.151	.511	-.097
I'm not sure where to get the HPV shot.	.192	.474	-.108
The vaccine only protects against some types of HPV.	.017	.437	.020
Getting the HPV shot takes too much time.	.285	.305	.157
I do not need to vaccinate because I plan to be abstinent (not have sex) until marriage.	-.038	-.241	.855
I do not need to vaccinate because I plan to only have one sexual partner in my lifetime.	.114	-.122	.737
My parents don't want me to get the HPV vaccine.	.033	.265	.563
I don't think I need the HPV vaccine.	-.035	.297	.443

Note. Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

^aRotation converged in 5 iterations.

^bThis item was removed from further analysis due to cross-loading.

Hypothetical distance and cost-oriented low construal barriers. Bivariate correlation analysis demonstrated that composite susceptibility was not associated with cost barriers. However, bivariate correlation demonstrated that worried-phrased susceptibility was associated with cost barriers ($r(94)=.220, p=.033$). Partial correlation analysis, controlling for vaccination status, supported the association between worried-phrased susceptibility and cost barriers ($r(90)=.220, p=.035$). Partial correlation analysis, controlling for vaccination status, also demonstrated that composite wart-phrased

susceptibility was associated with lower construal barriers ($r(90) = .247, p = .017$). Bivariate correlation analysis and partial correlation analysis did not demonstrate an association between any other specific phrasing of susceptibility and cost barriers. Lower hypothetical distance is characterized by higher susceptibility perceptions. Correlation analysis supports the prediction that as hypothetical distance decreases cost barriers increase. However, to fully evaluate hypothesis 3 these associations must be compared to those found between high construal barriers and hypothetical distance.

Hypothetical distance and no-need-oriented high construal barriers. Bivariate correlation analysis demonstrated that composite susceptibility was not associated with no-need barriers. However, bivariate correlation demonstrated that risk-phrased susceptibility was associated with no-need barriers ($r(94) = -.239, p = .020$). Bivariate correlation analysis and partial correlation analysis did not demonstrate an association between any other specific phrasing of susceptibility and no-need barriers.

A direct comparison may not be made between the two types of barriers in the context of hypothetical distance, due to differences in type of susceptibility associated with each barrier. However, the sign has reversed in the association between no-need barriers and risk-phrased susceptibility suggesting that as susceptibility decreases, no-need barriers increase. A decrease in susceptibility is indicative of an increase in hypothetical distance. Thus, the direction of the relationships offer support for the prediction that lower hypothetical distance would have a stronger association with lower construal barriers (H3).

Hypothetical distance and safety-oriented high construal barriers. Bivariate correlation analysis demonstrated that composite susceptibility was not associated with safety barriers. However, bivariate correlation demonstrated that worried-phrased susceptibility was associated with cost barriers ($r(94)=.222, p=.032$). Partial correlation analysis, controlling for vaccination status, supported the association between worried-phrased susceptibility and safety barriers ($r(90)=.215, p=.040$). In this case the association between safety barriers and worried-phrased susceptibility can be compared to those between cost barriers and worried-phrased susceptibility. The relationships are very similar, suggesting that lower hypothetical distance does not demonstrate a stronger association with lower construal barriers than it does with high construal barriers (H3).

Hypothesis 3 was not supported.

Hypothesis 4

Hypothesis 4a predicted lower construal barriers would be more strongly associated with temporally proximal intention to vaccinate within stage of change than to temporally distal intention to vaccinate.

Lower construal, cost-oriented barriers and stage of change. The most proximal intention within stage of change is the preparation stage wherein participants intend to vaccinate within the next 30 days. Bivariate correlation analysis demonstrated that lower construal barriers were not associated with preparation stage. Partial correlation analysis, controlling for vaccination status also indicated lower construal barriers were not associated with preparation stage.

The more distal stage, contemplation, indicates an intention to vaccinate sometime in the next six months. Bivariate correlation analysis demonstrated that lower construal barriers were not associated with contemplation stage. Partial correlation analysis, controlling for vaccination status also indicated lower construal barriers were not associated with pre-contemplation stage.

The most distal stage, pre-contemplation, indicates no intention to vaccinate in the next six months. Bivariate correlation analysis demonstrated lower construal barriers were associated with pre-contemplation stage ($r(92) = .335, p=.001$). This relationship indicates that as cost barriers increase, so does the temporal distance between the participant and an intention to vaccinate. Although the sign changed following partial correlation analysis, the relationship is no longer significant when controlling for vaccination status ($r(91) = .157, p = .132$).

Hypothesis 4a was not supported.

Hypothesis 4b predicted that higher construal barriers would be more strongly associated with temporally distal intention to vaccinate within stage of change than to temporally proximal intention to vaccinate.

Higher construal, no-need barriers and stage of change. Bivariate correlation analysis demonstrated that both no-need barriers and safety-oriented barriers were not associated with preparation or contemplation stage.

Bivariate correlation analysis demonstrated that no-need barriers were associated with pre-contemplation stage ($r(92) = .367, p<.001$). When controlling for vaccination

the partial correlation maintained significance ($r(91) = .245, p = .018$). This relationship indicates that as no-need barriers increase so does the temporal distance to the intention to vaccinate. Additionally, bivariate correlation analysis demonstrated that safety barriers were associated with pre-contemplation ($r(92) = .249, p = .015$). When controlling for vaccination status the relationship between safety barriers and pre-contemplation lost significance. Correlation analysis demonstrated a stronger association between no-need oriented barriers and the most distal stage of change.

Hypothesis 4b was supported.

Construal level of barriers and ordinal stage of change. Bivariate correlation analysis demonstrated that lower construal barriers were negatively associated with stage of change ($r(92) = -.499, p < .001$). This finding indicates that increases in cost-oriented, lower construal barriers are associated with backward movement in stage of change. When controlling for vaccination, this relationship lost statistical significance. Bivariate correlation analysis demonstrated that higher construal, no-need barriers were negatively associated with stage of change ($r(92) = -.437, p < .001$). When controlling for vaccination, the partial correlation between no-need construal and ordinal stage of change maintained significance ($r(91) = -.207, p = .047$). Bivariate correlation analysis demonstrated that safety barriers were associated with ordinal stage of change ($r(92) = -.395, p < .001$). However, partial correlation analysis indicated that the relationship was no longer significant. Hierarchical regression was run to determine if the addition of the three types of barriers improved the prediction of stage of change over and above vaccination status. Although the model was significant $R^2 = .612, F(4, 89) = 35.14, p <$

.001; adjusted $R^2 = .595$, the R^2 change was not significant and β values indicated that none of the barriers were significant predictors.

Multiple hierarchical regression analysis was repeated, excluding the portion of the sample who reported prior vaccination. The analysis did not provide any statistically significant models, suggesting that adding a temporal element to vaccination intention reduces the relationship between perceived barriers and intention to vaccinate.

Construal level of barriers and intention to vaccinate. Bivariate correlation analysis demonstrated that lower construal barriers were negatively associated with intention to vaccinate ($r(92) = -.499, p < .001$). However, when controlling for vaccination, this relationship loses statistical significance. Bivariate correlation analysis demonstrated that higher construal, no-need barriers were negatively associated with intention to vaccinate ($r(92) = -.562, p < .001$). When controlling for vaccination, the partial correlation between no-need construal and intention to vaccinate maintained significance ($r(91) = -.420, p < .001$). Bivariate correlation analysis demonstrated that safety barriers were associated with intention to vaccinate ($r(92) = -.307, p = .003$). However, partial correlation analysis indicated that the relationship was no longer significant.

Additionally, hierarchical regression was run to determine if the addition of the different improved the prediction of intention to vaccinate over and above vaccination status. The full model of perceived barrier construal and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .577, F(4, 89) = 32.65, p < .001$; adjusted $R^2 = .577$. Model 1 accounted for 47.8% of the variability, as indexed

by the adjusted R^2 statistic and Model 2 accounted for 57.7% of the variability, as indexed by the adjusted R^2 statistic. The addition of barrier construal level to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .111, $F(4, 89) = 8.10$, $p < .001$. The variable of vaccination status, as indexed by its β value of .581 ($p < .001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while no need barriers, as indexed by its β value of -.372 ($p < .001$), had a weaker statistically significant relationship to intention to vaccinate, safety barriers, as indexed by its β value of .177 ($p = .042$), cost barriers did not have a statistically significant relationship to intention to vaccinate. In contrast, to Gerend et al. (2013) finding among college women, college men in this sample did not demonstrate an increase in intention to vaccinate associated with lower construal barriers.

To allow for more direct comparison to Gerend et al. (2013), hierarchical multiple regression to assess the variability explained by each barrier type in intention to vaccinate was run excluding participants who had already vaccinated. Cost barriers (Model 1), no-need barriers (Model 2), and safety barriers (Model 3) were entered into the equation. The full model of all three barrier types to predict intention to vaccinate (Model 3) was statistically significant, $R^2 = .245$, $F(3, 70) = 7.56$, $p < .001$; adjusted $R^2 = ..$ Model 1 accounted for 0.3% of the variability, as indexed by the adjusted R^2 statistic, Model 2 accounted for 19.1% of the variability, as indexed by the adjusted R^2 statistic, and Model 3 accounted for 21.2% of variability. The addition of cost barriers to the prediction of intention to vaccinate (Model 1) did not lead to a statistically significant change in R^2 . The addition of no-need oriented barriers (Model 2) to the prediction of intention to vaccinate led to a statistically significant increase in R^2 of .196, $F(2,71) = 17.72$, $p < .001$.

The addition of safety barriers to the prediction of intention to vaccinate did not lead to a statistically significant change in R^2 . The variable of no-need barriers was a significant predictor of intention to vaccinate as indexed by its β value of $-.497$ ($p < .001$). Neither of the other barrier types were significant predictors among the portion of the sample who had not already vaccinated. This finding contrasts Gerend et al. (2013) finding among college women. Among the college males in this study not only are cost-oriented barriers not associated with intention, the non-significant relationship the two variables share is negative. Additionally, only no-need, not safety barriers demonstrated an association with intention.

Thus, in this sample the low construal barriers, cost-oriented barriers and high construal safety oriented barriers were not related to intention to vaccinate, however no-need barriers had a negative relationship with intention to vaccinate. Overall, the data did not provide strong evidence for an association between perceived barrier construal levels and intention to vaccinate.

Hypothesis 5

Hypotheses 5a/b predicted exposure to low construal message would be associated with later stages of change, while exposure to high construal message would be associated with earlier stages of change.

Composite construal scale and stage of change. Bivariate correlation analysis demonstrated that perceived message construal was associated with the action/maintenance phase wherein the participant has already been vaccinated ($r(92) =$

.391, $p < .001$). However, partial correlation, controlling for vaccination status demonstrated this association was not significant.

Additionally, bivariate correlation demonstrated that perceived message construal was negatively associated with pre-contemplation ($r(92) = -.372$, $p < .001$). This association maintained significance, even when controlling for vaccination status ($r(91) = -.265$, $p = .010$).

Next, bivariate correlation analysis demonstrated that perceived message construal was positively associated with the ordinal measure of stage of change ($r(92) = .466$, $p < .001$). This association maintained significance even when controlling for vaccination status ($r(91) = .305$, $p = .003$). Recall that a higher score on the perceived message construal scale indicates a low construal perception. All of this together indicates that lower construal message perceptions are associated with later stages of change, and as perceptions of messages become higher they are associated with earlier stages.

Additionally, hierarchical regression was run to determine if the addition of perceived message construal improved the prediction of ordinal stage of change over and above vaccination status. The full model of perceived barrier construal and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .628$, $F(2,91) = 76.75$, $p < .001$; adjusted $R^2 = .620$. Model 1 accounted for 58.5% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 62% of the variability, as indexed by the adjusted R^2 statistic. The addition of perceived message construal level to the prediction of ordinal stage (Model 2) led to a statistically significant

increase in R^2 of .038, $F(2,91) = 9.31$, $p = .003$. The variable of vaccination status, as indexed by its β value of .690 ($p < .001$), was shown to have the strongest statistically significant relationship to ordinal stage of change, while perceived message construal, as indexed by its β value of .210 ($p = .003$), had a weaker statistically significant relationship to ordinal stage of change.

The prediction that lower construal messages would be associated with later stage of change was partially supported by the data based on the directionality of the relationship between perceived message construal and ordinal stage of change (H5a/b).

Imagine dimension and stage of change. Bivariate correlation demonstrated that perceived message the imagine dimension was negatively associated with pre-contemplation ($r(92) = -.253$, $p = .014$). This association maintained significance, even when controlling for vaccination status ($r(91) = -.214$, $p = .040$).

Additionally, bivariate correlation analysis demonstrated that the imagine dimension was positively associated with the ordinal measure of stage of change ($r(92) = .236$, $p = .022$). However, this association did not maintain significance when controlling for vaccination status.

Additionally, hierarchical regression was run to determine if the addition of the imagine dimension improved the prediction of ordinal stage of change over and above vaccination status. The full model of imagine dimension and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .605$, $F(2,91) = 69.61$, $p < .001$; adjusted $R^2 = .596$. Model 1 accounted for 58.5% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 59.6% of the variability, as

indexed by the adjusted R^2 statistic. The addition of the imagine dimension to the prediction of ordinal stage (Model 2) did not lead to a statistically significant increase in R^2 ($p = .066$). The variable of vaccination status, as indexed by its β value of .749 ($p < .001$), was shown to have the strongest statistically significant relationship to ordinal stage of change, while the imagine dimension, as indexed by its β value of .124 ($p = .055$), did not have a statistically significant relationship to ordinal stage of change.

Hypothesis 5 was not supported.

Hypothesis 6

Hypothesis 6 predicted lower hypothetical distance, operationalized as high susceptibility, would be associated with higher intention to vaccinate for HPV.

Composite susceptibility and intention to vaccinate for HPV. Bivariate correlation analysis demonstrated that composite susceptibility was associated with intention to vaccinate ($r(92) = .213$, $p = .039$). Even when controlling for vaccination, the association remained ($r(90) = .253$, $p = .015$). Additionally, hierarchical regression was run to determine if the addition of composite susceptibility improved the prediction of intention to vaccinate over and above vaccination status. The full model of composite susceptibility and vaccination status to predict intention to vaccinate (Model 2) was statistically significant, $R^2 = .506$, $F(2, 91) = 48.55$, $p < .001$; adjusted $R^2 = .506$. Model 1 accounted for 47.8% of the variability, as indexed by the adjusted R^2 statistic and Model 2 accounted for 50.6% of the variability, as indexed by the adjusted R^2 statistic. The addition of composite susceptibility to the prediction of intention to vaccinate (Model 2) led to a statistically significant increase in R^2 of .032, $F(2,91) = 6.05$, $p < .016$. The

variable of vaccination status, as indexed by its β value of .687 ($p < .001$), was shown to have the strongest statistically significant relationship to intention to vaccinate, while composite susceptibility, as indexed by its β value of .180 ($p = .016$) had a weaker statistically significant relationship to intention to vaccinate. These analyses support the prediction that lower hypothetical distance would be associated with higher intention to vaccinate for HPV (H6).

Specific phrasings of susceptibility and intention to vaccinate. Bivariate correlation analysis demonstrated that HPV-phrased ($r(92) = .251, p = .015$), risk-phrased ($r(92) = .274, p = .008$), possible-phrased susceptibility ($r(92) = .210, p = .042$) were all associated with intention to vaccinate. When controlling for vaccination status, partial correlation demonstrated that HPV-phrased ($r(90) = .293, p = .005$), cancer-phrased ($r(90) = .205, p = .050$), risk-phrased ($r(90) = .209, p = .046$), possible-phrased ($r(90) = .239, p = .022$), and worried-phrased ($r(90) = .248, p = .017$) susceptibility were all associated with intention to vaccinate. Interestingly, neither wart-phrased nor likelihood phrased susceptibility correlated with intentions to vaccinate. Overall, the majority of susceptibility scales correlated with intention to vaccinate.

Correlation analysis of susceptibility and intention to vaccinate offered moderate support for the prediction that reduced hypothetical distance to HPV risk would be associated with increased intention to vaccinate (H6).

Hypothesis 7a predicted interactive conditions would be associated with lower perceived social distance.

Correlation analysis demonstrated that perceived interactivity (continuous) was associated with lower social distance, operationalized as increased self-reference ($r(92) = .219, p = .036$), the association existed even when controlling for vaccination status ($r(89) = .219, p = .037$). Additionally, when controlling for high or low message condition exposure, partial correlation analysis demonstrated perceived interactivity was related to both social distance ($r(89) = .217, p = .038$) and perceived construal level ($r(89) = .300, p = .004$). Hypothesis 7a was supported.

Hypothesis 7b predicted that lower perceived social distance would be associated with lower hypothetical distance.

Social distance and hypothetical distance. In the context of this study, reduced social distance was operationalized as increased self-reference. Lower hypothetical distance was operationalized as increased perceived susceptibility to HPV. Thus, positive correlations between these two variables would be indicative of support for the prediction that lower perceived social distance would be associated with lower hypothetical distance (H7b).

Bivariate correlation analysis demonstrated that lower social distance was associated with composite susceptibility ($r(92) = .219, p = .036$), the association maintained statistical significance even when controlling for vaccination status ($r(90) = .287, p = .006$).

Correlation analysis of composite susceptibility and social distance offers support for hypothesis 7b.

Social distance and specific phrasings of susceptibility. Bivariate correlation analysis demonstrated that lower social distance was associated with HPV-phrased ($r(92) = .251, p = .015$), wart-phrased ($r(92) = .284, p = .006$), cancer-phrased ($r(91) = .230, p = .026$), likelihood-phrased ($r(92) = .265, p = .010$), and worried-phrased ($r(92) = .328, p = .001$) susceptibility. Partial correlation analysis, controlling for vaccination status, demonstrated that lower social distance was associated with HPV-phrased ($r(90) = .254, p = .015$), wart-phrased ($r(90) = .288, p = .005$), cancer-phrased ($r(90) = .230, p = .027$), likelihood-phrased ($r(90) = .266, p = .010$), and worried-phrased ($r(90) = .335, p = .001$) susceptibility. The only susceptibility phrasing that did not associate with social distance was risk-phrasing. Overall, correlation analysis provided support for the prediction that lower perceived social distance would be associated with lower hypothetical distance (7b).

Hypothesis 7b was supported.

4.4 Experiment 2 Conclusion

Experiment 2 was designed to isolate the effect of interactivity on social distance and to assess the composite message effects in contrast to the dimensional presentation. Message manipulation did not demonstrate direct effects on any outcome variables according to independent T-test analysis. However, post hoc analysis using perceived message construal (continuous) and perceived interactivity (continuous) offered insight

into the relationships between construal level, hypothetical distance, social distance, barriers to vaccination, stage of change, and intention to vaccinate.

Correlation analysis demonstrated a relationship between low construal message perception and higher intention to vaccinate (H1). Low construal message perception was also associated with decreased hypothetical distance (H2) and decreased hypothetical distance was associated with higher intention to vaccinate (H6). Exploration of construal level of barriers and stage of change did not prove very fruitful. Lower hypothetical distance, operationalized as high perceived susceptibility to HPV, was not associated with low construal barriers (H3). Additionally, lower construal barriers did not associate with temporally proximal intention to vaccinate in accordance with stage of change (H4a). Higher construal barriers had a stronger association with temporally distal intentions to vaccinate than lower construal barriers (H4b), indicating that value-based barriers may be more difficult for this sample of college males to overcome. Also, although low construal message perception was associated with higher intention to vaccinate, once a temporal element was added using stage of change this association lost statistical significance (H5). However, though not statistically significant, the relationship was still in the predicted direction, meaning that as construal level of message perception decreased, intention to vaccinate became more proximal.

In the 2x2 design, correlation analysis indicated that perceived interactivity was associated with social distance (7a) and perceived message construal. This finding provides support for one of the assumptions of serious games design framework (Lee & Jeong, 2014). Additionally, reduced social distance was associated with reduced

hypothetical distance (7b). This finding suggests in the context of health campaigns with the goal of increasing perceived susceptibility may benefit from incorporating interactive elements to reduce social distance.

Overall, in experiment 2 post hoc analysis using perceived message construal (continuous) and perceived interactivity (continuous) provided support for the connections between construal level dimensions, hypothetical distance, and intention to vaccinate, with the exception of evaluations of barriers and stage of change. The outcomes of analysis of continuous perceived interactivity and message construal variables in experiment 1 and experiment 2 are summarized in Table 16. General discussion, limitations and suggestions for future studies follow this section.

Table 16

Summary of Hypothesis Testing

Hypothesis	Experiment 1	Experiment 2
1 Low construal message will be associated with higher intention to vaccinate.	Moderate support from continuous variables. Clairty and social distance also related to intention.	Supported by composite construal and by imagination dimension.
2 Low construal message would predict lower hypothetical distance.	Supported through regression analysis of clarity dimension dependent upon susceptibility phrasing ie likelihood.	Supported through regression analysis of the imagine dimension – composite, worried, risk and wart phrasing Composite construal predicted risk and HPV phrased
3 Lower hypothetical distance and low construal barriers will be associated	Supported	Not supported

Table 16 continued

4a Low construal barriers would be associated with more proximal intention	Not supported	Not supported
4b High construal barriers would be associated with more distal intention	Not very strong, but supported	Supported
5 Low construal message would be associated with more proximal intention	Not supported	Not supported.
6 Low hypothetical would be associated with distance higher intention	Supported	Supported
7a Interactivity would be associated with lower social distance	Supported	Supported
7b Lower social distance would be associated with lower hypothetical distance	Supported, depending on susceptibility phrasing	Supported

CHAPTER 5. DISCUSSION

This study investigated the explanatory potential of construal levels and interactivity among college males in relation to hypothetical distance from HPV, barriers to vaccination, position in stage of change, and intention to vaccinate. Little research has explored the role of hypothetical distance and construal level in immunization behavior (Soderberg et al., 2015). Additionally, males have proven a difficult population to reach regarding HPV vaccination possibly due to missing information and feminization of the disease and the vaccine benefits (Daley et al., 2012; Madden et al., 2012; Patel et al., 2011). This study hoped to find additional ways to target the college male population in this context. Although the message manipulation mechanisms used in the study proved ineffective, especially in relation to outcome variables, the constant variables of perceived construal of the message and perceived interactivity of the message provided preliminary evidence in support of further exploration of the role of hypothetical distance, construal level, and interactivity in promoting immunization behaviors among college males. Additionally, the results provide additional empirical support for existing theories of health campaign and intervention design.

The data yielded in both experiment 1 and experiment 2 demonstrated relationships between clarity and ease of imagination dimensions of construal level perceptions and susceptibility. The finding in experiment 1 suggests that concrete imagery may be more effective than artist renderings or conceptual imagery in altering perceived susceptibility. While experiment 2 suggests non-medicalized language is more effective than medical language in lowering construal level and increasing perceived susceptibility. The present study duplicates the connection demonstrated by Sherman et al., (1985) between ease of imagining disease and perceived susceptibility, but adds the photographic element to this manipulation. The relationship between ease of imagining disease and construal level was demonstrated by Wakslak and Trope (2009) in a general health context. The present study combined the goals of the prior studies and demonstrated the connection between construal level, imagination, and a specific health context. The practical implication of this finding is that low construal imagery and language should promote ease in imagining disease symptoms if the goal is to increase perceived susceptibility.

According to the theory of planned behavior, perceived norms, capability to choose a behavior, and attitude toward a behavior inform intention to act; intention is indicated as the strongest predictor of action (Ajzen, 1988, 1991; Fishbein & Ajzen, 1975). The connection between these clarity and imagination dimensions of construal level and intention to vaccinate indicated in both experiments extend the practical and theoretical implications of construal level to the context of theory of planned behavior.

When connections between hypothetical distance, operationalized as susceptibility, and intention to vaccinate were evaluated both experiments supported the association between lower hypothetical distance and higher intention to vaccinate. Additionally, when individual dimensions of susceptibility were analyzed there were differences among the phrasing of susceptibility items and intention to vaccinate. Participants perceived highest susceptibility to HPV-phrased, followed by wart-phrased, then cancer-phrased susceptibility scales. Correlation analysis demonstrated that HPV-phrasing and cancer-phrasing have stronger associations with intention to vaccinate than does wart-phrased susceptibility, which did not demonstrate a statistically significant relationship. Males may perceive contraction of the HPV virus as likely, but feel they are still invulnerable to negative outcomes of contraction.

This study also evidences sex differences in perception of HPV outcomes and intention to vaccinate. Carcioppolo et al., (2013) assessed the effect of message framing (wart-oriented versus cancer-oriented) on intention to vaccinate among college women. Although no direct effects were demonstrated, their analysis suggested that women felt the vaccine was more efficacious in preventing warts than cancer. Thus, they suggest emphasizing the risk of warts in HPV campaigns. In the present study, males seem to be motivated to vaccinate more by the risk of cancer or HPV in general than by warts, despite perceived susceptibility to warts being higher than that to cancer. Thus, this study finds preliminary evidence suggesting that campaign materials targeting male HPV vaccination uptake should emphasize the more severe risks associated with HPV infection.

In experiment 1, data indicated that when the perceived construal of the message is lower, the reported relevance of barriers in general decrease. This finding is significant, because barriers are related to self and response efficacy which impede immunization behavior, according to health communication theories including health belief model (Gerend & Shepherd, 2012; Janz & Becker, 1984), theory of planned behavior (Ajzen, 1991; Gerend & Shepherd, 2012) and extended parallel processing models (Carcioppolo et al., 2013; Witte, 1992).

Interestingly, in experiment 1 and experiment 2 when barriers were categorized by construal level they did not demonstrate powerful associations with temporal intention to vaccinate. Gerend et al. (2013) studied intention to vaccinate among college women and found that in stark contrast to the dominant findings among health communication researchers cost barriers had a positive relationship with intention to vaccinate. They suggested this may be because individuals who intend to vaccinate are more focused on concrete barriers than those who do not intend to do so (Gerend et al., 2013). Gerend et al. (2013) also suggest that if construal level is a factor than the effect should be present when a temporal element is added to the study. Among the sample of college males in this study, cost barriers did not demonstrate a positive or even significant explanatory value for intention to vaccinate. Moreover, when temporal qualifiers were added to intention to vaccinate using the stage of change framework none of the barrier types demonstrate significant explanatory power. Perceptions of message construal also failed to demonstrate any association with stage of change. The data from this study does not suggest barriers are related to position within stage of change in the context of males and HPV vaccination, or that the relationship between barriers and intention to vaccinate can

be explained using construal level theory. The practical implications of this finding may be that a primary focus on reducing perceived barriers through communication to the college male population regarding HPV vaccination status should target value-oriented barriers regarding the need to vaccinate.

According to Hefner, Klimmt, & Vorderer (2007) interactivity is essential for identification with characters within a digital game. Additionally, Oh and Sundar (2015) posit that interactivity may enhance attitudes of apathetic audiences toward subject matter with which they are disinterested. This study found that interactivity with a message may enhance identification and reduce social distance with a health issue, thus influencing perceived hypothetical distance. This relationship is in accordance with the construal level theory proposition that all forms of psychological distance are interdependent and that targeting change in one type may be an effective method of changing harder to reach types of distance. The evidence suggests that the modality element of interactivity could be an important tool for manipulating psychological distance.

Perceived interactivity was associated with decreased social distance and lower perceived construal level. Additionally, reduced social distance was associated with decreased hypothetical distance. Moreover, increases in perceived interactivity and decreases in social distance were associated with increased intention to vaccinate. This finding is consistent with the serious games design framework assumptions (Lee & Jeong, 2014). Thus, this study provides preliminary empirical support for use of this framework in formative phases of serious games development.

Overall, in this study construal level theory did not demonstrate high predictive associations with barriers to vaccination. However, lower construal level perceptions

were associated with higher perceived susceptibility and higher intentions to vaccinate.

This study suggests that construal level theory may be useful in the formative evaluations for HPV-related campaigns targeting males

CHAPTER 6. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. It has been stressed that psychological distances are complicated and may interact (Soderberg et al., 2015) so an assessment of all four dimensions relative to vaccination intention would be more informative. Additionally, CLT falls victim to a heavy emphasis on cognitive analytical processes a shortcoming shared by health belief model and theory of planned behavior as well (Carcioppolo et al., 2013; Hall & Fong, 2007).

Additionally, the method of interactivity manipulation did not demonstrate any direct effects. Oh and Sundar (2015) suggest testing different forms of interactivity in persuasive appeals. They reference that using a time-lapse slider, improved perceived quality of content and persuasive appeal of the message, in addition to perceptions of smoking as less attractive, among participants in an anti-smoking study. In order to clarify the connection between interactivity and tenets of health communication a more substantial interactive component should be incorporated in future studies.

Additionally, Oh and Sundar (2015) recommend assessing elaboration and absorption in relation to each type of interactivity manipulation. This type of analysis could elucidate whether that particular form of interactivity promotes divergent, elaboration or convergent, absorption (Oh & Sundar, 2015). In a construal level context this would

add an extra dimension to the potential of interactivity to function as promoting high construal thought (elaboration) or low construal thought (absorption). Such that all forms of interactivity would not be assumed to function in the same cognitive manner and can be more deliberately designed and selected depending on the goal of the serious game or health campaign.

There is evidence to suggest that although construal level may be manipulated using priming exercises, it is also a trait variable (K. Fujita & Carnevale, 2012); each person may have a baseline construal level. It may have been more effective to run a pre-test to better understand the trait construal level of the sample used in this study to be matched to a specific construal level message. Future studies should include such a pre-test so that manipulation of construal level would be clearly defined, additionally that design would offer more direct support for the concept of matching effect. Matching effects refers to congruency between content and construal level (Fujita & Carnevale, 2012). Matching effect should enhance the effect of construal level in decision making (Fujita & Carnevale, 2012). A pre-test would allow future researchers to match the construal level of the participant to the construal level of the message and examine if matching enhances influence on outcome variables.

Additionally, this study relied on perceptions of construal level. The manipulation of construal level dimensions through the message was inadequate in producing groups with statistically significant mean differences on both the BIF and construal level dimension scales. Future studies may want to limit the number of dimensions which are manipulated so that the effect may be more pronounced and definitive.

Furthermore, multiple independent T-tests were used to analyze both the manipulation check and the initial impact of message condition on outcome variables. Performing multiple T-tests increases the likelihood of Type 1 error. In future studies, this potential could be reduced both by limiting the number of dimensions included in the manipulation and by performing MANOVA analysis in lieu of multiple T-tests. However, in the present study mean differences were not significant regardless and correlation analysis relied instead on perceptions of the message conditions.

Small sample size grossly limits the power of this study, however the conceptual connections between elements of construal level theory and theories of health behavior are still valid. Additionally reliance on perceptions rather than on direct message effect mean the data in this study can only provide preliminary support for tailored messages and was not proven an effective strategy for targeted campaigns. However, the data from the present study indicated that on average the sample had low BIF scores and low construal message perceptions, this may be indicative of a low construal trait mindset among college males. Understanding the average construal level of a target group may be advantageous in campaign design such that matching effect can be capitalized on. Especially, if the goal of the campaign is to improve intention to vaccinate as this study demonstrated associations between these perceptions and that intention.

Furthermore, in accordance with theory of planned behavior intention was measured as a reliable indicator of behavior adoption (Ajzen, 1988, 1991; Fishbein & Ajzen, 1975). However, this study did not offer any direct measures of behavior change. A longitudinal design that tracked vaccination uptake would enhance the significance of

this study and allow for more thorough comparisons against female samples in other studies.

Finally, construal level theory and vaccination intentions among a more diverse sample would contribute to other areas of HPV research lacking adequate understanding for public health decision-making. However, this sample was chosen in part due to the age limits associated with the CDC recommended vaccination frame.

Although this study was limited by sample size, lack of pre-test, and ineffective manipulation of both message construal level and interactivity, the findings provide interesting insight into the relationships among dimensions of construal level theory, interactivity, and health communication theories. These associations provide preliminary evidence that understanding construal levels of a target population may be advantageous in the formative phase of campaign design.

CHAPTER 7. CONCLUSION

HPV poses a more severe threat to male populations than originally publicized (Chaturvedi et al., 2011; Chaturvedi, 2010). However, while women are still increasing uptake, male HPV vaccine uptake is negatively impacted by issues of feminized framing and missing information (Daley et al., 2012; Patel et al., 2011). This study analyzed the relationships between perceived message construal level, perceived interactivity, hypothetical distance operationalized as susceptibility, construal level of barriers, stage of change, and intention to vaccinate. Construal level theory did not demonstrate explanatory strength in the context of barriers and stage of change, which included a temporal intention component. However, correlation and regression analyses demonstrated relationships between lower construal perceptions, higher perceived susceptibility, and higher intention to vaccinate. These relationships suggests that a more concrete perception of HPV messages, may indicate more concrete perceptions of HPV risk and more realistic perception vaccination. This study offers preliminary evidence that construal level theory may be applicable to the formative phases of targeted health campaign design

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APPENDICES

Appendix A Stimulus Materials

The even numbered slides represent the high construal condition, while the odd number slides represent the low construal condition.

1



HPV: an Important Men's Health Issue

January	February	March	April
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
May	June	July	August
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
October	November	December	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	

Every year 360,000 people in the US contract HPV.

2




HPV: an Important Men's Health Issue




Every 20 minutes someone contracts HPV in the US.

Temporal

3




HPV: an Important Men's Health Issue

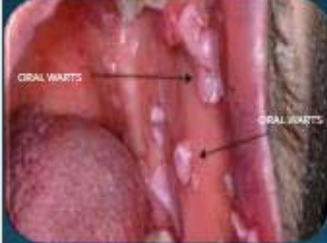


HPV VIRUS

4



HPV: an Important Men's Health Issue



ORAL WARTS

ORAL WARTS

Clarity

Appendix A continued

5

HPV: an Important Men's Health Issue

The low-risk types of HPV may present as condylomata acuminata, or lesions on the genitals, anus, mouth or throat. These can take on several appearances and can be treated in various ways.

The clinically administered treatment for low-risk types of HPV that present as condylomata acuminata may include cryotherapy, tangential scissor excision, and Bichloroacetic acid (BCA).

6

HPV: an Important Men's Health Issue

The low-risk types of HPV may present as warts on the genitals, anus, mouth or throat. These can take on several appearances and can be treated in various ways.

Genital warts may be frozen or surgically removed by a healthcare provider or patients may self-administer topical treatments under the direction of a healthcare provider.

Imagination

7

HPV: an Important Men's Health Issue

Some types of HPV can be much more dangerous than others.

HPV-related oral cancers are more common among males than females.

8

HPV: an Important Men's Health Issue

Some types of HPV can be much more dangerous than others.

Men are 6-7 times more likely than women to develop HPV-related oral cancers. Men may also develop penile or anal cancers.

Specificity

Appendix A continued

HPV: an Important Men's Health Issue

Protection
 The HPV vaccine is one way to protect yourself from the strains of HPV that are associated with several cancers and from those that cause a majority of condylomata acuminata.

Promotes herd immunity across genders.

Condoms are not always effective in protecting against HPV.

Protects against most common genital and anal warts.

When fewer community members are vulnerable to HPV, outbreaks can be prevented.

Helps prevent Oropharynx, anal and penile cancer.

HPV: an Important Men's Health Issue

Protection
 The HPV vaccine is one way to protect yourself from the strains of HPV that are associated with several cancers and from those that cause 90% of genital warts.

Recommended and safe for males age 11-15 years.

Available at local clinics like PUSH.

Given in three doses, over six months.

Covered by most insurance policies, contact your insurance provider to verify.

\$120 per dose without insurance.

Means versus goals

Appendix A continued


HPV: an Important Men's Health Issue

Year	Men	Women
2008	10,000,000	10,000,000
2009	10,000,000	10,000,000
2010	10,000,000	10,000,000
2011	10,000,000	10,000,000
2012	10,000,000	10,000,000
2013	10,000,000	10,000,000
2014	10,000,000	10,000,000
2015	10,000,000	10,000,000
2016	10,000,000	10,000,000
2017	10,000,000	10,000,000
2018	10,000,000	10,000,000
2019	10,000,000	10,000,000
2020	10,000,000	10,000,000
2021	10,000,000	10,000,000
2022	10,000,000	10,000,000
2023	10,000,000	10,000,000
2024	10,000,000	10,000,000
2025	10,000,000	10,000,000
2026	10,000,000	10,000,000
2027	10,000,000	10,000,000
2028	10,000,000	10,000,000
2029	10,000,000	10,000,000
2030	10,000,000	10,000,000

In a single year, 360,000 people in the US will contract HPV.

HPV is transmitted by intimate dermal contact, most commonly through fellatio, cunnilingus, vaginal and anal intercourse. Nearly 80 million people have HPV.

The low-risk types of HPV may present as condylomata acuminata, or lesions on the genitals, anus, mouth or throat.



HPV VIRUS

Other types of HPV can be much more dangerous.




HPV-related cancer of the oropharynx is more common among men than women.

Men may also develop HPV-related penile and anal cancers.

WHY TO PROTECT YOURSELF WITH THE HPV VACCINE

Vaccination promotes herd immunity, meaning when fewer community members are vulnerable to HPV, outbreaks can be prevented.




Protects against most common genital and oral warts.

Helps prevent Oropharynx, anal and penile cancer.

Source: cdc.gov

1


HPV: an Important Men's Health Issue



Every 20 minutes someone contracts HPV in the US.


HPV is transmitted by intimate skin-to-skin contact, most commonly through vaginal, anal, and oral sex. Roughly one in four people have HPV.

The low-risk types of HPV may present as warts on the genitals, anus, mouth or throat.



Oral Warts

Other types of HPV can be much more dangerous.




Men are 6-7 times more likely than women to develop HPV-related oral cancers.

On average 7300 cases of HPV-related mouth, head, and neck cancers are recorded annually among males. HPV is also responsible for 90% of anal cancer and 63% of penile cancer.

HOW TO PROTECT YOURSELF WITH THE HPV VACCINE

Covered by most insurance for the recommended male age group 11-25 years old, call your provider to confirm.



Get all three (3) doses, over a six month period.

Make an appointment. Available at local clinics like PUSH.

Source: cdc.gov

2

Experiment 2 Message Conditions

Appendix B Hypothetical Distance

Susceptibility Measure ($\alpha=.92$)

Susceptibility adapted from Cho and Witte (2005) and Cho, Sands, and Wilson (2010) and in accordance with (Carcioppolo et al., 2013)

Directions please indicate on scale of 1 to 7 the degree to which you agree with the following statements.

HPV-Phrased Susceptibility Items ($\alpha=.73$)

I am at risk for HPV.

It is likely that I will contract HPV.

It is possible that I will develop HPV.

I am worried about HPV.

Warts-Phrased Susceptibility Items ($\alpha=.87$)

I am at risk for genital warts.

It is likely that I will contract genital warts.

It is possible that I will develop genital warts.

I am worried about genital warts.

Cancer-Phrased Susceptibility Items ($\alpha=.84$)

I am at risk for HPV-related cancer.

It is likely that I will contract HPV-related cancer.

It is possible that I will develop HPV-related cancer.

I am worried about HPV-related cancer.

Appendix C Perceived Barriers

The barriers listed below are categorized per Gerend et al.'s (2013) factor analysis. These same items were included in the present study. The factor analysis of the present study is presented in Table

Indicate the degree to which each of the following impacts your decision whether to vaccinate for HPV a scale of 1-7, with one being not at all and seven being very much.

Perceived Barrier Item

Safety (high construal i.e. global)

I have concerns about whether the HPV vaccine is safe.

I have concerns about whether the HPV vaccine is effective.

I have concerns about possible side effects of the HPV vaccine.

The HPV vaccine may have long-term side effects.

There has not been enough research done on the HPV vaccine.

My parents don't want me to get the HPV vaccine.

Cost (low construal i.e. local)

The vaccine only protects against some types of HPV.

Vaccine cost (it's too expensive).

My insurance does not cover HPV vaccine.

My insurance does not cover enough of the vaccine.

I'm not sure how to file the insurance claim to get reimbursed.

No Need (high construal i.e. global)

I don't think I need the HPV vaccine.

I plan to be abstinent (not have sex) until marriage.

I plan to only have one sexual partner in my lifetime.

Logistics (Low-construal ie. local)

Getting the HPV shot takes too much time.

I'm not sure where to get the HPV Shot

I don't know enough about HPV. (Added to the original survey)

Appendix D Stage of Change Scale (Fernandez et al., 2014)

Pre-Contemplation

I have no intention of receiving the vaccine in the next 6 months.

Contemplation

I intend to get HPV vaccination in the next 6 months.

Preparation

I intend to get the HPV vaccination in the next 30 days.

Action/Maintenance

I have received the entire HPV vaccination series.

Appendix E Behavioral Identification Form

The Behavioral Identification Form (BIF) (Vallacher & Wegner, 1989) was used to assess construal level of thought processing following message exposure during the manipulation check. This survey has been validated for this purpose in previous research on construal level (Fujita et al., 2006; Liberman & Trope, 1998). The items 'joining the army' and 'voting' were removed due to the prevalence of these issues in the media during an election year and 'following a map' was changed to 'following a GPS'.

Choosing a low construal item equates to a score of zero and high construal equates to a score of 1 for a total score between 0 and 23. High construal items are bolded here.

Directions: For each of the following activities please choose one of the two descriptors.

1. Making a list
 - a. Getting organized**
 - b. Writing things down
2. Reading
 - a. Following lines of print
 - b. Gaining knowledge**
3. Washing clothes
 - a. Removing odors from clothes**
 - b. Putting clothes into the machine
4. Picking an apple
 - a. Getting something to eat**
 - b. Pulling an apple off a branch
5. Chopping down a tree
 - a. Wielding an axe
 - b. Getting firewood**
6. Measuring a room for carpeting
 - a. Getting ready to remodel**
 - b. Using a yardstick
7. Cleaning the house
 - a. Showing one's cleanliness**
 - b. Vacuuming the floor
8. Painting a room
 - a. Applying brush strokes
 - b. Making the room look fresh**
9. Paying the rent
 - a. Maintaining a place to live**
 - b. Writing a check
10. Caring for houseplants
 - a. Watering plants
 - b. Making the room look nice**

11. Locking a door
 - a. Putting a key in the lock
 - b. Securing the house**
12. Climbing a tree
 - a. Getting a good view**
 - b. Holding on to branches
13. Filling out a personality test
 - a. Answering questions
 - b. Revealing what you're like**
14. Tooth-brushing
 - a. Preventing tooth decay**
 - b. Moving a brush around in one's mouth
15. Taking a test
 - a. Answering questions
 - b. Showing one's knowledge**
16. Greeting someone
 - a. Saying hello
 - b. Showing friendliness**
17. Resisting temptation
 - a. Saying "no"
 - b. Showing moral courage**
18. Eating
 - a. Getting nutrition**
 - b. Chewing and swallowing
19. Growing a garden
 - a. Planting seeds
 - b. Getting fresh vegetables**
20. Traveling by car
 - a. Following a GPS
 - b. Seeing countryside**
21. Having a cavity filled
 - a. Protecting your teeth**
 - b. Going to the dentist
22. Talking to a child
 - a. Teaching a child something**
 - b. Using simple words
23. Pushing a doorbell
 - a. Moving a finger
 - b. Seeing if someone's home**

Appendix F Descriptions of Construal Level Dimensions Experiment 1

Dimensions of Perceived Message Construal and Related Items Experiment 1

Dimension Label	Related Questionnaire Item	Scale Limits
Temporal	After reviewing the message, how would you describe when college males should consider HPV vaccination?	1= Never; 7= Immediately
Imagine	After reviewing the message, how easy is it to imagine the HPV treatment experience?	1= Extremely difficult; 7=Extremely easy
Clarity	After reviewing the message, please describe the clarity of your understanding of what HPV is.	1= Extremely unclear; 7=Extremely clear
Specificity	Please indicate the specificity or broadness of the message.	1= Extremely broad; 7= Extremely Specific
Means-Oriented	Please indicate your level of agreement with the following statements.-I understand how to protect myself from HPV.	1= Strongly disagree; 7= Strongly agree
Interactivity	Please rate the interactivity of this message, where 1 is not interactive at all and 7 is extremely interactive.	1= Not interactive at all; 7= Extremely interactive
Social Distance	To what extent did the infographic make you focus your thoughts on yourself?	1= Not at all; 7= Completely
Concreteness	Please indicate the level to which you believe the descriptor below applies to the group of messages you reviewed -Concrete	1= Strongly disagree; 7= Strongly agree

Appendix G Descriptions of Construal Level Dimensions Experiment 2

Dimensions of Perceived Message Construal and Related Items Experiment 2

Dimension Label	Related Questionnaire Item	Scale Limits
Temporal Vaccination	After reviewing the message, how would you describe when college males should consider HPV vaccination?	1= Never; 7= Immediately
Temporal HPV	After reviewing the message, how would you describe when college males are at risk for getting HPV?	1= Never; 7= Immediately
Imagine	After reviewing the message, how easy is it to imagine the HPV treatment experience?	1= Extremely difficult; 7=Extremely easy
Clarity	After reviewing the message, please describe the clarity of your understanding of what HPV is.	1= Extremely unclear; 7=Extremely clear
Specificity	Please indicate the specificity or broadness of the message.	1= Extremely broad; 7= Extremely Specific
Means-Oriented	Please indicate your level of agreement with the following statements.-I understand how to protect myself from HPV.	1= Strongly disagree; 7= Strongly agree
Social Distance	To what extent did the infographic make you focus your thoughts on yourself?	1= Not at all; 7= Completely
Concreteness	Please indicate the level to which you believe the descriptor below applies to the group of messages you reviewed –Concrete	1= Strongly disagree; 7= Strongly agree
Feasibility	Please indicate your agreement with the following statement: HPV vaccination is feasible or possible.	1= Strongly disagree; 7= Strongly agree