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Development and Piloting of a Randomized Controlled Trial of a Narrative Communication Intervention to Increase Human Papillomavirus Vaccination Intentions and Uptake in a College Population

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Development and Piloting of a Randomized Controlled Trial of a Narrative

Communication Intervention to Increase Human Papillomavirus Vaccination Intentions

and Uptake in a College Population

A dissertation submitted in partial satisfaction of the requirements of the degree

Doctor of Philosophy

In

Psychological Sciences

By

Sara E. Fleszar-Pavlović

Committee in charge:
Professor Linda D. Cameron, Chair
Professor Anna V. Song
Professor Martin S. Hagger
Professor Michael A. Diefenbach

2022

This dissertation is dedicated to Danielle Louise Joanette-Kluck. Friendship transcends death. Memories made will never be forgotten. I am better person for knowing you. The world is a better place for having you.

The dissertation of Sara E. Fleszar-Pavlović is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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University of California, Merced

2022

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ACKNOWLEDGEMENTS

I want to express my sincerest appreciation and gratitude to my advisor, Dr. Linda Cameron. Thank you for your guidance over the past five years. Not only are you a brilliant and accomplished academic, but you are also caring, patient, and empathetic. That's almost impossible to find! Thank you for encouraging me to think deeply and critically about topics and for your support in exploring my many research interests.

To my faculty committee members, Drs. Anna Song and Martin Hagger, thank you for sticking with me through my candidacy paper and now, my dissertation. I am so appreciative of your willingness to be on my committee without hesitation. I am so grateful for the project advice, thoughtful edits, and copious amounts of time you both have put into my academic development.

To my Abel Magwitch, thank you for being my benefactor. The impact that you have had on me will never be forgotten. Your candidness about academia and life has helped me get through the difficult times. Thank you for truly caring!

To Dr. Michael Diefenbach, no words can adequately express my gratitude for everything you have done for me. Thank you for your continued mentorship and friendship, and for believing that I could do this!

The beginning of my psychology career started with Professor Tracey Revenson. Her engaging health psychology lectures drew me into her lab to become an RA. I would not be where I am without Professor Revenson's mentorship. Thank you, thank you, thank you!

Last, and certainly not least, I want to thank my husband, Michael. He has been my biggest cheerleader throughout this journey. I will forever be grateful to him for moving across the country and putting his career on hold so that I could pursue my dream. I can't wait to look back on our journey through life one day and say, "Hey, remember when we lived in Merced?"

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EDUCATION

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2021	William R. Shadish Fellowship Award for Leadership and Service
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2020	Women's Health Special Interest Group Award, Society of Behavioral Medicine's 41st Annual Meeting, "Beliefs About Cannabis Use During Pregnancy in a Hispanic-Majority Region of California"
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PUBLICATIONS

Journal Articles:

Fleszar-Pavlović, S. E. & Cameron, L. D. (*In Press*). Are interventions efficacious at increasing Human Papillomavirus Vaccinations among adults? A meta-analysis. *Annals of Behavioral Medicine*. doi:10.1093/abm/kaac043

Fleszar-Pavlović, S. E., Cameron, L. D., Yepez, M., Manzo, R. & Brown, P. M. (*In Preparation*). Perceived benefits and risks of e-cigarette use during pregnancy and breastfeeding among a Latino population in Central California.

Fleszar-Pavlović, S. E., Alegria, K. E., Hua, J. & Song, A. V. (*In Preparation*). Associations between milk consumption and body mass index within Mexican American and Non-Hispanic White populations. *Journal of Nutrition Education and Behavior.*

Fleszar-Pavlović, S. E., Alegria, K. E., & Epperson, A. E. (*Under Review*). Beliefs about the benefits of cannabis use among an American Indian/Alaska Native population. *Journal of Racial and Ethnic Health Disparities.*

Peters, E., Boyd, P., Cameron, L.D. Contractor, N., Diefenbach, M. A., **Fleszar-Pavlović, S. E.,** Markowitz, E., Salas, R., & Stephens, K. (*2022*). Evidence-based recommendations for communicating climate change and health issues. *Translational Behavioral Medicine.*

Cameron, L. D., **Fleszar-Pavlović, S. E.**, Yepez, M., Manzo, R. D., & Brown, P. M. (2022). Beliefs about marijuana use during pregnancy and breastfeeding held by residents of a Latino-majority, rural region of California. *Journal of Behavioral Medicine*, 10.1007/s10865-022-00299-1. Advance online publication. https://doi.org/10.1007/s10865-022-00299-1

Alegria, K., **Fleszar-Pavlović, S**., Hua, J., Ramirez Loyola, M., Reuschel, H., & Song, A. V. (2022). How Socioeconomic Status and Acculturation Relate to Dietary Behaviors Within Latino Populations. American Journal of Health Promotion. https://doi.org/10.1177/08901171211059806

Alegria, K. E., **Fleszar-Pavlović, S. E.**, Ngo, D., Beam, A., Halliday, D. M., Hinojosa, B. M., Hua, J., Johnson, A., McAnally, D., McKinley, L. E., Temourian, A. A. & Song, A. V. (2021). The role of risk perceptions and affective consequences in COVID-19 protective behaviors. *International Journal of Behavioral Medicine.*1-7. https://doi.org/10.1007/s12529-021-09970-4

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Larish, Y., Telis, L., Sedaghatpour, D., Glickman, L., **Fleszar, S.E.,** Diefenbach, M., & Berookhim, B. (2016). Mp26-09 factors predicting morbidity after sepsis secondary to urinary stones. *The Journal of Urology*, *195*, e357. https://doi.org/10.1016/j.juro.2016.02.2946

Roberts, K. J., Revenson, T. A., Urken, M. L., **Fleszar, S.E**., Cipollina, R., Rowe, M. E. & Lepore, S. J. (2016). Testing with feedback improves recall of information in informed consent: A proof of concept study. *Patient Education and Counseling*, *99, 1377-1381.* https://doi.org/10.1016/j.pec.2016.03.014

Book Chapters:

Cameron, L.D., **Fleszar, S.E.** & Khachikian, T. (2020). Changing behavior using the Common-Sense Model of Self-Regulation. In Hagger, M.S., Cameron, L.D., Hamilton, K., Hankonen, N., & Lintunen, T. (Eds.), *The Handbook of Behavior Change*. Cambridge, UK: Cambridge University Press.

Diefenbach, M.A. & **Fleszar, S.E.** (2019). Shared decision making: A review and call for advancement. In Revenson, T.A., & Gurung, R.A. (Eds.), *Handbook of Health Psychology*. New York, NY: Routledge.

ABSTRACTS & POSTERS

Fleszar–Pavlović, S. E. & Cameron, L.D. Are Interventions Efficacious at Increasing Human Papillomavirus Vaccinations Among Adults? A Meta-Analysis, Abstract presented at presented the 43rd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Baltimore, MD, April 6-9, 2022.

Fleszar–Pavlović, S. E. & Cameron, L.D. Beliefs about Cannabis Use Among American Indian/Alaskan Native Populations, Abstract presented at presented the 43rd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Baltimore, MD, April 6-9, 2022.

Beam, A., Johnson, A., Alegria, K., **Fleszar–Pavlović, S. E**., McAnally, K., Ngo, D., & Song, A. COVID-19 Related Risk Behaviors Among People with and without Exposure to those with Chronic Illness, Abstract presented at presented the 43rd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Baltimore, MD, April 6-9, 2022.

Fleszar–Pavlović, S. E., Cameron, L.D., Yepez, M., Manzo, R., Brown, P. Perceived Benefits and Risks of E-Cigarette (e-cig) Use During Pregnancy and Breastfeeding in a Hispanic-Majority Region of California, Abstract presented at the 42nd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Virtual Conference, April 12-16, 2021.

Fleszar-Pavlović, S. E., Alegria, K. E., Johnson, A., & Song, A. V. Uncertainty and Adverse Health Behaviors During the COVID-19 Pandemic, Abstract presented at presented the 42nd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Virtual Conference, April 12-16, 2021.

Scherr, C. L., Christy, S. M., **Fleszar-Pavlović, S. E.** Health Decision Making Graduate Student and Early Career Scholar Preconference: All IN for Mentoring and Career Development, Pre-conference Workshop Sponsored by the Health Decision Making Special Interest Group, Virtual Conference, April 12-16, 2021.

Fleszar, S. E., Cameron, L.D., Yepez, M., Manzo, R., Brown, P. Beliefs about electronic cigarette and marijuana use during pregnancy in a Hispanic-majority region of California, Abstract to be presented at Joining Forces 2020: Ending the Tobacco Epidemic for All, Palm Desert, CA, June 15-18, 2020.
*Conference canceled due to COVID-19

Fleszar, S. E., Cameron, L.D., Yepez, M., Manzo, R., Brown, P. Beliefs about cannabis use during pregnancy in a Hispanic-majority region of California, Abstract to be presented the 41st Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, San Francisco, CA, April 1-4, 2020.
*Conference canceled due to COVID-19

Alegria, K. E., **Fleszar, S. E.**, Hua, J. N., Ramirez Loyola, M. D., Reuschel, H. How socioeconomic status and acculturation relate to dietary behaviors within Latino populations, Abstract presented at the 40th Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Washington D.C., March 6-9, 2019.
*Won meritorious abstract award

Diefenbach, M.A., Marziliano, A., Hudson, S., Tagai, E., **Fleszar, S.E.**, Torre, G., Bator, A., DeCoster, C., Bhat, R., Chen, Y.T., Cox, B., Hall, S.J., Kutikov, A., Miyamoto, C., Potters, L., Reese, A., Vira, M., Miller, S.M. Negative affect, physical symptom evaluation, and the utilization of web-based support among prostate cancer survivors. Abstract presented at the 39th Annual Meeting of the Society for Behavioral Medicine. New Orleans, LA, April 11-14, 2018.

Marziliano, A., Diefenbach, M.A., Hudson, S., **Fleszar, S.E.**, Tagai, E., Bator, A., Chen, Y.T., Cox, B., Hall, S.J., Kutikov, A., Miyamoto, C., Potters, L., Reese, A., Vira, M., Torre, G., DeCoster, C., Bhat, R., Hui, S. A., Miller, S.M. Establishing patient profiles to predict use of a prostate cancer survivorship website: Results from a multi-site RCT. Abstract presented at the 39th Annual Meeting of the Society for Behavioral Medicine. New Orleans, LA, April 11-14, 2018.

Diefenbach, M.A., Hudson, S., Marziliano, A., **Fleszar, S.E.**, Tagai, E., Bator, A., Chen, Y.T., Cox, B., Hall, S.J., Kutikov, A., Miyamoto, C., Potters, L., Reese, A., Vira, M., Torre, G., DeCoster, C., Bhat, R., Hui, S. A., Miller, S.M. PROGRESS, a web-based resource for prostate cancer patients: Evidence of one-month quality of life improvements. Poster presented at the American Urological Association 2018 Annual Conference. San Francisco, CA, May 18-21, 2018.

Boyajian, J., Mantoan, G., Schnier, K., Singh, R., **Fleszar, S.E.**, O'Carroll, R., Cameron, L.D., Brown, P. Addressing Deceased Organ Donation Preferences Through

Discrete Choice Experiment. Poster presented at the American Public Health Association 2017 Annual Meeting. Atlanta, GA, November 4-8, 2017.

Fleszar, S.E., Adia, A., Torre, G.M., Hudson, S.V., Miller, S.M., Diefenbach, M.A., Google Analytics Usage in the study of an Online Program Designed for Prostate Cancer Survivorship. Poster presented at the 38th Annual Meeting of the Society for Behavioral Medicine. San Diego, CA March 29-April 1, 2017.

Bator, A.K., Tagai, E.K., **Fleszar, S.E.**, Garner, S., Torre, G.M., Adia, A., Diefenbach, M.A., Miller, S.M., Hudson, S.V., Impact of Health Literacy and Patient Activation on Use of Prostate Cancer Coping Website Intervention. Poster presented at the 38th Annual Meeting of the Society for Behavioral Medicine. San Diego, CA March 29-April 1, 2017.

Diefenbach, M.A., Benedict, C., Miller, S.M., Ropka, M., Fleisher, L., Stanton, A., Yi Wen, K., **Fleszar, S.E**., Torre, G.M., Impact of a multimedia intervention on treatment decision making among newly diagnosed prostate cancer patients: A nationwide trial. Poster presented at the 38th Annual Meeting of the Society for Behavioral Medicine. San Diego, CA March 29-April 1, 2017.

Adia, A., **Fleszar, S.E.**, McGinn, T., Hajizadeh, N., Zhang, M., McCullagh, L., Prediction Algorithm for COPD Exacerbations. Poster presented at the Hofstra Northwell Medical School Annual Poster Session for Clinical Research. Hempstead, NY September 14, 2016.

Diefenbach, M.A., **Fleszar, S.E**., Gullo, M.A., Cognitive and emotional responses to prostate cancer among African American and White patients: Results from a Longitudinal Study. Symposium presented at the 37th Annual Meeting of the Society for Behavioral Medicine. Washington, DC March 30-April 2, 2016.

Roberts, K.J., Revenson, T.A., Urken, M.L., **Fleszar, S.E.**, Cipollina, R., Rowe, M.E., Dos Reis, L.L., Lepore, S.J. Testing with feedback improves comprehension in multimedia medical informed consent. Poster presented at the 37th Annual Meeting of the Society for Behavioral Medicine. Washington DC March 30-April 2, 2016.

Revenson, T.A., Roberts, K.J., **Fleszar, S.E.**, Cipollina, R., Urken, M., & Lepore, S., Improving comprehension in informed consent for medical procedures through dynamic testing. Paper presented at the Annual Meeting of the European Health Psychology Society, Limassol, Cyprus September 1-5, 2015.

Presentations

Fleszar-Pavlović, S. E., Cameron, L. D., Boyd, P. The State of Health and Climate Change Communications Literature and Theories, Presidential symposium presentation given at the 43rd Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Baltimore, MD, April 6-9, 2022.

Fleszar-Pavlović, S. E., Alegria, K.E. The role of illness risk perceptions in health behaviors during the COVID-19 pandemic, Presentation given at University of California, Merced's Research Week: COVID-19 Research at UC Merced, Merced, CA, March 1, 2021.

Fleszar, S. E., Alegria, K.E., Hua, J., Song, A. Associations between milk consumption and BMI within Mexican American and non-Hispanic White populations, Paper

presentation to be given at the 41ˢᵗ Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, San Francisco, CA, April 1-4, 2020. *Conference canceled due to COVID-19

Alegria, K. E., **Fleszar, S. E**., Hua, J. N., Ramirez Loyola, M. D., Reuschel, H. How socioeconomic status and acculturation relate to dietary behaviors within Latino populations, Paper presentation given at the 40th Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine, Washington D.C., March 6-9, 2019.

Leach, C., Diefenbach, M.A., Hudson, S., **Fleszar, S.E.**, Lally, K., Torre, G., Alfano, C. M., Vereen, R., McDonald, B., Auguston, E. Qualitative Evaluation of an eHealth Tool for Cancer Survivors: Springboard Beyond Cancer. Symposium presented at the American Public Health Association 2017 Annual Meeting. Atlanta, GA, November 4-8, 2017.

Boyajian, J., Mantoan, G., Schnier, K., Singh, R., **Fleszar, S.E.**, O'Carroll, R., Cameron, L.D., Brown, P. Preferences Regarding Deceased Organ Donations: Evidence from a Discrete Choice Study. Paper presentation given at the American Public Health Association 2017 Annual Meeting. Atlanta, GA, November 4-8, 2017.

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University of California, Merced Psychological Sciences Graduate Student Summer Research Funding, 2020
University of California, Merced Psychological Sciences Graduate Student Summer Research Funding, 2019

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Teaching Assistant
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  Fall 2019 Psy 190 Psychology of Gender
  Spring 2019 Psy 181 Clinical Neuropsychology
  Fall 2018 Psy 159 Personality Psychology
  Spring 2018 Psy 158 Positive Psychology
  Fall 2017 Psy 145 Human Sexuality

SERVICE TO THE RESEARCH COMMUNITY

2022-Present Society of Behavioral Medicine (SBM), Health Decision Making Special Interest Group, Co-Chair

2020-Present Society of Behavioral Medicine (SBM), Health Decision Making Special Interest Group, Member, Communications/Newsletter Committee

2020-2022 Society of Behavioral Medicine (SBM), Presidential Working Group on Climate Change and Health, Member, Communications Subgroup

2019-2022 Society of Behavioral Medicine (SBM), Health Decision Making Special Interest Group, Member, Trainee Committee

2020-2021 Society of Behavioral Medicine (SBM), Health Decision Making Special Interest Group, Trainee Co-Chair, 42nd Annual Meeting and Scientific Sessions

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 Workshop Attendee, Presented by Ren Liu, Ph.D.
UC Berkeley National Science Foundation Innovation Corps Program
 May 10-May 17, 2021 at UC Berkeley
 Workshop Attendee & Co-developer of *Circlet:* A smart app and fNIRs technology
UC Merced Graduate Division Dissertation Bootcamp
 May 17-21, 2021 at the University of California, Merced
 Workshop Attendee, Strategies to increase academic writing productivity
Bayesian Bootcamp: Fundamentals, Extensions, and Guidelines for Best Practice
 April 30, 2021, 9:00 am to 4:00 pm at University of California, Merced

Workshop Attendee, Presented by Sarah Depaoli, Ph.D. & Haiyan Liu, Ph.D.
UC Merced National Science Foundation Innovation Corps Program
   October 16, 2020-January 15, 2021 at the UC Merced Venture Lab
   Workshop Attendee & Co-developer of *Circlet:* A smart app and fNIRs technology
Software Carpentry Workshop Series
   October 15-November 5, 2020 at the University of California, Merced
   Workshop Attendee, Four-workshop series of research computing in R
   November 19, 2020, at the University of California, Merced
   Workshop Attendee, Version Control with Git and Github
Data Carpentry Workshop
   March 27-28, 2019 at the University of California, Merced
   Workshop Attendee, Two-day data carpentry workshop on Unix, Git, and R
Teaching Matters Workshop Series
   (Backward) Lesson and Curriculum Design ‡
   March 12th, 2018 at the University of California, Merced
   Workshop Attendee, Creating a learner-centered lesion and curriculum.
   Designing Rubrics ‡
   March 12th, 2018 at the University of California, Merced
   Workshop Attendee, Creating an effective rubric.
   How to Write a Teaching Statement ‡
   October 19th, 2018 at the University of California, Merced
   Workshop Attendee, Creating a teaching statement.
   Instructional Assessment and Student Evaluations ‡
   October 19th, 2018 at the University of California, Merced
   Workshop Attendee, Evaluating teaching effectiveness.
‡: Part of the Center for Engaged Teaching and Learning

PROFESSIONAL MEMBERSHIPS

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Health Sciences Research Institute (HSRI), Advisory Board Member, 2018-present
Society of Health Communication, Member, 2020-present
Society for Personality and Social Psychology, Member, 2021-present
Association for Research in Personality, Member, 2021-present

PROGRAMS

o SPSS
o R
o MPlus
o STATA
o Qualtrics Survey Software
o REDCap

Abstract

Dissertation Title: Development and Piloting of a Randomized Controlled Trial of a Narrative Communication Intervention to Increase Human Papillomavirus Vaccination Intentions and Uptake in a College Population
Name: Sara E. Fleszar-Pavlović
Degree Name: Psychological Sciences
University: University of California, Merced, 2022
Committee Chair: Linda D. Cameron, PhD

Objective: Adding to the literature on the development and evaluation of interventions to increase HPV vaccination intentions and uptake in adults, the current project outlines the development and evaluation of a theoretically-guided health communication video containing information on HPV, the HPV vaccine, and HPV-related cancers. This project also examines the feasibility of the intervention and evaluates with a pilot randomized controlled trial (RCT), the efficacy of the newly designed health communication video compared to an attentional control condition and the standard-of-care condition in increasing the intentions of the HPV vaccine in an adult, college population.

Methods: Two studies were conducted: (1) a mixed-methods approach to the development and evaluation of a CSM-guided narrative video, and (2) a pilot, RCT that examined the feasibility and efficacy of the newly developed narrative video. Study 1 was conducted in three phases: Phase 1: Script Content Development, Phase 2: Script Content Evaluation and Refinement, and Phase 3: Video Evaluation and Refinement. For study 3, university undergraduate students ($N = 72$) were randomized to either the narrative intervention condition ($n = 25$), an attentional control condition ($n = 24$), or a standard-of-care condition ($n = 23$). Participants completed a baseline survey and two days post-baseline they completed the intervention condition and post-intervention survey. Participants also completed a one-month follow-up survey.

Results: Study 1 results indicate the newly developed narrative video was appealing, persuasive, interesting, believable, of high quality, and provided new information about HPV and the HPV vaccine. Study 2 results indicate that it is feasible to recruit participants to complete an intervention to increase HPV vaccine intentions and uptake in a Hispanic-majority university population. Further, the pilot RCT findings reflected the expected patterns of correlations and mean differences of survey measures over time.

Conclusions: This project successfully developed and evaluated a theoretically-guided health communication video for college students containing information on HPV, the HPV vaccine, and HPV-related cancers. The feasibility and pilot RCT indicate the expected patterns of findings for primary and secondary outcome measures. A full RCT will be conducted that will be powered to detect meaningful differences among intervention conditions.

CHAPTER ONE: INTRODUCTION

Recent research suggests that interventions with the goal of increasing Human Papillomavirus (HPV) vaccine intentions and uptake in adults have small effects on intentions and completion of the vaccine series, but no effect on the uptake of the first dose of the vaccine (Fleszar-Pavlović & Cameron, 2022). Thus, advancements in HPV vaccine interventions are necessary for the continued encouragement of catch-up vaccinations among adults. Specifically, the development and testing of interventions that are guided by well-established theories of health decision-making and behavior change are needed (Hagger & Weed, 2019; Michie & Prestwich, 2010) . The current research is in response to the need for a theoretically-guided health communication tailored to an adult, college population that promotes behaviors that reduce the risk of contracting HPV (i.e., HPV vaccine uptake). The primary aims of the current research project are to (1) systematically develop and evaluate a theoretically-guided health communication video for college students containing information on HPV, the HPV vaccine, and HPV-related cancers, and (2) examine the feasibility of the intervention and evaluate with a pilot randomized controlled trial (RCT), the efficacy of the newly designed theoretically-guided health communication video compared to an attentional control condition and the standard-of-care condition in increasing the intentions and uptake of the HPV vaccine in an adult, college population. The following introductory chapter provides an overview of HPV and the vaccine, HPV disparities, and predictors and barriers to HPV vaccine intentions and uptake. Chapter Two considers the narrative communication theory and its use within behavior change interventions. Chapter Three presents the Common-Sense Model of Self-Regulation (CSM), the framework utilized to guide the development of the narrative communication video. Within this chapter, we highlight the CSM constructs, the associations between the constructs and vaccination intentions and uptake, and vaccine-relevant behavior change interventions guided by the CSM. Chapter Four underlines the rationale, aims, and hypotheses for the development of the CSM-guided narrative video pilot testing of the newly developed video. The development, evaluation, and refinement of the CSM-guided narrative video will be outlined in Chapter Five. Chapter Six outlines the methods, results, and a discussion of the feasibility of the intervention and pilot RCT with the newly developed CSM-guided narrative video. Chapter Seven provides a general discussion of the current research project, its limitations, and future recommendations.

Human Papillomavirus and the HPV Vaccine

Human Papillomavirus (HPV) is the most common sexually transmitted infection in the U.S., with most sexually active adults being infected at least once during their lifetime (CDC, 2019a; Satterwhite et al., 2013). Although the majority of HPV infections are asymptomatic and resolve on their own, nearly 20% of U.S. adults have 'high risk' infections (CDC, 2018b). 'High risk" HPV infections are linked with cervical, vaginal, penile, anus, and oropharyngeal cancers (back of the mouth behind the oral cavity; CDC, 2018c). The primary prevention for HPV is vaccination, which has the potential to prevent 90% of cancers attributed to HPV (CDC, 2020a). The HPV vaccine is recommended for preteens (11 to 12 years old; 2-dose series); however, for those

unvaccinated as preteens, it is recommended for all persons up to 26 years old (3-dose series after the age of 15 years old; CDC, 2020b). The HPV vaccine has demonstrated high efficacy in preventing HPV infections, however, there are still low rates of vaccination with less than half of preteens completing the full vaccine series. The low vaccination rates leave a high percentage of adolescents and young adults unprotected when they are most susceptible, between the ages of 15 to 25 (Jemal et al., 2013). The CDC's Advisory Committee on Immunization Practices (ACIP) reports that nearly all sexually active adults by the age of 26 have already been exposed to HPV, rendering the vaccine less effective; thus, vaccination after the age of 26 years is not recommended (CDC, 2020a). However, under certain circumstances, adults up to the age of 45 may decide to get vaccinated based on discussions with their health care provider (CDC, 2020b).

Even though the overall percentage of adults who have received the recommended full vaccine series has increased (13.8% in 2013 to 21.5% in 2018; Boersma & Black, 2020), there are still relatively low vaccination rates, particularly in comparison to other recommended vaccines (e.g., MMR, tetanus, diphtheria, pertussis). Exacerbating the circumstances, the COVID-19 pandemic has disrupted vaccine schedules (Kujawski et al., 2022), heightened the inaccessibility to preventive care (Nunez et al., 2021), and increased vaccine hesitancy (He et al., 2022). HPV vaccination rates declined by approximately 70% in March 2020 and remained low in August 2020 (Daniels et al., 2021; Wentzensen et al., 2021). Recent micro-simulation models project that if HPV vaccine uptake does not rebound to the pre-pandemic rate within a three-year timeframe, there will be a significant rise in oropharyngeal cancers (e.g., approximately 6,200 new cases per year; Damgacioglu et al., 2022). Increased efforts to recover HPV vaccine uptake to pre-pandemic rates are needed to minimize long-term consequences. Thus, it is vital to develop interventions focused on catch-up vaccinations.

Along with the low national rates of HPV vaccination, there are disproportionate rates of vaccine uptake across U.S. geographic regions, racial/ethnic groups, and gender. For instance, residents of Southern states have lower HPV vaccination rates compared to those residing in the Western states (Choi et al., 2016). Moreover, Hispanic/Latina women in all regions of the U.S. have lower HPV vaccination rates compared with non-Hispanic White, African American/Black, and Asian populations (Williams et al., 2017). This disparity is alarming given that cervical cancer incidence and mortality are higher among Hispanic/Latina women when compared to their non-Hispanic White counterparts (Viens et al., 2016). For all races and ethnic groups in the U.S., men have higher rates of "high risk" HPV types and are disproportionally affected by HPV-related head and neck cancers (Lewis et al., 2017). Further, men who have sex with men have a higher prevalence of HPV infections and HPV-related penile cancer (Chow et al., 2021; Moscicki & Palefsky, 2011). Yet, men are less likely than women to have ever received one or more doses of the HPV vaccine (Boersma & Black, 2020). Although there is recent evidence to suggest that HPV-related cancers are decreasing across the U.S. (71% decline in HPV among 20 to 24-year-olds; Berenson et al., 2016; CDC, 2019a; Oliver et al., 2017), it is expected that HPV-related disparities will continue due to low vaccination rates among certain populations.

Previous research finds that HPV awareness and knowledge are predictors of vaccine acceptance and uptake (Beavis & Levinson, 2016; Gerend et al., 2018). Even though awareness and knowledge of HPV (e.g., 75% in female college students; Sherman et al., 2016) and the vaccine are high (68% in U.S. adults; Blake et al, 2015), HPV awareness and knowledge are influenced by sociodemographic characteristics. Chido-Amajuoyi and colleagues (2020) found that HPV awareness and knowledge are lowest among racial minorities, rural residents, males, and those with low educational and socioeconomic standing. Further, Strohl et al., (2015) found that African American women demonstrated low knowledge about HPV, cervical cancer, and the vaccine. These findings held even for African American women who had high levels of education, income, and health knowledge. Similarly, young women from Appalachian Kentucky, a population with the lowest socioeconomic status in the country, not only had low knowledge of HPV and the vaccine but also had high levels of misinformation, citing incorrect information about HPV and the vaccine (Mills et al., 2013). Along with the varying levels of HPV and vaccination awareness and knowledge, several studies have found that the awareness of the associations between HPV infection and cancer remains low (McBride & Singh, 2018; Thompson et al., 2020), particularly for non-cervical cancers (e.g., oropharyngeal cancers; Parsel et al., 2020).

In addition to the inconsistency of HPV awareness and knowledge, there are several barriers to the uptake of the vaccine reported by adults. A recent systematic review found that barriers among adult men were not only attributed to low awareness and knowledge of HPV and the vaccine but also the perceptions about the vaccine itself such as fear of side effects and needles, perceived vaccine ineffectiveness, lack of recommendation by their healthcare providers, and low knowledge about the link between HPV and cancers (Grandahl & Nevéus, 2021). Other barriers include practical concerns such as cost, perceived low accessibility to the vaccine, difficulty scheduling an appointment, and time (e.g., need for multiple shots; Dibble et al., 2019). Grandahl & Nevéus' (2021) review also found that although men who have sex with men (compared with men who do not have sex with men) have greater knowledge about the virus and more positive beliefs and attitudes toward the HPV vaccine, they cite concerns surrounding the discussion of same-sex relationships with their health care provider, creating a barrier to vaccination. Gerend and colleagues (2013) found that barriers to vaccination differed depending on an individual's intentions to be vaccinated. For instance, those who did not intend to receive the HPV vaccine cited concerns about vaccine safety and low perceived need for the vaccine whereas those who intended to receive the vaccine cited practical concerns such as vaccine cost and logistic barriers (i.e., no primary care provider, insufficient time to get the vaccine). Hispanic/Latina women report several barriers to vaccination such as lack of accessibility and information, perceived reproductive consequences, preventive medicine not being a strong cultural norm, worry about side effects, religious beliefs around sexual abstinence, and financial issues related to the cost of the vaccine, (Calderon-Mora et al., 2020; Lechuga et al., 2016; Maertens et al., 2017). There is a growing need to address the misperceptions and barriers associated with HPV and the vaccine, particularly in populations that face HPV-related disparities.

CHAPTER TWO: NARRATIVES IN HEALTH COMMUNICATION

Narrative communications are useful tools in communicating health information and have been increasingly utilized in interventions as a method to modify health-related intentions and behaviors. This chapter introduces narrative communication theory, its use within interventions to modify health-related intentions and behaviors, and the current literature on narrative interventions in increasing HPV vaccination intentions and uptake in adult populations.

Narratives in Health Communication

Traditionally, health communications aimed at modifying behavior rely on rhetorical arguments appealing to an individual's logic and reasoning by presenting statistical evidence, risk factors, preventive actions, symptoms, and treatment options. However, there is often a disconnection between the health information presented and the relevancy of this information in a person's own life (Hinyard & Kreuter, 2007). It is well-established that narratives have effects on the receivers' beliefs and attitudes, making this a potentially useful tool to convey health information (de Graaf et al., 2012). As such, there has been an increase in examining narrative storytelling to deliver health information. Narrative communication, the most fundamental form of human interaction, may be particularly suited to bridging the gap between health information and how it relates to 'the self'. Narratives are stories describing fictional or true-life experiences told in a chronological sequence of events, with a persuasive element that is implicitly embedded within the story (Kreuter et al., 2007). Instead of forming logical arguments for the audience to judge, narratives engage the audience with fictional or real-life experiences that are difficult to oppose or dispute (Dal Cin et al., 2004).

Green and Brock's (2000; 2002) transportation-imagery model proposes that during a narrative an individual can be "transported" into another person's experiences (Green & Brock, 2002). During narrative transportation, for a short time, the real world is "lost", and the receiver is completely absorbed in the story. According to Green and Brock (2002), a "transported" individual is more likely to believe the experiences of the narrator; thus, they are less likely to dispute information presented in the story. By reducing this cognitive resistance in the audience, a narrative can change attitudes and increase self-efficacy, intentions, and behaviors (Houston et al., 2011). Several studies suggest that transportation is a key mechanism through which knowledge, attitudes, and behaviors are affected. For instance, Dunlop and colleagues (2009) found that smokers who experienced an increase in transportation in response to an antismoking message reported that they would make a greater effort to quit smoking. However, the relationship between transportation and intentions to quit smoking was mediated by self-referencing or relating a situation to aspects of one's own life. This suggests that the relationship between transportation and intentions may be more complicated than previously thought.

Busselle and Bilandzic (2008, 2009; Bilandzic & Bussell, 2011) contend that the mechanisms through which narratives work are more nuanced than the mechanistic processes delineated by Green and Brock's (2000, 2002) transportation-imagery model. Bilandizic and Busselle (2011) suggest that distinct factors may moderate the effectiveness of the narrative message, such as the extent of involvement in the story plot,

how relevant or relatable the message is to the audience's own life, how immersed one is with the story and the concentration of the message receiver. This element has been defined as identification (de Graaf et al., 2012). Identification is the "imaginative process through which an audience member assumes the identity, goals, and perspective of a character" (Cohen, 2001, p. 261). Identifying with the characters and developing emotions for the characters in the story creates a greater influence of their perspective on the beliefs of the audience and has been shown to change relevant health-related knowledge, attitudes, beliefs, and behaviors (Murphy et al., 2013). Further, the greater the element of realism, or the extent to which the story is to be perceived to be similar to the real world, the greater the likelihood that the audience will identify with the narrative's characters and events (Busselle & Bilandzic, 2009). Identification also increases absorption of knowledge as individuals learn more from those whom they want to be like or feel as though they know (Slater & Rouner, 2002). Some studies suggest that identification is paramount in the effectiveness of narrative communication. For instance, Slater et al., (2013) found that the effectiveness of narratives in enhancing nutritional information was contingent upon identification with persons portrayed in the message. Authors suggest that identification with the source of the message is imperative for the audience to emotionally engage with the narrative situation and characters (Slater et al., 2013).

The Use of Narrative Communication to Modify Health-Related Behaviors

There is a growing body of literature examining narratives as a method to modify health-related intentions and behaviors (Shaffer et al., 2018). For example, in a study on smoking cessation, participants who were provided with a narrative about successful smoking cessation experienced a greater degree of engagement with the story, involvement with the characters, and elevated levels of intentions to quit compared with the non-narrative group (Kim et al., 2012). In the context of HPV, several narrative interventions have been developed to increase vaccination intentions. In a study examining the influence of the type of vaccine information (i.e., statistical, narrative, or hybrid) and the type of narrative (i.e., first-person or third-person) on college students' (mean age of 20.4 years) intentions to obtain the HPV vaccine, Nan and colleagues (2014) found that increased risk perceptions caused by both hybrid information (i.e., statistical and narrative) and narrative types (i.e., first-person and third-person) were indirectly associated with intentions to receive the vaccine, but only if the vaccine was offered at free of charge. In another study, Chan et al., (2015) found that in a sample of Hispanic/Latino adults (18-26 years old), an intervention utilizing a fotonovela, a picture storybook delivering educational health messages that incorporate social norms, positive role models, and the importance of being vaccinated against HPV, increased intentions to get vaccinated. Participants in the fotonovela group also had greater intentions to motivate others in their social circle to get vaccinated. In a more recent study, women ($\geq$ 18 years old) who were assigned to a narrative intervention titled Women's Stories, viewed three stories (a discussion between two women in a kitchen about the risks and consequences of HPV, a discussion between a male and female on a park bench about HPV and cancer risk for men, and a doctor discussing their support for vaccination to a young woman during a wellness visit) on an iPad in a Planned Parenthood waiting room.

Compared with the control group who received written educational material, women in the Woman's Stories group had higher vaccination intentions directly after the intervention. However, intentions between the Women's Stories and the control group did not differ at one- and six months post-intervention (Hecht et al., 2021).

To date and to the authors' knowledge, only two studies have examined the efficacy of narrative interventions in increasing HPV vaccination uptake in adults. Hopfer (2012) evaluated an intervention comparing communication sources of a narrative message (i.e., peer only, medical expert only, or a combination of peer and expert) in motivating vaccine uptake in college women. Findings suggest that women who received a peer-and-expert narrative message compared with peer or expert-only messages were twice as likely to receive the HPV vaccine two months post-intervention. In the second study, Kim et al., (2020) investigated the efficacy of a storytelling intervention delivered via a mobile, web-based platform versus information-based written material in increasing American Korean college women's intentions and uptake of the vaccine. Both the storytelling intervention and information-based groups increased intentions to receive the HPV vaccine; however, at two months post-intervention, the storytelling intervention group was twice as likely to receive or to have scheduled an appointment to receive the HPV vaccine relative to the information-based group. Although growing evidence suggests that narrative interventions may be effective in increasing HPV vaccine intentions and uptake, more research is needed. The majority of narrative interventions to increase intentions and uptake of the HPV vaccine examine only female populations and have racially/ethnically homogenous populations (e.g., American Korean women, Hispanic/Latina women), removing the possibility of examining gender and ethnic/racial group differences. It is yet to be determined whether narrative interventions targeting adults are efficacious for all genders and racial/ethnic groups and whether their effects vary as a function of gender and race/ethnicity.

Effectiveness of Narrative Communications in Specific Populations

Previous research suggests that narrative communication may be particularly effective for specific populations such as racial, ethnic, and minority groups with a strong tradition of storytelling, such as Hispanic/Latino and African American populations (Houston, et al., 2011; Larkey & Gonzalez, 2007; Lee et al., 2016; Murphy et al., 2013). As such, there have been several studies examining narratives as an effective method of increasing knowledge and behavior change in African American populations. For example, an intervention to improve blood pressure in an African American population examined if real narratives told by individuals from their community were effective in encouraging health behavior change. The participants who received the real narratives exhibited significantly greater decreases in blood pressure, both statistically and clinically, relative to a comparison group (Houston et al., 2011). Similarly, in an online intervention examining a narrative communication (e.g., personal stories) versus didactic information (i.e., question and answer section addressing topics such as radiation side effects, chemotherapy, stress, and hair loss) in increasing knowledge and healthcare participation among African American and non-Hispanic White breast cancer patients, it was found that the narrative's effects on knowledge and healthcare participation were greater for African American women than for non-Hispanic White women (Wise et al.,

2009). Results suggest that narratives may be particularly efficacious in increasing health-related knowledge and behavior change in African American populations, but further investigation is needed.

Studies have also examined narrative interventions as a method for increasing knowledge and behavior change in Hispanic/Latino populations. In an intervention designed to increase cervical cancer-related knowledge and attitudes in Hispanic/Latina women, it was found that Mexican American women, in comparison to all other Hispanic/Latina women, were transported more, identified most with the characters, and experienced the strongest emotions for the narratives featuring a Hispanic/Latina woman. Further, transportation and identification with specific characters were positively associated with increased knowledge, positive attitudes, and behavioral intentions (Murphy et al., 2013). Findings from Murphy et al. (2013) indicate that even within racial/ethnic groups, narratives may be more powerful in communicating health-related information for particular populations. Further, in the context of blood pressure, breast cancer, and cervical cancer the described interventions demonstrate that narratives may be particularly effective for increasing knowledge and behavior change in African American and Hispanic/Latino populations; however, this has yet to be examined within interventions to increase HPV vaccination intentions and uptake. We expect similar findings for African American and Hispanic/Latino populations for narrative interventions aimed at increasing HPV vaccine knowledge and behavior change, particularly when the key concepts of narrative communication (e.g., transportation, identification, realism) are higher for these populations.

CHAPTER THREE: THE COMMON-SENSE MODEL OF SELF-REGULATION

While narrative interventions have demonstrated persuasive power in improving health-related attitudes, knowledge, intentions, and behaviors, they often have little focus on the mechanisms and processes that could be particularly salient for or specific to the processing of health-related information and decisions. Using a theoretical framework of health cognitions and health behavior decisions to develop the contents and messages in a narrative health communication could potentially enhance its efficacy relative to a narrative health communication that focuses solely on the narrative mechanisms of transportation, realism, and identification. This chapter presents literature on the Common-Sense Model of Self-Regulation (CSM), the framework utilized to guide the development of a narrative health communication video containing information on HPV, the HPV vaccine, and HPV-related cancers. The narrative video specifically targets the CSM constructs: illness risk representations, illness risk coherence, and risk-action-link coherence. This chapter discusses these constructs in detail as well as the current literature on the associations between the CSM constructs and predicting intentions and behavior change. We also briefly highlight vaccine-relevant interventions utilizing CSM constructs.

The Common-Sense Model of Self-Regulation

The common-sense model (CSM) of self-regulation (Leventhal, Brissette, & Leventhal, 2003; Leventhal, Meyer, & Nerenz, 1980) provides a theoretical framework to conceptualize how individuals respond to and manage future or current health threats (see Figure 3.1). The CSM describes how individuals create their understanding of health, which in turn directs cognitive and emotional processes toward coping responses, health behaviors, and feedback and evaluation of the efficacy of these processes and behaviors. The CSM has predominately been used to understand how people appraise and manage an illness (Hagger & Orbell, 2003); however, the CSM is also applied to understand how individuals evaluate the risk of illness threats (e.g., Cameron, 2008; Cameron et al., 2017; Hubbard et al., 2018). Within the context of managing an illness threat, risk information activates illness risk representations. Illness risk representations, commonly used to assess risk-related beliefs and behaviors (Cameron et al., 2020; Cameron et al., 2017; Cameron, 2008; Brewer et al., 2004), develop from the process of matching self-characteristics with illness representation features (Cameron, 2003). For example, in the context of HPV, one's representation of causal factors relating to HPV is based on matching self-characteristics (*"I am sexually active"*) with beliefs about the causes of HPV (*"HPV is a sexually transmitted infection"*). When self-representations correspond with elements of illness risk representations, risk beliefs will be high. However, when aspects of self-representation do not match with corresponding elements of illness risk representations, then perceptions of risk may be inaccurate.

Attributes or contents of illness risk representations span five key domains: (1) identity- illness label and associated symptoms; (2) cause- beliefs about what factors contribute to the illness; (3) timeline- beliefs about the onset, duration, and decline of the illness; (4) consequences- anticipated physical and psychosocial outcomes; (5) control- beliefs about protective behaviors and medical (or self) treatments, or beliefs that the
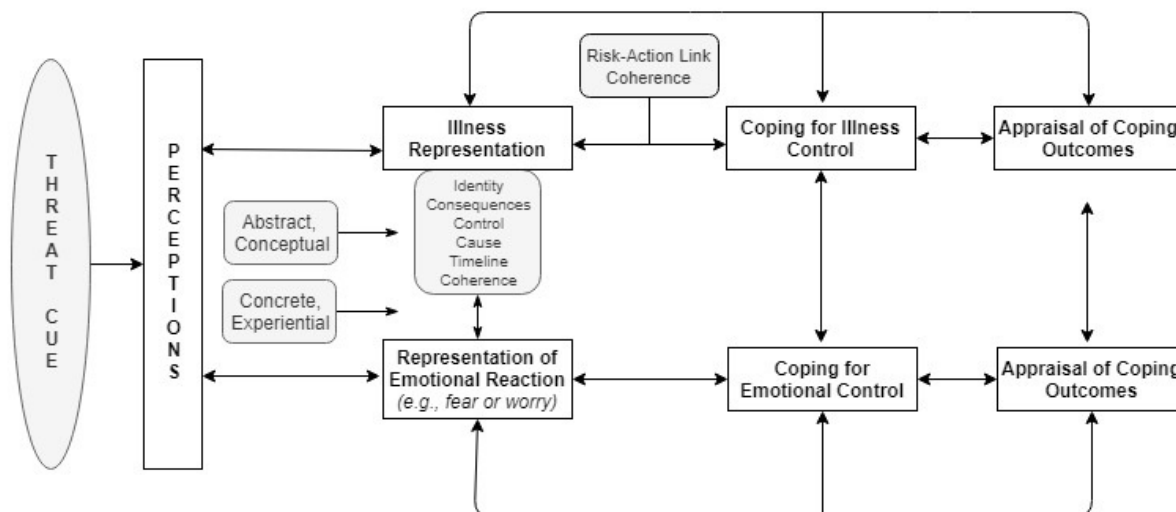
Figure 3.1. The Common-Sense Model of Self-Regulation. Illness risk representations (i.e., identity, consequences, control, cause, timeline, coherence) mediate the relationship between risk information and engaging in protective behaviors. These protective behaviors are influenced by coherence and its link with protective behaviors (i.e., action-risk coherence).

illness is uncontrollable (Cameron, 2008). An individual's beliefs about the identity, cause, and timeline of an illness are related to the perceived risk of contracting an illness, and their beliefs about the illness's consequences and control are related to the perceived severity of an illness. Risk representations are important as they mediate the relationship between risk information (e.g., the threat of HPV) and decisions to engage in protective behaviors (e.g., uptake of the HPV vaccine). Protective behaviors are also motivated by coherence (i.e., the clear understanding of a health threat) and its link with protective behaviors, termed risk-action-link coherence. Having a clear understanding of a health threat (e.g., HPV) can reduce the distress caused by incoherence and increase protective behaviors (e.g., receiving the HPV vaccine; Bishop et al., 2005; Cameron et al., 2020; Cameron et al., 2012; Durazo & Cameron, 2019).

Illness risk representations include mental contents created through both abstract-conceptual and concrete-experiential processes. Abstract-conceptual aspects of illness risk representations emerge from conceptual reasoning that is typically linguistic or numeric in nature and is gained from processing information from sources such as social networks, media, and the medical community resulting in abstract knowledge about an illness threat (e.g., abstract knowledge that cervical cancer is caused by HPV infections). Concrete-experiential aspects of illness risk representations involve mental imagery and perceptual memories relating to the experience of the illness threat (e.g., being sexually active is a risk behavior for contracting an HPV infection) or other experiential cues or memories related to the illness threat (Cameron et al., 2020; Cameron et al., 2017). Previous research has found that imagery related to illness risk may be particularly powerful in motivating protective intentions and behaviors (Cameron, 2008; Cameron &

Chan, 2008; Lee et al., 2011). Exposing individuals to mental imagery related to a health threat can lead to cognitive and emotional processes that direct intentions to engage in protective behaviors (Cameron, 2008). Further, the mental imagery components of the CSM incorporated within a narrative (i.e., story-based images and the stimulation of vivid mental imagery) may promote mental simulations of situations in which an individual modifies their behaviors. For example, individuals who can imagine themselves with an illness (e.g., HPV), may have stronger behavioral intentions to engage in actions to prevent an illness (e.g., receiving the HPV vaccine). In an intervention examining these constructs, Bishop and colleagues (2005) investigated if providing women with an extended leaflet (i.e., a written narrative) including vivid descriptions designed to create mental imagery linking cigarette smoking with cervical cancer (vs. a brief leaflet with no mental imagery) was successful in increasing intentions to quit smoking. Women who had recently received an abnormal cervical smear test and were current smokers were randomized to receive either an extended leaflet or a brief leaflet. Both leaflets provided information on cervical cancer, the vulnerability of smokers to cervical cancer, reducing the risk of getting cervical cancer, and treatments to aid in quitting smoking. The extended leaflet also included a vivid explanation of how smoking affects the cervix (e.g., blood carries harmful chemicals from cigarettes to your cervix; chemicals attack your cervix; abnormal cells can develop into cancer). Results indicated that women who received the extended leaflet had higher intentions to quit smoking in the next month compared with women who received the brief leaflet. This relationship was mediated by the coherence of the link between cigarette smoking and cervical cancer. Study findings support previous research findings that concrete-experiential content can be more powerful than conceptual content as well as the importance of risk-action link coherence in motivating behavior change.

CSM Utilized to Predict Vaccination Intentions and Uptake

The CSM has been widely implemented to change a wide variety of single (e.g., genetic testing; Leite et al., 2017; Marteau & Weinman, 2006) or recurring behaviors (e.g., medication adherence; Theunissen et al., 2003) focusing on populations with acute (e.g. myocardial infarction; Petrie et al., 2002) and chronic illnesses (e.g., diabetes; Chan et al., 2021) as well as populations at risk for illnesses (e.g., populations at risk for skin cancer; Cameron, 2008). Although the literature examining the CSM dynamics with illness risks is in its early stages, to date, evidence indicates that illness risk representations in populations at risk for an illness guide protective intentions and behaviors. For instance, Cameron (2008) found that skin cancer risk representations were positively associated with screening and intentions to engage in sun protection and skin cancer detection behaviors. Similarly, Alegria and colleagues (2021) found that risk coherence, consequences, and timeline were related to higher perceived risks of contracting COVID-19 and increased protective behaviors (e.g., increased handwashing, social distancing).

Mounting evidence indicates that illness risk representations and coherence regarding vaccine-preventable diseases are key predictors of vaccination intentions and uptake behavior (Garg et al., 2018; Parsons et al., 2021). In a study of adults aged 65 and older, illness representations of pneumonia and the pneumococcal vaccine were

associated with vaccine intentions and uptake. Specifically, those that perceived pneumonia to be chronic (timeline) and believed that vaccines can prevent pneumonia (control) were associated with intentions to receive the vaccine. Further, those who perceived more severe consequences of pneumonia (consequences) and believed that treatment can control pneumonia (control) had higher vaccine uptake (Wang et al., 2021). Likewise, in a 2021 study on COVID-19 vaccination willingness conducted in the Netherlands, all illness representation dimensions except for timeline were related to willingness to receive the COVID-19 vaccination (Vollman & Salewski, 2021).

Risk-action-link coherence has been associated with motivating protective behaviors; in contrast, inaccurate beliefs about the links between a health threat and protective behaviors may decrease intentions and behaviors towards protective actions. For example, in a study with mothers of children unvaccinated for pertussis who live in the vaccine exemption allowable Appalachian region of West Virginia, the risk representation domain of identity (i.e., difficulty breathing, cough) and control (i.e., vaccines are ineffective) were associated with no intentions to vaccinate their child for pertussis. Although mothers had high levels of knowledge of the identity of pertussis, they were less likely to have children who were up to date with the pertussis vaccine and less likely to have intentions to vaccinate. This study suggests that mothers who are aware of the signs and symptoms of pertussis and have less confidence in preventive behaviors may have more confidence in identifying and treating pertussis themselves; thus, they are less motivated to prevent the disease by vaccinating their children (Garg et al., 2017). This study highlights the importance of coherence in the understanding of a health risk as well as its link with protective behaviors, or risk-action-link coherence. Similar results were found in a pilot study examining Australian women's decision to initiate the HPV vaccine. Results indicated that women assigned to a detailed communication message utilizing the CSM framework reported greater increases in illness risk coherence compared to those assigned to the brief message. Further, illness risk coherence (i.e., a clear understanding of the health threat) was associated with intentions to receive the HPV vaccine (Sherman et al., 2017). These collective findings suggest that interventions aimed at modifying vaccine behaviors should implement communications aimed at increasing illness risk coherence and coherent risk-action links between illness risk representations and protective behaviors.

CHAPTER FOUR: RATIONALE, AIMS, AND HYPOTHESES

Although a few narrative interventions have been developed to increase HPV vaccination intentions and uptake in adults (Chan et al., 2015; Hecht et al., 2021; Hopfer, 2012; Kim et al., 2020; Nan et al., 2014) to our knowledge there has been no narrative intervention developed that is theoretically grounded in the CSM. As such, Aim One of the current project was to develop and evaluate a video intervention containing information on HPV, the HPV vaccine, and HPV-related cancers that utilizes narrative communication key concepts (e.g., transportation-how absorbed the audience is in the story, realism-extent to which the story is perceived to be real, and identification-how relevant or relatable the message is to the audience's life) and is guided by the CSM constructs illness risk representations (i.e., identity, cause, timeline, consequences, and control), illness risk coherence (i.e., clear understanding of an illness risk), and risk-action-link coherence (i.e., understanding of the illness risk and its link with protective behaviors) to motivate protective behaviors (i.e., HPV vaccine intentions and uptake).

Aim Two of the project was to assess the feasibility of the intervention by assessing recruitment in a relevant population and study measure patterns. Aim Two also pilot tested, with an RCT, the efficacy of the newly designed CSM-guided narrative video (i.e., narrative intervention) compared to an attentional control condition (i.e., CDC video on binge drinking) and the standard-of-care (i.e., Centers for Disease Control and Prevention's Vaccine Information Statement) in increasing the intentions and uptake of the HPV vaccine in an adult (aged 18 to 26 years), college-population. Figure 4.1 presents our hypothesized model. We expected that the relationship between intervention groups (i.e., narrative intervention condition, attentional control condition, standard-of-care condition) and vaccine uptake would be mediated by three sets of factors: (1) knowledge of HPV and the HPV vaccine, illness risk perceptions (including coherence), risk-action-link coherence, narrative engagement, and realism, (2) perceived effectiveness of the HPV vaccine, perceived severity and susceptibility of the HPV virus, and perceived harms of the vaccine, barriers to receiving the vaccine, and uncertainty of the vaccine, and (3) vaccine intentions. Although mediation and moderation hypotheses are described here, the current study focuses on the feasibility in which mediation and moderation analyses will not be conducted. The theoretical model is presented as a context for consideration for a full RCT.

Next, we hypothesized that participants receiving the narrative intervention condition would have greater HPV vaccine intentions and uptake immediately after and one month post-intervention compared with participants in the attentional control condition and standard-of-care condition. For participants receiving the narrative intervention condition compared with participants in the attentional control condition and standard-of-care condition, we expected that there would be increases in knowledge of the HPV and HPV vaccine, perceived effectiveness of the HPV vaccine, perceived severity and susceptibility of HPV, illness risk perceptions, risk-action-link coherence, and decreases in perceived harms, barriers, and uncertainty of the HPV vaccine immediately post-intervention as well as one-month post-intervention.
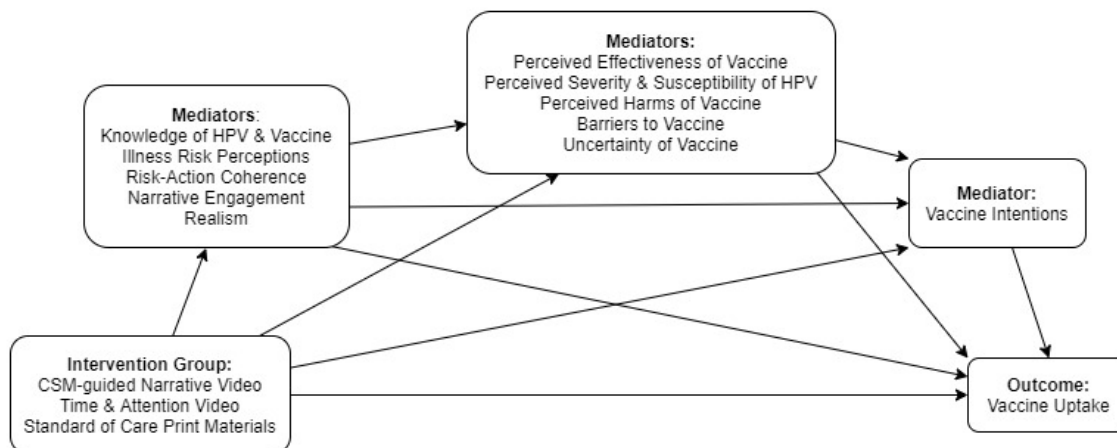
Figure 4.1. The mediational effects of three sets of mediators on the relationship between intervention groups and vaccine uptake.

Studies have found that increased religious beliefs and less permissive sexual behavior among young adults are associated with lower knowledge of HPV and HPV vaccination and lower HPV vaccine adherence (Birmingham et al., 2019; Maertens et al., 2017). As such, we expected that permissive sexual behavior would moderate the
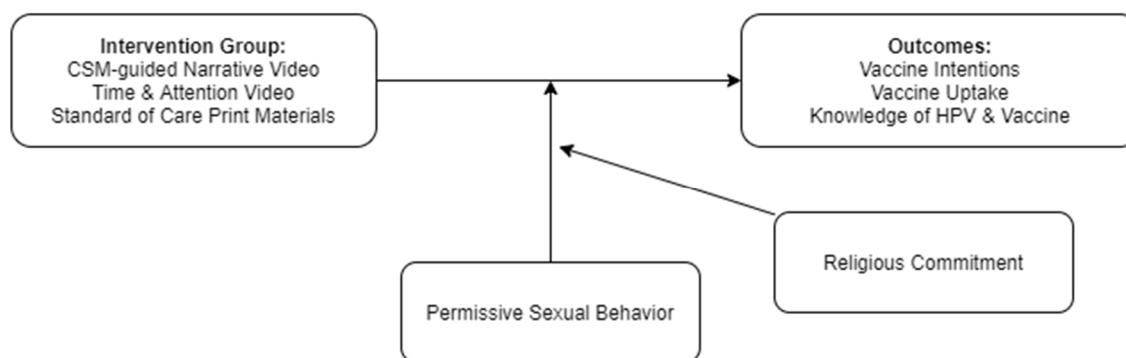
Figure 4.2. The moderating effects of permissive sexual behavior and religious commitment on the relationship between intervention groups and vaccine intentions, uptake, and knowledge of HPV and the vaccine

relationship between the intervention groups (i.e., narrative intervention condition, attentional control condition, standard-of-care condition) and vaccine intentions and uptake, and knowledge of HPV and the vaccine. Further, we expected that this relationship would be moderated by religious commitment (See Figure 4.2).

Previous interventions have found that narratives may be more efficacious in populations with a strong tradition of storytelling, such as Hispanic/Latino and African American/Black populations (Houston, et al., 2011; Larkey & Gonzalez, 2007; Lee et al., 2016; Murphy et al., 2013). Thus, we expected that there would be a moderating effect of story-telling cultures (Hispanic/Latino and/or African American/Black compared to non-Hispanic white participants) on the relationship between the intervention groups (i.e.,

narrative intervention condition, attentional control condition, standard-of-care condition) and vaccine intentions and uptake, narrative engagement, and realism (See Figure 4.3).
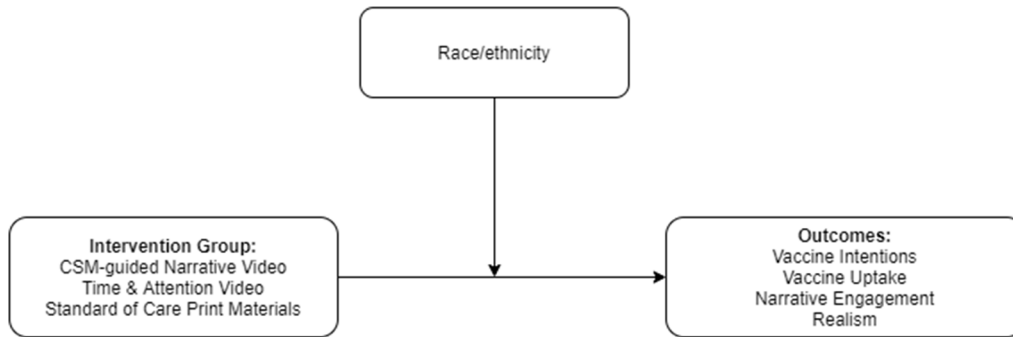
Figure 4.3. The moderating effects of race/ethnicity on the relationship between intervention groups and vaccine intentions, uptake, and knowledge of HPV and the vaccine

CHAPTER FIVE: DEVELOPMENT AND EVALUATION OF THE CSM-GUIDED NARRATIVE VIDEO

Chapter five outlines the development, evaluation, and refinement of the CSM-guided narrative video. The health communication video was developed to provide a comprehensive resource on HPV and HPV prevention for undergraduate university students. The video utilizes key concepts of narrative communication and addresses HPV illness risk representations, illness risk coherence, risk-action-link coherence, and information on HPV, the HPV vaccine, and HPV-related cancers.

The current project utilized an adapted ORBIT (Obesity-Related Behavioral Intervention Trials; Czajkowski et al., 2015) model for the development, refinement, and preliminary evaluation of the intervention. Figure 5.1 presents the adapted ORBIT methodological framework. The ORBIT model defines a process for behavioral intervention development and, unlike previous models that target health outcomes (e.g., The Behavior Change Wheel, Michie et al., 2011; Intervention Mapping, Bartholomew et al., 2011; EVOLVE mixed-methods approach; Peterson et al., 2013), it focuses on the early phases of behavioral intervention development and is not specified for one particular disease, health risk, or health behavior (e.g., cancer, physical activity). Illustrating the diversity of this model, ORBIT has been utilized in the development of a parental bereavement intervention (Dias et al., 2021), a physical activity intervention to manage fatigue among head and neck cancer patients (Wang et al., 2019), a mindfulness training intervention to reduce stress and gestational weight gain in pregnant women (Vieten et al., 2018), and a citywide employer-based walking intervention (Salinas et al., 2022). Thus, the ORBIT model is efficacious in developing a wide variety of behavioral interventions and, as such, was chosen to guide the development of the current intervention.

The ORBIT model was designed to parallel the phases of the clinical drug development model because of the extensive regulation and rigorous development and testing of clinical drugs. Employing the clinical drug development terminology and processes boosts understanding by medical staff familiar with clinical drug trials and supports the movement towards an established development and testing method for behavioral health treatments. The ORBIT framework is also advantageous as it outlines adaptable phases and provides for an iterative feedback process. The phases of the ORBIT model are as follows: (a) Phase 1, which encompasses defining (Phase 1a) and refining (Phase 1b) the design, essential features, and basic elements of the intervention; (b) Phase 2, which encompasses preliminary testing of the intervention to examine efficacy, and (c) Phases 3 and 4 which comprise efficacy and effectiveness trials of the newly developed intervention. The current study will focus on Phases 1a, 1b, and 2 of the ORBIT model. In line with Phase 1a of the ORBIT model, we developed a hypothesized pathway by which a behavioral treatment can solve an important clinical problem (i.e., CSM-guided narrative video to increase HPV vaccine intentions and uptake to reduce HPV infections), we provided a behavioral science basis for treatment components (e.g., theoretically-guided intervention focusing on components such as illness risk representations, coherence, risk-action coherence, and narrative communication components), and identified appropriate subjects (i.e., undergraduate university students).

The methods in which these components are developed are discussed within Phase 1: Script Content Development. Phase 1b of the ORBIT model focuses on refining the treatment and examining components of the intervention together for the first time. As such, we conducted two refinement phases: Phase 2: Script Content Evaluation and Refinement and Phase 3: Video Evaluation and Refinement. Lastly, corresponding to Phase 2 of the ORBIT model, which uses preliminary testing methods to examine the efficacy of the intervention, we conducted a pilot RCT examining the efficacy of the newly designed CSM-guided narrative video compared to an attentional control condition and the standard-of-care condition in increasing the intentions and uptake of the HPV vaccine.

The following sections contain a detailed discussion of the methods in which Phases 1a, 1b, and 2 were conducted. As highlighted above, the development of the narrative video was conducted in three phases: (1) Phase 1: Script Content Development, (2) Phase 2: Script Content Evaluation and Refinement, and (3) Phase 3: Video Evaluation and Refinement (See Figure 5.1). Phase 1: Script Content Development is included within Phase 1a of the ORBIT model. Phase 2: Script Content Evaluation and Refinement and Phase 3: Video Evaluation and
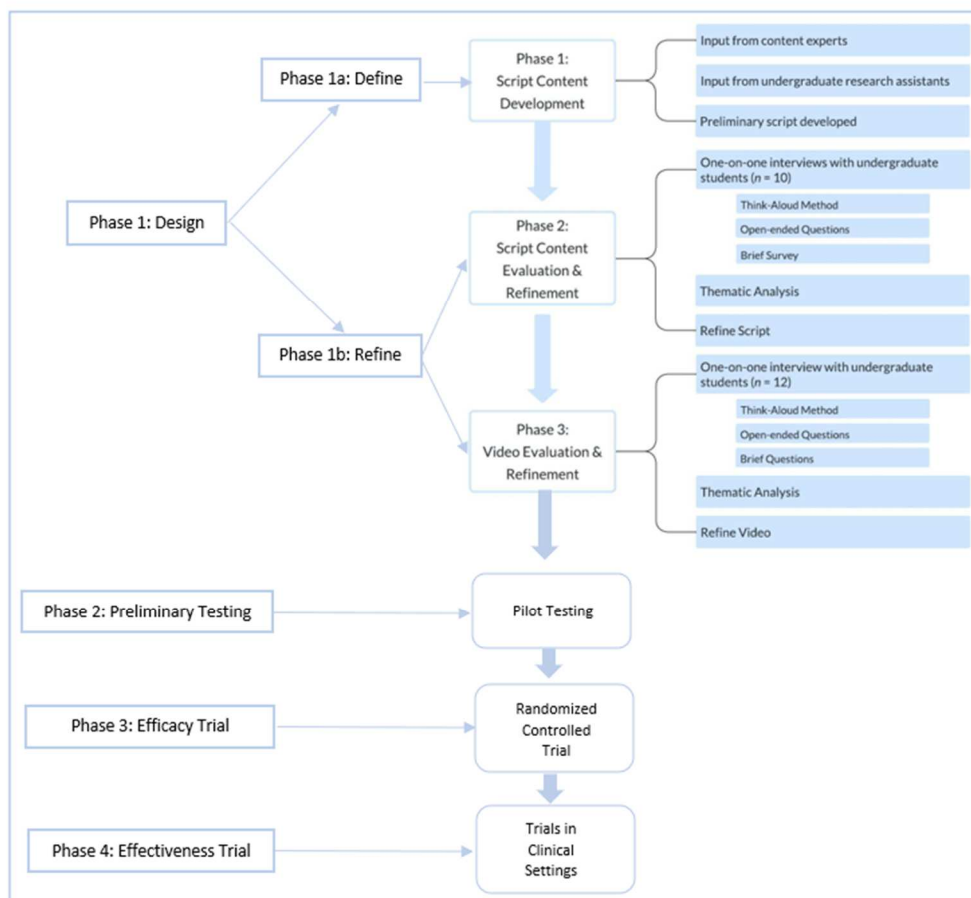
Figure 5.1. Adapted ORBIT Methodological Framework for the Development of the CSM-guided Narrative Video

Refinement are included within Phase 1b of the ORBIT model. The development and refinement of Phases 1 through 3 were informed by Russ' (2010) Rapid Usability Evaluation (RUE) method. The RUE method was developed for eliciting user (e.g., patients, physicians) input in the healthcare setting and is advantageous as it is easy to conduct, rapid, and low-cost. For the current study, RUE was utilized because it is a suitable method for eliciting user input for multiple tasks (i.e., reading a script, watching a video). RUE was conducted in four steps:

Step One: Develop Scenarios. The first step which is referred to as "develop scenarios" in the RUE method, included the development of the script content. The script content was developed by content area experts and trained university research assistants and is described in detail below (see Phase 1: Script Content Development).

Step Two: Identify Target Population. One of the primary objectives was to develop a narrative communication video targeted toward undergraduate students attending the University of California, Merced; accordingly, incorporating their perspectives was vital to the development of the script and video. The University of California is a Hispanic Serving Institution (HSI) with 54.3% of the students identifying as Hispanic/Latino. The university also has a high percentage of students identifying as Asian/Pacific Islander (20.6%) with lower percentages of students identifying as non-Hispanic White (9.5%) and African American/Black (4.2%). As mentioned in Chapter Two, narrative communication may be particularly effective for specific populations such as racial, ethnic, and minority groups with a strong tradition of storytelling, such as Hispanic/Latino populations. Thus, a narrative communication video is relevant to the university's majority population. The narrative video was created to be relevant to the primary audience (Hispanic/Latino students); however, great consideration was taken to ensure that the information was relevant to other represented populations at the university. Thus, during each evaluation phase, all races/ethnicities were included. Further, all participants who aided in the development and evaluation of the narrative video were UC Merced undergraduate students. Additionally, the video actors were UC Merced students, and the video was filmed in a dorm on UC Merced's campus.

The first two steps, developing scenarios and identifying the target population are components of the RUE preparation stage which corresponds to Phase 1a of the ORBIT model. Once the preparation stage or Phase 1: Script Content Development of the study was completed, RUE was conducted in Phase 2: Script Content Evaluation and Refinement and Phase 3: Video Evaluation and Refinement.

Step Three: Conduct RUE via One-on-One Interviews. To evaluate and refine the script and video content, one-on-one interviews with undergraduate students were conducted. The one-on-one interviews utilized a mixed-methods approach (Creswell & Clark, 2018) and consisted of three components: (1) the think-aloud portion; (2) open-ended questions; and (3) a brief survey. Qualitative methods (i.e., the think-aloud method and open-ended questions) provided the opportunity for undergraduate students to have a voice in the development of the script and video content and to provide advice for further refinements. The validity of the qualitative data was assessed with quantitative methods (i.e., a brief survey) as well as the evaluation of the magnitude of the constructs. The think-aloud Method (Ericsson & Simon, 1993; Fonteyn et al., 1993) is the verbalization of thoughts while performing a task, such as reading, viewing images, watching a video,

or using a smartphone application. This method requires that participants spontaneously report everything that they are thinking about (or anything that comes to their mind) while doing a task or immediately following completion of that task (Ericsson & Simon, 1993; Fonteyn et al., 1993). The one-on-one interviews were designed to examine the appropriateness of the script and video language, comprehension of the information, informativeness, realism of the storyline, identification/transportation of the participant while reading the script or watching the video, suggestions to improve the script, and the likability for the script/video characters. Interviews coupled with the think-aloud method incorporate the perspective of those who the intervention targets; thus, improving intervention engagement and outcomes (Davis et al., 2019; Yardly et al., 2012). Further, the think-aloud method may be advantageous in identifying unexpected reactions that lead to changes to the script or video content. For example, Usher-Smith and colleagues (2021) used the think-aloud method in the development of a program that presented the harms and benefits of colorectal cancer screening to at-risk patients. The think-aloud interviews found that statistical information presented on the harms and benefits of screening did not appear to be a factor in patient decision-making. Participants made decisions based on prior knowledge and beliefs about screening from the context of family members' experiences. This led the authors to rely less on the presentation of statistical information on the harms and benefits of colorectal cancer screening in the program.

The open-ended questions portion of the one-on-one interviews posed questions related to suggested improvements, appropriateness of language, comprehension of information, and likability of the storyline, characters, and setting. The brief survey assessed the quality (e.g., believability, persuasiveness) and informativeness (e.g., new information gained) of the script and video.

Step Four: Compile Findings. The script and video evaluation and refinement were conducted in two separate phases. The script and video think-aloud and open-ended question portions of the one-on-one interviews were analyzed with deductive thematic analysis (Braun and Clarke, 2006). Based on the thematic analysis the script and video were refined. The quality and informativeness measures were evaluated with descriptive analyses.

The following sections describe in detail Phase 1: Script Content Development, Phase 2: Script Content Evaluation and Refinement, and Phase 3: Video Evaluation and Refinement.

Phase 1: Script Content Development

Table 5.1 presents an abbreviated structure of the narrative video content (See Appendix A for a comprehensive outline of components). Guided by CSM constructs, video content was developed to induce coherent HPV risk representations as a means of motivating protective behaviors (i.e., HPV vaccination). Specifically, relevant information about HPV and the HPV vaccine were categorized and paired with each CSM construct. For example, regarding the construct of identity, the content presented was a description of the HPV infection and the risks associated with contracting the infection. As another example, regarding the construct of control, the content provided was about the HPV vaccine. Once these components were identified for each CSM

construct, the techniques (e.g., communication between friends, action planning) for delivering the information were developed. These techniques were based on inducing the key aspects of narrative communication.

Table 5.1. *Script Content: CSM Constructs, Techniques, and Video Content*

CSM Constructs	Technique	Video Content
Identity	Communication between friends	Description of HPV infection; Risks Associated with Contracting HPV
Cause		Infection caused by the Human Papillomavirus
Consequences		Most HPV infections resolve on their own; High-risk strains cause cervical, vaginal, penile, anal, and head and neck cancers.
Control		There is no cure for HPV; High-risk strains can be prevented with the HPV vaccine; Information about the Vaccine
Timeline		Most sexually active people will be infected with HPV at some point in their life
Coherence		Discussion of the link between HPV and cancer
Risk-Action Link Coherence	Communication to link the relationship between HPV and protective behaviors/actions	Explanation of how the HPV vaccine stimulates the body to produce antibodies
Coping for Threat Control	Action Planning	Resources for more information and where the vaccine is available

Next, a video script was created by content experts (S.F.P. & L.C.) with input from trained undergraduate research assistants in the Health Communications and Interventions Lab. The script aimed to incorporate the concepts of narrative communication (e.g., transportation, realism, identification) by including (1) a direct testimonial of a UC Merced undergraduate student named Sofia (in her dorm room) telling a story to her roommate, Elena, and roommate's boyfriend, Luis, about her mom's recent cervical cancer diagnosis and how it motivated her to get the HPV vaccine; and (2) a conversation among the roommates where information about the HPV infection and HPV vaccine is discussed. Trained research assistants reviewed the script and provided language, tone, and scene recommendations. Research assistants also highlighted script sections that were confusing or areas that needed additional information for clarity. The script was revised based on these recommendations (See Appendix B for provisional script).

Phase 2: Script Evaluation and Refinement
The refined script from phase 1 was further evaluated and refined in phase 2. Phase 2: Script Evaluation and Refinement is outlined below.

Participants

In the Fall 2021 semester, a total of 10 University of California, Merced undergraduate students were recruited to complete a one-on-one interview. The participants were on average 21.6 (SD = 1.17) years old, male (70.0%), and 60.0% reported that they were in their senior (4th) year at the university. Participants were recruited through the Health Communications and Interventions Lab's (HCI) research assistant management system, Trello, and via a lab listserv. Participants were eligible if they were between the ages of 18 and 26 years old and had working video and audio (e.g., headphones/speakers) on their computer.

Study Design and Procedure

Ethics approval for the study was granted by the Institutional Review Board at University of Merced, California. Participants responded to a study advertisement on Trello or responded to an email sent by the HCI lab manager. Students who were interested in participating scheduled a one-on-one interview with the study staff via Trello. Participants were then sent a consent form via Qualtrics, a web-based survey platform. Once participants finished the consent form, the study staff sent the participant a zoom link for the one-on-one interview. On the scheduled meeting date, the participant and interviewer (S.F.P) met privately via Zoom for a one-on-one interview. At the beginning of the interview, the consent form was reviewed, and any questions were answered. Participants were informed that the interviewer would be transcribing the interview during the session. Participants voiced that they would feel more at ease if the one-on-one interviews were not recorded. Thus, based on participant recommendations, interviews were not recorded. This enabled participants to be candid and more willing to share their views about sensitive topics (e.g., HPV, sexual intercourse, cancer). The participants were informed that the one-on-one interview consisted of three tasks (1) a think-aloud session with the script, (2) answering open-ended questions about the script, and (3) a brief survey via Qualtrics. The one-on-one interview began with the interviewer providing the participants with the following instructions:

> "We are asking UC Merced students about their feedback on a script for a newly developed video communicating information about Human papillomavirus (HPV), the HPV vaccination, and HPV-related cancers. The purpose of this one-on-one interview is to collect feedback on needed enhancements for the video script. We will ask you to complete three tasks today. The first task is to silently read short segments of the script and then describe your thoughts out loud in your own words as you are reading the short segments. We ask that you vocalize your thoughts, reactions, and anything confusing about the script segment. For the second task, we will be asking you open-ended questions about the script. For the last task, we ask that you complete a brief questionnaire on the quality and informativeness of the script."

The video script was divided into six sections. Participants were asked to stop at the end of each section to vocalize any thoughts and reactions they did not provide while reading the segment. If participants found anything confusing or had any questions regarding information in the script, the interviewer recorded the areas of confusion and probed further about what the participant found confusing. The interviewer also recorded if the participant indicated how the confusion could be ameliorated. After participants finished task one, the interviewer asked several opened ended questions. After the one-on-one interview had been completed, participants were sent a link to a brief survey on Qualtrics. One-on-one interviews lasted an average of 31.4 minutes ($SD = 6.6$) ranging from 22 to 41 minutes.

Measures
Open-ended Questions. The open-ended questions probed for suggestions for improvements (e.g., "What do you think can be improved?"), appropriateness of language (e.g., "Do you think the language is appropriate for undergraduates at UC Merced?"), comprehension of information (e.g., "Was there anything you found confusing about the information in the script?"), and likability of the script (e.g., "What did you like about the script?"; "What did you not like about the script"). See Appendix C for the one-on-one interview guide.
Script Evaluation. The quality subscale, adapted from Lee et al. (2011), assessed participants' appraisals of the quality of the script (e.g., "The script was appealing", "The script was believable."). The subscale 8-item subscale ratings ranged from *strongly disagree* = 0 to *strongly agree* = 4. Participants' appraisals of the informativeness of the script (e.g., "The script did not teach me anything new"; "I gained a lot of information from this script") were assessed with 3 items with ratings ranging from *strongly disagree* = 0 to *strongly agree* = 4. See Tables 5.4 and 5.5 for a full list of statements.
Demographics. Participants were asked about their age, gender, race/ethnicity, sexual orientation, current university level, and relationship status.

Statistical Analysis
The one-on-one interviews were held virtually via a private zoom meeting room. Because of the sensitivity of the topic, interviews were not audio recorded. Participants were informed that the session was being transcribed during the interview by the interviewer (S.F.P.). No identifying information was recorded during the interview. The one-on-one interview data were entered into an excel spreadsheet and analyzed using deductive thematic analysis which is applicable for examining a variety of experiences (e.g., Heathcote et al., 2021; De Maria et al., 2022; Lindsay et al., 2021). The one-on-one interviews were coded by S.F.P and two trained RAs. The following themes were chosen a priori based on narrative communication concepts (i.e., realism, identification, transportation) and participant perspectives to refine the script: (1) appropriateness of the script and video language (i.e., is the language appropriate and accessible for understanding the information for undergraduate students at UC Merced?), (2) comprehension of the information and storyline (i.e., participants' understanding of the information and scenario presented), (3) informativeness (i.e., was new information learned?), (4) realism of the information presented (i.e., did the storyline seem like it

could happen in real-life?), (5) identification/transportation (i.e., did the participants assume the identity, goals, and perspective of a character?), (6) advice (i.e., suggestions to improve the script), and (7) likability (i.e., did the participants like the script?). We also adopted a realist approach in identifying any new themes at semantic and interpretive levels based on the procedures detailed by Braun and Clarke (2006). The script evaluations (i.e., quality, informativeness) and demographics were assessed with descriptive statistics. The script evaluation ratings of *Agree* to *Strongly Agree* by 60% or more participants were considered acceptable for all survey questions, except for one statement in the informativeness measure. The statement, "The script did not teach me anything new" was deemed acceptable if 60% or more participants rated this question *Disagree* to *Strongly Disagree*.

Results

Table 5.2 presents the general characteristics of the sample. Participants were on average 21.6 years old, male (70.0%), identified as White/Caucasian (40.0%) or Asian (40.0%), identified as Hispanic/Latino (50.0%), heterosexual/straight (80.0%), in their Senior (4th) year at the university (60.0%), and reported their relationship status as single (60.0%).

Table 5.2. *Demographic Characteristics of the Script "think-aloud" Sample*

Variable	Total/Mean (SD)
Age (20-26)	21.6 (1.17)
	Total(%)
Gender	
Male	7(70.0)
Female	3(30.0)
Race/Ethnicity	
Asian	4 (40.0)
White/Caucasian	4(40.0)
Multi-Race	1(10.0)
Other/Not Listed	1(10.0)
Hispanic/Latino	5(50.0)
Sexual Orientation	
Heterosexual/Straight	8(80.0)
Bisexual	1(10.0)
Gay/Lesbian	1(10.0)
University Level	
2nd Year/Sophomore	1(10.0)
3rd Year/Junior	1(10.0)
4th Year/Senior	6(60.0)
5th Year or More	2(20.0)
Relationship Status	
Single	6(60.0)
In a Relationship/Living Together	2(20.0)
In a Relationship/Not Living Together	2(20.0)

Table 5.3 presents sample findings that informed the refinement of the script based on the themes: (1) appropriateness of the script language, (2) comprehension, (3) informativeness, (4) realism, (5) identification/transportation, (6) advice, and (7) likeability. The thematic analysis did not reveal any new themes. Statements that either did not fit with the predetermined thematic categories nor could not be grouped into new thematic categories were defined under the "other" category.

Table 5.3. *Summary of Script One-on-One Interview Findings*

Theme	Sample Responses
Appropriateness of the script language	Participants voiced when they felt that the language was not appropriate or accessible for understanding the information. Further, participants offered revisions to make the language colloquial. *"'The HPV for short' sounds a little odd; maybe change it to 'also known as HPV'."* (Female) *"There were several instances where the language is too formal."* (Female) *"It's all simple vocabulary, but I would change the word 'honor' to something else."* (Male)
Comprehension	Participants voiced when they felt that the information was clear as well as when the information presented, or scenario was unclear or confusing. *"The whole section makes sense, and I got all the information I needed."* (Male) *"Did Elena's mom die? This sentence seems to indicate that the mom has died. I don't think [getting a vaccine] is a nice way to honor your mom. It's a little confusing."* (Male) *"It's easy to understand and conceptualize, but I might be biased because I'm a biology student."* (Male)
Informativeness	Participants expressed when new information was learned. *"I didn't realize you can get the HPV vaccine after even having the infection."* (Male) *"I did not know that HPV was an STI."* (Male) *"Oh, guys can get it [HPV] too?"* (Female)
Realism	Participants expressed when the storyline seem like it could happen in real-life.

	"[It] sounds like a real scenario. Elena looking up HPV [on the computer] seems like it was something I would do." (Female) *"I like that it sounded like it could be a true story. It doesn't seem too scripted or dramatic. It doesn't seem like it some sort of dramatic movie."* (Female)
Identification/ Transportation	There were several instances where participants voiced that the storyline was relevant or relatable to their own lives and that they were absorbed in the storyline. *"In my mind, I was being Elena and if my roommate came in, I would ask her the same questions."* (Female) *"The mom having cancer makes people more empathetic."* (Male) *"Add a little more sense of feeling. I am really affected by friends whose parents have cancer."* (Female)
Advice	Participants expressed when there were areas that needed more information or that comparisons should be made to make the information more relatable. *"Overall, make more comparisons, like make comparisons with the flu shot. It's just like getting the flu shot."* (Male) *"Someone who has anxiety might need to know exactly what they are calling for. Add more details about who to call and where to go."* (Female) *"There were parts where it seems like Luis was sitting there doing nothing. He needs to have more lines."* (Female)
Likability	Participants expressed if they liked or did not like how the information was presented, the storyline, or the characters. *"I liked the informational part. Learning about HPV. What we can do to prevent it. I enjoyed seeing Sofia's friends acknowledge the situation and affirm."* (Male) *"I liked that it kind of acted like a FAQ. Elena or Luis would ask about the vaccine and there would be clear information about it"* (Female) *"I liked that it was very informational, but it wasn't given to you all at once. It wasn't like they were teaching you. It was embedded in the conversation."* (Female)

Other	Participants made statements that did not fit into the predetermined thematic categories, nor could the statements be assigned to new thematic categories. "*This seems really personal.*" (Male) "*These sentences are all compound sentences.*" (Male) "*This doesn't apply to me.*" (Female) "*I just had to remind myself how [Elena, Sofia, and Luis] are all related.*" (Female)

Table 5.4 presents the descriptive findings on the quality of the script. All participants strongly agreed/agreed that the script was persuasive, interesting, believable, and of high quality. Further, all participants strongly disagreed/disagreed that the script was boring. Most participants (≥ 80%) strongly agreed/agreed that the script was an appropriate length, was relevant to them, and appealing.

Table 5.4. *Quality of the Script*

Variable	Strongly Agree/Agree Total(%)	Neutral Total(%)	Disagree/Strongly Disagree Total(%)
The script was appealing.	9 (90)	1(10)	0(0)
The script was persuasive.	10(100)	0(0)	0(0)
The script was interesting.	10(100)	0(0)	0(0)
The script was believable.	10(100)	0(0)	0(0)
The script was an appropriate length.	8(80)	2(20)	0(0)
The script was of high quality.	10(100)	0(0)	0(0)
The script was boring.	0(0)	0(0)	10(100)
The script was relevant to me.	8(80)	2(20)	0(0)

Tables 5.5 presents the descriptive findings for the informativeness of the script. All participants strongly agreed/agreed that the script was logical and rational. Most participants (90%) strongly agreed/agreed that they gained a lot of information from the script. Only (40%) of participants strongly agreed/agreed that the script did not teach them anything new.

Table 5.5. *Informativeness of the Script*

Variable	Strongly Agree/Agree Total(%)	Neutral Total(%)	Disagree/Strongly Disagree Total(%)
The script did not teach me anything new.	4(40)	0(0)	6(60)

I gained a lot of information from this script.	9(90)	1(10)	0(0)
The script was logical and rational.	10(100)	0(0)	0(0)

Discussion

Analyses revealed that participants agreed that the script was persuasive, interesting, believable, appealing, high quality, an appropriate length, relevant to them, and rational and logical. Further, participants disagreed that the script was boring and that it did not teach them any new information. Thematic analysis revealed that the key aspects of narrative communication were present (e.g., realism, identification, transportation) and overall participants were able to comprehend the information presented and they liked the manner in which the information was presented. The thematic analysis also revealed important findings that had direct implications for the revision of the script. Below are examples of the major revisions made based on the one-on-one interviews.

Example 1: In the provisional script, the character Sofia says, "I already got my first dose. I did it in honor of my mom." Participants voiced their concerns about using the word 'honor'. Some participants felt that the word 'honor' in their culture usually indicates that the person you are honoring has died. The use of this word created confusion and some participants questioned if Sofia's mom had died. The line was edited by participants and revised to read, "Yes, I got my first dose already because this situation with my mom has really freaked me out!" To further clear up any confusion about Sofia's mom being alive, we added a line at the end stating, "I know my mom would be happy to know you are both protecting yourselves.".

Example 2: Participants voiced their confusion about using a condom versus the vaccine for protection against HPV. The provisional script did not cover information on condom use and HPV protection; therefore, we felt this topic was necessary to include within the script. We added the line, "I'm not gonna lie, I'm a little afraid of shots. What about using a condom for protection instead of getting the vaccine?" which was vocalized by Luis. Sofia followed this statement with: "Sure, using a condom can lower your chances of getting HPV, but HPV can infect areas of your skin that the condom doesn't cover. Unfortunately, condoms don't fully protect against getting HPV". Not only did this dialogue allow for information about the use of condoms versus the vaccine for protection against HPV but also addressed a common barrier reported by men (i.e., fear of needles; Grandahl & Nevéus, 2021) and potentially induced participant identification with Luis.

Example 3: Participants were unaware of where cervical cancer was located anatomically. We added dialogue between Luis and Sofia to help clarify the organ, location, and system of the body that cervical cancer affects. Luis asks Sofia what cervical cancer is, and she responds, "It's cancer of the cervix… the organ connecting the uterus and vagina… part of a women's reproductive system".

Example 4: Participants suggested that more comparisons be made between the HPV vaccine and the flu vaccine, which they may have received recently and potentially receive every year. Including dialogue comparing the flu and HPV vaccine is a type of metaphor that may potentially reduce fear or hesitation towards getting the HPV vaccine.

Additional refinements were made based on participants' suggestions on language revisions. Participants felt that the language spoken by the characters in the script was often too formal. Participants' advice on how to revise the language was incorporated into the final script.

All refinements were incorporated into the script (See Appendix D for final video script) and a video was produced and moved into Phase 3: Video Evaluation and Refinement.

Phase 3: Video Evaluation and Refinement

The refined script from phase 2 was utilized for the filming of the video. Once the script was finalized, an announcement was made via a UC Merced arts, singing, and acting listserv as well as the HCI Lab listserv. Students interested in acting in a video about HPV and the HPV vaccine contacted the study staff. Interested students were informed that the video would be utilized in a research study, and other students participating in research at the university could potentially view the video. Interested students were emailed the script to assess their comfort level with discussing sensitive topics such as HPV, HPV-related cancer, and the HPV vaccine. Three students expressed interest; thus, they were chosen as the actors in the video. S.E.P met with the actors twice prior to the filming of the video to provide general instructions relating to the delivery of the script in line with narrative communication theory and to run through the script lines. During these sessions, stage direction was added to the script, and language was further refined to match the dialect of the undergraduate population at UC Merced.

A professional videographer was contracted to co-direct, film, and create the video. The video was filmed in the Spring semester of 2022 on UC Merced's campus and in a dorm room. On the day of filming each actor signed a photo/video release form and tested negative for COVID-19. Filming the video took approximately 4 hours and the actors were gifted a $50 gift card for their time.

The evaluation and refinement of the video created with the refined script from phase 2 are described below.

Participants

In the Spring 2022 semester, a total of 12 University of California, Merced undergraduate students were recruited to complete a one-on-one interview. The participants were on average 20.8 ($SD = 2.14$) years old, female (83.3%), indicated that they were Hispanic/Latino (50%), and 75.0% reported that they were in their junior (3rd) year at the university. Participants were recruited via SONA, the university's research participant pool. Participants were eligible if they were between the ages of 18 and 26 years old and had working video and audio (e.g., headphones/speakers) on their computer.

Study Design and Procedure

Ethics approval for the study was granted by the Institutional Review Board at University of Merced, California. Participants responded to a study advertisement on SONA, the university's research participant pool system. Students who were interested in participating scheduled a one-on-one interview with the study staff via SONA. Participants were then sent a consent form via SONA. Once participants finished the

consent form, the study staff sent the participant a zoom link for the one-on-one interview. On the scheduled meeting date, the participant and interviewer (S.F.P) met via Zoom for a one-on-one interview. At the beginning of the interview, the consent form was reviewed, and any questions were answered. Participants were informed that the interviewer would be transcribing the interview. The participants were informed that the one-on-one interview consisted of three tasks (1) a think-aloud session with the video, (2) answering open-ended questions about the video, and (3) a brief Qualtrics survey. The one-on-one interview began with the interviewer providing the participants with the following instructions:

> "We are asking UC Merced students about their feedback on a newly developed video communicating information about Human papillomavirus (HPV), the HPV vaccination, and HPV-related cancers. The purpose of this one-on-one interview is to collect feedback on needed enhancements for the newly developed video. We will ask you to complete three tasks today. The first task is to watch short segments of the video and then describe your thoughts out loud in your own words. We ask that you vocalize your thoughts, reactions, and anything confusing about the video. For the second task, we will be asking you open-ended questions about the video. For the last task, we ask that you complete a brief questionnaire on the quality and informativeness of the video."

The video was divided into three segments that were between 2.00 and 2.30 minutes in duration. At the end of each segment, participants were asked to vocalize any thoughts and reactions. After participants finished task one, the interviewer asked several opened ended questions. After the one-on-one interview had been completed, participants were sent a link to a brief survey and granted course credit for participation in the study. One-on-one interviews lasted an average of 32.9 minutes ($SD = 6.1$) ranging from 24 to 47 minutes.

Measures
Open-ended Questions. The open-ended questions were identical to those in phase 2 with the addition of three questions relating to character likability and realism (i.e., "What do you think about the characters in the story?"; "Do you find the characters likable?"; "Do you feel like the scenario could happen in real life?").
Script Evaluation. The quality and informativeness subscales were identical to the measures in phase 2 and ratings ranged from *Strongly Disagree* = 0 to *Strongly Agree* = 4.
Demographics. Demographic measures were identical to those in phase 2.

Statistical Analyses
The procedures were identical to those in phase 2. As in phase 2, themes were chosen a priori based on narrative communication concepts and participant perspectives to refine the video (i.e., appropriateness of the video language, comprehension of the

information and storyline, informativeness, realism of the information presented, identification/transportation, advice, and likability). A realist approach was used to identify any new themes at semantic and interpretive levels (Braun and Clarke, 2006). The video evaluations (i.e., quality, informativeness) and demographics were assessed with descriptive statistics. The video evaluation ratings of *Agree* to *Strongly Agree* by 60% or more participants were considered acceptable for all survey questions, except for one statement in the informativeness measure. The statement, "The video did not teach me anything new" was deemed acceptable if 60% or more participants rated this question *Disagree* to *Strongly Disagree.*

Results

Table 5.6 presents the general characteristics of the sample. Participants were on average 20.8 years old, female (83.3%), identified as a race/ethnicity not listed (41.7%), identified as Hispanic/Latino (50.0%), heterosexual/straight (83.3%), in their Junior (3rd) year of college (75.0%), and reported their relationship status as single (66.7%).

Table 5.6. *Demographic Characteristics of the Video "think-aloud" Sample*

Variable	Total/Mean (*SD*)
Age (19-26)	20.8 (2.14)
	Total (%)
Gender	
Male	2(16.7)
Female	10(83.3)
Race/Ethnicity	
Asian	2 (16.7)
Black/African American	1(8.3)
White/Caucasian	3(25.0)
Multi-Race	1(8.3)
Other/Not Listed	5(41.7)
Hispanic/Latino	6(50.0)
Sexual Orientation	
Heterosexual/Straight	10(83.3)
Bisexual	2(16.7)
University Level	
1st Year/Freshman	1(8.3)
2nd Year/Sophomore	2(16.7)
3rd Year/Junior	9(75.0)
Relationship Status	
Single	8(66.7)
In a Relationship/Not Living Together	4(33.3)

Table 5.7 presents the findings that informed the refinement of the video based on the themes: (1) appropriateness of the video language, (2) comprehension, (3) informativeness, (4) realism, (5) identification/transportation, (6) advice, and (7)

likeability. The thematic analysis did not reveal any new themes. Statements that either did not fit with the predetermined thematic categories nor could not be grouped into new thematic categories were defined under the "other" category.

Table 5.7. *Summary of Video One-on-One Interview Findings*

Theme	Sample Responses
Appropriateness of the video language	*"The guy said, 'we have your support' that's not something you would generally hear them say but I get what they were trying to portray with giving support for their friend."* (Female) *"It was like a conversation that you would have with your friends."* (Female) *"I think that it was scientific without being overly complex."* (Female)
Comprehension	*"I think when they were reading off the google searches it was a little difficult to keep up and there was medical information that can be confusing."* (Female) *"It's very understandable. It's easy to follow along."* (Female) *"I feel like the information was pretty clearly said. There wasn't any confusion. It wasn't awkward. You were able to really understand what they were saying and the point they were making."* (Female)
Informativeness	*"I thought it was informative. There were definitely parts I was like I didn't know that."* (Female) *"I think this is completely new to me. I did not know what HPV was. I was aware of other STDs like AIDS/HIV."* (Male) *"I really like how it went into the different doses and when you get them. It was really good information. The male asks about using a condom and she answers him and it was really good information."* (Female)
Realism	*"I think at first it seemed very dramatic but considering the topic, I think it's good and it's helpful."* (Female) *"I thought it was also interesting and having it staged on campus and it will help students think it's actually being portrayed on campus."* (Female) *"You can tell where the video is going to go with it. It's kind of like when you watch a movie, and you see where it's going. I think the cliché of the stormy weather and it's going to be sad. It prepared me for what could have been the conversation."* (Female)

Identification/ Transportation	*"I can totally feel her pain because a year ago I lost my mother to lung cancer. She had cancer the first time which was in the breast area, and it metastasized to the lung area. Seeing her suffer through the pain of cancer was really hard to live."* (Male) *"My mom went through something like that I just didn't tell anyone. The fact that she vocalizing it shows that there is a lot of support at the school."* (Female) *"The fact that it has a sentimental back story. Even though it's a sad backstory it gets you hooked. I don't want my family member to go through this so how can I protect myself."* (Female)
Advice	*"I thought the introduction was long. The intro was long so if you can condense it…"* (Male) *"There is a lot of information at once so if there are visuals or graphics/bullet points it would be helpful. They talked about specifically for UC Merced at the end so if there is a link at the end that would be good."* (Male) *"I think editing the video can be better. The sound can be better."*
Likability	*"I like the questions that they asked because I was thinking about those questions. It was very friendly for a normal person for them to watch it."* (Female) *"I thought it was cool how you guys took real students. I've seen them before. I think it's cool because they look our age and look like us. You are more likely to listen because they are just like us. They know what life is like at this age and at this school. It was nice that they look our age and I've seen them around campus."* (Female) *"I like the amount of info and how it was a conversation throughout, and she wasn't just lecturing them. She didn't shut her friends down when they were asking questions. The girl on the laptop was looking it up as they were talking about it, and it shows that you can do reach on it."* (Female)
Other	*"I think it was therapy support that [Sofia] needed."* (Male) *"My brother is going into college, and I think he needed [the HPV vaccine]."* (Female) *"You don't see vaccines for cancer."* (Male)

Table 5.8 presents the descriptive findings on the quality of the video. Participants ($\geq 75\%$) strongly agreed/agreed that the video was appealing, persuasive, interesting,

believable, and of high quality. Most participants (66.7%) strongly agreed/agreed that the video was an appropriate length, of high quality, and was relevant to them. Over half of the participants (58.4%) strongly disagreed/disagreed that the video was boring.

Table 5.8. *Quality of the Video*

Variable	Strongly Agree/Agree Total (%)	Neutral Total (%)	Disagree/Strongly Disagree Total (%)
The video was appealing.	10(83.3)	1(8.3)	1(8.3)
The video was persuasive.	10(83.3)	2(16.7)	0(0)
The video was interesting.	10(83.3)	2(16.7)	0(0)
The video was believable.	9(75.0)	1(8.3)	2(16.7)
The video was an appropriate length.	8(66.7)	1(8.3)	3(25.0)
The video was of high quality.	8(66.7)	2(16.7)	3(25.0)
The video was boring.	2(16.7)	3(25.0)	7(58.4)
The video was relevant to me.	8(66.7)	4(33.3)	0(0)

Table 5.9 presents the descriptive findings on the informativeness of the video. The majority of participants ($\geq 83.3\%$) strongly agreed/agreed that they gained a lot of information from the video and that the video was logical and rational. Further, over half of the participants (58.4%) strongly disagreed/disagreed that the video did not teach them anything new.

Table 5.9. *Informativeness of the Video*

Variable	Strongly Agree/Agree Total (%)	Neutral Total (%)	Disagree/Strongly Disagree Total (%)
The video did not teach me anything new.	5(41.7)	0(0)	7(58.3)
I gained a lot of information from this video.	12(100)	0(0)	0(0)
The video was logical and rational.	10(83.3)	2(16.7)	0(0)

Discussion

Analysis revealed that, overall, the CSM-guided narrative video was perceived as of high quality (e.g., appealing, persuasive) and informative (e.g., new information was gained). Thematic analysis revealed that participants agreed that the information was clear and concise and, although participants had varying degrees of knowledge about HPV and the vaccine, most indicated that they learned something new during the video. Results also indicate the key aspects of narrative communication (e.g., realism, identification, transportation) were present while participants viewed the video. For example, participants stated that they could empathize with the character, Sofia, and it felt like similar situations that happened in their lives. Participants also indicated liking that it was evident that it was filmed in a dorm room on campus with actors who were

students at UC Merced. The thematic analysis also revealed important components needed for the video refinement. Below we discuss the revisions as well as potential revisions for the next iteration of video refinement.

First, participants indicated that the introduction scenes of the video were too long. As such, the introduction scenes were reduced by 14 seconds reducing the video from 7:39 minutes to 7:25 minutes. The introduction scenes included the character named "Sofia" walking through the UC Merced campus, to her dorm, and into her dorm room. Because there was no vital information presented during the introduction, we felt it was acceptable to reduce the opening scenes. Second, the analysis revealed that participants were not aware of where the new UC Merced Health Center is or how to contact them. They suggested that it would be beneficial to add information at the end of the video about the location and contact information for the health center. Figure 5.1 presents the additional slide that was included at the end of the video with information on the health center's location, contact information, and hours of operation. Third, the analysis

Figure 5.1. Screenshot of the location of the UC Merced Health Center and Contact information

revealed that participants who retain information better when they read compared with hearing it may benefit from a brief written synopsis of the HPV and HPV vaccine information presented in the video. Thus, we created "HPV Fast Facts" that were presented on two slides at the end of the video (see Figure 5.2). The inclusion of the three slides (Figures 5.1 and 5.2) on UC Merced Health Center information and HPV Fast Fact added 20 seconds to the end of the video.
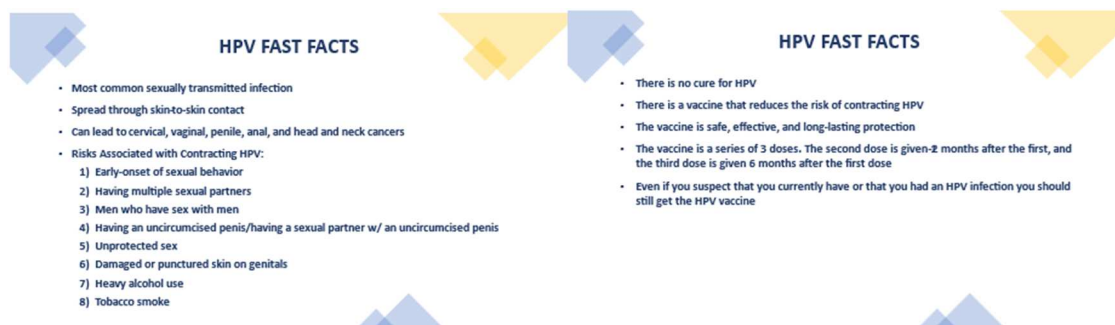
Figure 5.2. Screenshot of slides 1 and 2 of HPV Fast Facts

Each slide was presented for approximately 6.6 seconds. A meta-analysis by Brysbaert (2019) suggests that English reading adults can read 238 words of non-fiction per minute. Thus, we felt that 6.6 seconds per slide was a reasonable length of time for participants to read the information presented.

Future refinements to the video need to address two aspects of the video quality. Specifically, efforts should be made to create smoother transitions between shots, and adjustments to background music volume should be improved. Several barriers, such as monetary and time, prevented our team from editing the video further. We believe that the video may benefit from another phase of evaluation and refinement.

The newly refined CSM-guided narrative video's efficacy in increasing intentions and uptake of the HPV vaccine was evaluated with a pilot RCT. The following chapter discusses the methods, results, and a discussion of the pilot randomized controlled trial with the newly developed CSM-guided narrative video.

CHAPTER SIX: PILOT TEST OF THE CSM-GUIDED NARRATIVE VIDEO

This chapter presents Phase 2 of the ORBIT model: preliminary testing of the intervention to examine efficacy (See Figure 5.1). We report the feasibility of performing an RCT and findings from the pilot RCT of the newly designed theoretically-guided health communication video compared to an attentional control condition and the standard-of-care condition in increasing the intentions and uptake of the HPV vaccine in an adult, college population. To reduce threats to internal validity we employed two control conditions to test for two levels of efficacy (Chambless & Holland, 1998). First, we included an attentional control condition to test whether the intervention was potentially efficacious and specific in its mechanisms of action (i.e., its efficacy is not due to nonspecific mechanisms of time and attention to a health topic). Second, we utilized a standard-of-care condition to test whether the intervention against a currently used health communication about HPV vaccines had efficacy. Participants who were allocated to the attentional control condition were provided with a video (i.e., CDC video on binge drinking) that was approximately equivalent in timing to the HPV video and controlled for focus on a health issue that has similar communication strategies as the newly developed HPV video. Participants in the standard-of-care condition received the CDC's Vaccine Information Statement (VIS). Healthcare providers are required to distribute the VIS to patients before receiving each dose of the HPV vaccine. The VIS was chosen as it is easy to understand, is publicly available, and provides the benefits and risks of the HPV vaccine.

We predicted that participants receiving the narrative intervention condition would have greater HPV vaccine intentions compared with participants in the attentional control condition and standard-of-care condition. We also predicted that participants receiving the narrative intervention condition would have greater HPV vaccine uptake at one-month post-intervention compared with participants in the attentional control condition and standard-of-care condition. For participants receiving the narrative intervention condition compared with participants in the attentional control condition and standard-of-care condition, we predicted that there would be increases in illness risk perceptions, risk-action-link coherence, knowledge of the HPV and HPV vaccine, perceived effectiveness of the HPV vaccine, perceived severity and susceptibility of HPV and decreases in perceived harms of and barriers to the HPV vaccine, and uncertainty of the HPV vaccine immediately post-intervention as well as one-month post-intervention.

Method

Participants

Participants ($N = 72$) were recruited via the University's SONA system for course credits and a $15 gift card. The inclusion criteria were: (1) current university students aged 18-26 years; (2) had not received any dose or were unsure if they had received any dose of the HPV vaccine; and (3) having working audio (e.g., headphones/speakers) on their computer. The exclusion criteria were: (1) university students under the age of 18 or over the age of 26 years; (2) have had at least one dose of the HPV vaccine; or (3) not having working audio (e.g., headphones/speakers) on their computer.

Between April 2022 and June 2022, 239 participants were screened for eligibility and 134 participants were enrolled and completed the baseline survey (See Figure 6.1). Approximately 46% ($n = 62$) of those that completed the baseline survey did not respond to the intervention survey announcement. Of that completed the baseline survey and responded to the intervention announcement, 25 participants were randomized to the narrative intervention condition, 24 to the attentional control condition, and 23 to the standard-of-care condition and completed the post-intervention survey. Participation in the 4-week follow-up is still in progress (See Figure 6.1).

Participants in the narrative intervention condition (https://youtu.be/LE3iLyW77WM; 7:45 minutes) received the newly developed CSM-guided narrative video. Participants in the attentional control condition received a Centers for Disease Control and Prevention video on binge drinking (https://youtu.be/I9hdkDTaQWU; 4:22 minutes). This health communication video was utilized because it contains information on a widely accepted health risk (i.e., binge drinking) and several unintended consequences such as pregnancy, sexually transmitted diseases, injury, car accidents, and violence. The health information is disseminated through expert testimonials and aspects of imagery (e.g., actors binge drinking; actors being arrested). Participants in the standard-of-care condition received the Centers for Disease Control and Prevention's Vaccine Information Statement (VIS; https://www.cdc.gov/vaccines/hcp/vis/vis-statements/hpv.pdf). The VIS explains the benefits and risks of the HPV vaccine and is required by federal law to be distributed to patients before receiving each dose of the HPV vaccine.

Study Design and Procedure

After completing the study screener, eligible participants were directed to Qualtrics, a web-based survey platform. Participants were asked to provide informed consent and complete a baseline survey. Once the baseline survey was complete, participants were contacted two days post-baseline survey completion. At two days post-baseline survey completion, participants received a link to a Qualtrics survey and, upon beginning the survey, were randomized via Qualtrics' Randomizer into either the narrative intervention condition, ($n = 25$), to an attentional control condition (i.e., CDC video on binge drinking; $n = 24$), or the standard-of-care condition (i.e., Centers for Disease Control and Prevention's Vaccine Information Statement; $n = 23$). After viewing the intervention condition communication, participants then advanced to a post-intervention survey via Qualtrics. Participants in all groups were contacted via SONA or by a member of the research team via email at one-month post-intervention to complete a survey to assess if they received the HPV vaccine. The study staff that contacted participants via email were blind to the condition of the participant. The follow-up survey was accessed via a link to Qualtrics. If participants did not receive the HPV vaccine, their intentions to receive the vaccine were assessed as well as the longer-term effects of the groups on illness risk representations, risk-action-link coherence, knowledge of HPV and HPV vaccine, and effectiveness, harms, barriers, and uncertainty of the HPV vaccine

This study was registered with clinicaltrials.gov (ID: NCT05352308) prior to the study's start and all procedures adhered to CONSORT guidelines (See Appendix E for CONSORT Checklist; Schultz et al., 2010).

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┌─────────────────────┐                              ┌──────────────────────────────┐
│ Accessed for        │                              │          Excluded            │
│ Eligibility         │─────────────────────────────▶│ -Did not meet inclusion      │
│ (n = 239)           │                              │  criteria (e.g., over 26     │
└─────────────────────┘                              │  years old; under 18 years   │
          │                                          │  old) (n = 22)               │
          ▼                                          │ -Already vaccinated at       │
┌─────────────────────┐                              │  baseline (n = 68)           │
│ Baseline Complete   │                              │ -Did not complete baseline   │
│ (n =134)            │                              │  (n = 15)                    │
└─────────────────────┘                              └──────────────────────────────┘
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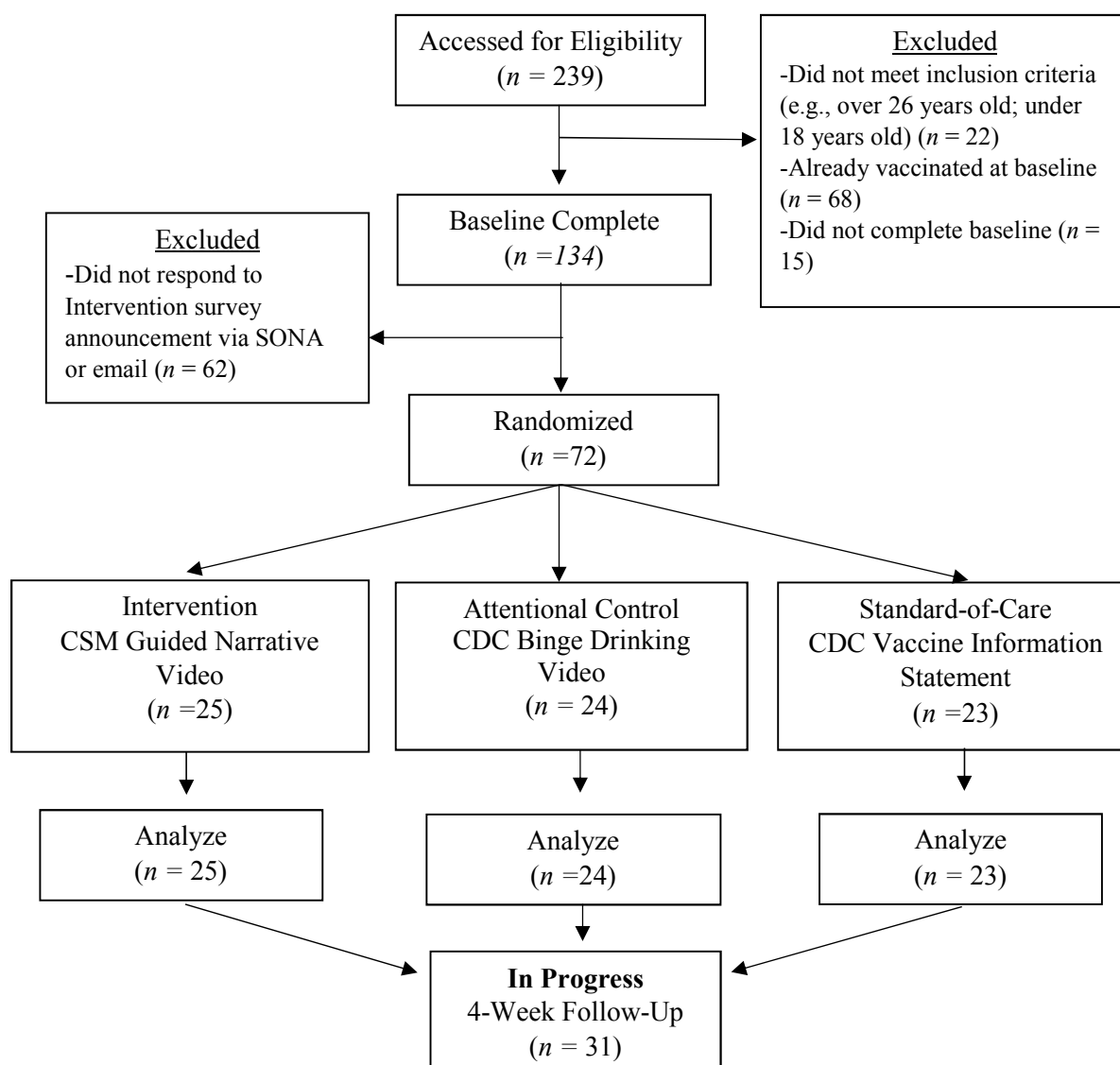
Figure 6.1. CONSORT Flow Diagram of Participants in the Pilot RCT

Measures

      The primary outcome, intentions were measured with a previously developed measure assessing behavioral intentions (Moyer-Guse, Chung, & Jain, 2011) which has been adapted for use in assessing intentions to engage in several HPV-related behaviors (Landrau, 2020). The assessment asks participants, on a scale of 0 = *definitely will not* to 6 = *definitely will*, "What is the likelihood that you will": (1) "Get the HPV vaccine within the next 30 days" and (2) "Get the HPV vaccine within the next 12 months." Several other HPV-related behaviors are assessed by asking participants, "What is the likelihood that you will engage in the following behaviors over the next 6 months on a scale of 0 = *definitely will not* to 6 = *definitely will*." Sample statements include (1) "Discuss the HPV vaccine with a healthcare provider" and (2) "Search for more

information about the HPV vaccine." Responses were averaged with higher scores indicating higher intentions to engage in HPV-related behaviors. Intentions were measured at baseline and immediately post-intervention. If participants indicated that they have not received the HPV vaccine at one-month post-intervention, intentions were assessed. (See Appendix F).

HPV Vaccine Uptake

HPV vaccine uptake was assessed at one-month post-intervention. Participants were asked, "Have you received any dose of the HPV vaccine in the past one month? — that is, since the last time you completed a session for this study?". If a participant indicated that they received a dose of the HPV vaccine, they were asked, "What dose of the HPV vaccine have you completed?" Participants responded by indicating 1 = 1st dose, 2 = 2nd dose, or 3 = 3rd dose. Participants were then asked to identify the date (approximate date if the exact date is unknown) that they received the dose(s) from a provided calendar.

Knowledge of HPV and HPV Vaccine

Participants' knowledge of HPV was measured with 10 true/false statements adapted from Kester and colleagues (2014) HPV vaccine knowledge assessment developed for use in young adults. The measure is comprised of 5 true and 5 false statements. Participants can also indicate "I don't know" for each statement. A higher percentage of correct statements indicates greater HPV and vaccine knowledge. Knowledge of HPV and HPV vaccine were measured at baseline and immediately post-intervention (See Appendix G).

Effectiveness, Harms, Barriers, & Uncertainty of HPV Vaccine

The perceived effectiveness, harms, barriers, and uncertainty were measured with an adapted version of the Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS; McRee et al., 2010). The CHIAS was adapted for use with an adult population and targeted information from the newly developed narrative video. The four subscales are (1) perceived potential harms from the vaccine (5-items); (2) perceived barriers to HPV vaccination including cost and access to a healthcare provider (2-items); (3) perceived effectiveness of the HPV vaccine in protecting against genital warts, cervical cancer, penile, anus, and head and neck cancers (4 items); and (4) uncertainty, which includes not having enough information about the vaccine and perceptions of community vaccination norms (6-items). Participants were asked to rate the agreement with the statement provided on a 7-point Likert scale with 0 = *strongly disagree* to 6 = *strongly agree*. Mean scores were generated for each of the four subscales after reverse-scoring positively phrased items. Higher scores represent more agreement with the statements provided. The adapted Carolina HPV Immunization Attitudes and Beliefs Scale was administered to participants at baseline and immediately post-intervention (See Appendix H).

Perceived Severity & Susceptibility of the HPV Virus

Perceived severity and susceptibility of the HPV virus were measured with questions developed by Frank and Colleagues (2017). Perceived severity of the HPV virus was measured with the question, "What impact do you think having the HPV infection would have on your life?" with responses on a scale ranging from 0 = *no impact* to 10 = *severe impact*. Perceived susceptibility to contracting the HPV virus was

measured with "What do you think your chances of getting the HPV infection are?" Responses are on a scale ranging from 0 = *it will definitely not happen* to me to 10 = *this will definitely happen to me*. Higher scores indicate higher perceived severity and susceptibility of contracting the HPV virus. Perceived severity and susceptibility of HPV were measured at baseline and immediately post-intervention.

Illness Risk Representations

The Assessment of Illness Risk Representations (AIRR; Cameron, 2008) was used to measure the conceptual and concrete (imagery) HPV risk representations. The AIRR contains a subscale assessing imagery contents which have been adapted for use in assessing HPV virus risk representations. The AIRR also includes subscales that assess risk beliefs about identity, timeline, consequences, personal control, cause, and coherence which have been adapted from the revised illness perception questionnaire (IPQ-R; Moss-Morris et al., 2002; See Appendix I).

Imagery. Participants were first asked to report five images that come to mind when they think of the HPV virus. For the full RCT, the images produced by the participants will be coded into thematic categories by trained research assistants. Interrater reliability will be computed with Cohen's Kappa.

Identity risk beliefs. Identity risk beliefs were assessed with a measure that combines beliefs related to having HPV characteristics, symptoms, or behaviors and the potential risk of each feature. Participants are asked to sum the number of these characteristics, symptoms, or behaviors that they are currently experiencing, and indicate the total. In response to "Do you think that this characteristic, behavior, or symptom puts a person at risk for HPV", each item is rated on a scale from 0 = *definitely not* to 3 = *definitely yes*. Scores were produced by multiplying the number of attributes by the average risk ratings.

Causal risk beliefs. Causal risk beliefs were assessed with beliefs related to what an individual might consider the cause of HPV. Sample items are "HPV is hereditary-it runs in the family" and "Poor immune function" and responses are rated on a scale of 0 = *strongly disagree* to 4 = *strongly agree*. The standard IPQ-R includes personal history items which are used to calculate causal risk belief scores; however, the personal history items have been omitted from the current study to mitigate privacy issues. The starred items in Appendix I are used to calculate the mean causal risk scores (e.g., "A germ or virus", "Poor immune function").

Timeline Risk beliefs. Timeline risk was assessed with the question, "People my age are likely to contract HPV at this time in their lives" with responses ranging from 0 = *strongly disagree* to 10 = *strongly agree* and with the questions, "How likely is it that a person your age would contract HPV now-at this age?" and "How likely is it that a person of your age would contract HPV in the next 10 years?". Both question responses are rated on a scale of 0 = *no chance* to 10 = *certain to happen*. The timeline score was generated by averaging responses across the three items. Higher scores indicate higher perceived timeline risk.

Consequences. The appraisals of consequences related to contracting HPV was measured with 9-items that assess psychosocial effects, pain, and shortened life. Sample items include "If I had HPV, it would cause difficulties for those who are close to me", "If I had HPV, I would have to undergo painful treatments", and "If I get HPV, I will die

fairly quickly." Scores were averaged across the three subscales. Responses ranged from 0 = *strongly disagree* to 4 = *strongly agree.*

Risk Control. Personal control is a 5-item measure assessing the control beliefs about personal control over the prevention of HPV. Sample items are "There are things I can do to prevent HPV" and "Preventing HPV depends on me" with responses on a scale from 0 = *strongly disagree* to 4 = *strongly agree*. Mean scores were generated after reverse-scoring negatively phrased items.

Risk Coherence. The understanding or comprehension of HPV was assessed with a 6-item scale. Sample items are "The symptoms of HPV are puzzling to me" and "I don't understand the risk of contracting HPV" with responses ranging on a scale of 0 = *strongly disagree* to 4 = *strongly agree.*

Risk-Action-Link Coherence

Risk-action-link coherence or having a coherent understanding of the risk-action link between the risk of contracting HPV and receiving the HPV vaccine was assessed with a 5-item measure adapted from Bishop et al. (2005). Sample questions include, "I have a clear understanding of how the HPV vaccine can reduce the chance of contracting HPV" and "I would find it easy to explain to someone else how the HPV vaccine can protect from contracting HPV" with responses ranging from 0 = *strongly disagree* to 4 = *strongly agree*. Mean scores were generated after reverse-scoring negatively phrased items. Higher scores indicate a higher coherent understanding of the risk-action-link between HPV risk and the HPV vaccine (See Appendix J). Illness risk representations and risk-action-link coherence were measured at baseline, immediately post-intervention, and one-month post-intervention.

Narrative Engagement

The narrative engagement was measured with the 12-item Narrative Engagement Scale (Busselle & Bilandzic, 2009). This scale measures four interrelated subconstructs: (1) narrative understanding, or the comprehension of the narrative and ease of the audience to construct meaning from the narrative (3-items) (2) attentional focus which describes the non-conscious focus on the narrative (3-items); (3) emotional engagement, which measures the emotions that are evoked within the audience (e.g., empathy, sympathy; 3-items); (4) narrative presence, which measures the loss of awareness of the self and the space produced by the narrative (3-items). Sample questions are: "My understanding of the characters is unclear"; "I found my mind wandering while the program was on"; "During the video, my body was in the room, but my mind was inside the world created by the story"; "The story affected me emotionally". Responses ranged from 0 = *strongly disagree* to 6 = *strongly agree*. Mean scores were generated for each of the four subscales after reverse-scoring negatively phrased items. Higher scores indicated higher understanding, attentional focus, emotional engagement, and narrative presence. The narrative engagement scale was only assessed in the post-intervention survey for participants in the narrative intervention condition (See Appendix K).

Realism

Realism was measured with 2-items, "The story in the video can happen in real life", and "The events in the video could have been inspired by real-life situations," which were adapted for use with adults from Soto-Sanfiel & Angulo-Brunet (2020). Both questions assess the plausibility of the narrative (i.e., the narrative could occur in real-

life; Hall, 2003). Participants were asked to what degree they agree with the statements above on a scale of 0 = *strongly disagree* to 4 = *strongly agree*, with higher scores indicating greater narrative realism. Realism will only be assessed in the post-intervention survey for participants in the narrative intervention condition.

Religious Commitment

Religious commitment was measured with the 10-item Religious Commitment Inventory-10 (RCI-10; Worthington et al., 2003). The RCI-10 assesses the level of religious commitment or the extent to which an individual adheres to their religious beliefs, values, and practices, using a 5-point Likert rating scale (0 = *not at all true of me* to 4 = *totally true of me*). Sample items include, "I spend time trying to grow in understanding of my faith" and "I enjoy spending time with others of my religious affiliation". Higher scores indicate greater religious commitment. Religious commitment was measured at baseline only (See Appendix L).

Sexual Attitudes

Sexual attitudes were measured with the permissiveness subscale of the Brief Sexual Attitudes Scale (BSAS; Hendrick et al., 2006). The original 23-item scale consists of four subscales: permissiveness, communion, instrumentality, and birth control. For the current study, the communion, instrumentality, and birth control subscales were omitted. The 10-item permissiveness subscale assesses permissive attitudes about sex (i.e., freedom of sexual behavior), on a 5-point Likert scale (0 = *strongly disagree* to 4 = *strongly agree*). Sample items include: "Casual sex is acceptable" and "I do not need to be committed to a person to have sex with them". Mean scores were generated, and higher scores indicate greater permissive attitudes toward sex. Sexual attitudes was measured at baseline only (See Appendix M).

Demographics and Health-Related Information

Demographic and health-related information were collected in the baseline survey. Participants were asked about their age, gender, sexual orientation, race/ethnicity, relationship status, current university level, annual income, and political affiliation. Health-related information assessed were healthcare insurance status, healthcare provider status, and if they had received a routine medical check-up in the past 12 months. Participants were also asked the reasons for not receiving the HPV vaccine (i.e., didn't know there was a vaccine for HPV, do not have enough information about the vaccine, the healthcare provider has not recommended the vaccine, the vaccine is only for females, have not been to a healthcare provider lately, do not know where to get a vaccine, too much money, no healthcare insurance).

Statistical Analyses

Analyses for the Present Feasibility Study

Descriptive and exploratory analyses were conducted for all baseline measures to characterize the sample. All categorical variables were summarized using frequencies and percentages. Comparisons for continuous variables between intervention and control conditions were performed using either the t-test or Mann-Whitney test as appropriate. The chi-square or Fisher's exact test was used, as appropriate, to examine associations between categorical variables. Descriptive statistics were based on non-imputed data. An a priori power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2007)

to determine the minimum sample size required to test the study hypothesis. Results indicated the required sample size to achieve 80% power for detecting a medium effect (f = 0.25), at a significance criterion of α = .05, was N = 150 for repeated measures ANOVA. According to a further sensitivity analysis, the obtained sample size of N = 72 provided power to detect an effect size of f = 0.09. The current 'rules of thumb' for pilot trial sample sizes range from 12 to 35 participants per condition (Julious, 2005; Browne, 1995; Whitehead et al., 2016). The current pilot randomized controlled trial meets this criterion with > 23 participants per condition. These power estimates can inform interpretations of the patterns of findings and considerations of the sample size for the full RCT testing the intervention efficacy.

The primary statistical objective was to explore the impact of the narrative intervention condition on the intentions to receive the HPV vaccine. Repeated measures ANOVA were used to assess within-subjects and between-group effects between baseline and immediately post-intervention, and one-month post-intervention.

Repeated measures ANOVA were used to assess the within-subjects and between-group differences in scores of the secondary outcome variables: (1) knowledge of HPV and the HPV vaccine, (2) perceived effectiveness, harms, barriers, and uncertainty, (3) perceived severity and susceptibility, (4) illness risk representations, and (5) risk-action-link coherence at post-intervention. Significant Time effects were followed up by simple-effects analyses testing baseline-to-post-intervention differences for each of the three intervention conditions. Significant Time (baseline to post-intervention) X Group (i.e., narrative intervention condition, attentional control condition, standard-of-care condition) interaction effects were followed up with the following simple-effects analyses: (1) a comparison of the narrative intervention condition with the attentional control condition; and (2) a comparison of the narrative intervention condition with the standard-of-care condition. HPV vaccine uptake was assessed at one-month post-intervention with χ^2 chi-square analysis

After inspection, data was assumed to be missing at random (MAR) and had low values (0.45%) of missing data; thus, the most appropriate approach to handle missingness is multiple imputation (Rubin, 1987). The approach used was SPSS Statistics' Mersenne Twister (random number generator) and linear regression settings that imputed missing observations by prediction associated with other variables in a regression mode.

Data analyses were conducted in SPSS Statistics version 24 (BM Corp.).

Analysis Plans for the Anticipated, Full RCT

The present feasibility study was not powered to conduct the mediation and moderation analyses testing the full theoretical model presented in Chapter Four: Rationale, Aims, and Hypotheses. However, the analysis plans for these mediation and moderation effects are presented here as context for consideration of how the repeated measures analyses will be extended in the full RCT. Mediation effects of the three sets of mediators: (1) knowledge of HPV and the HPV vaccine, illness risk perceptions, risk-action coherence, narrative engagement, and realism, (2) perceived effectiveness of the HPV vaccine, perceived severity and susceptibility of the HPV virus, and perceived harms, barriers, and uncertainty of the vaccine, and (3) vaccine intentions, between the intervention groups and vaccine uptake, will be tested with a series of models using

PROCESS Model 6 (Hayes, 2022). The models will include only mediators for which the repeated measures ANOVAs revealed significant intervention effects and will compare the narrative intervention with a comparison condition only when the repeated measures ANOVAs revealed significant condition differences in effects. The moderating and moderated mediation effects of permissive sexual behavior, religious commitment, and storytelling culture (Hispanic/Latinx and/or African American/Black compared to non-Hispanic white participants) on the relationship between the intervention groups (i.e., narrative intervention condition, attentional control condition, standard-of-care condition) and the outcomes (i.e., and knowledge of HPV and the HPV vaccine and HPV intentions) will be tested with a series of models using PROCESS Model 8.

Results

Sample Characteristics and Differences Between Conditions

Table 6.1 presents the socio-demographic characteristics of the sample. Participants were on average 20.63 ($SD = 1.97$) years old, and the majority identified as female (77.8%), White/Caucasian (34.8%), Hispanic/Latino (58.3%), heterosexual/straight (68.1%), single (55.6%), were in their 3rd year of university (Junior Year; 37.5%), and had liberal political views (51.4%). Participants also indicated that they had health insurance (84.7%), a primary healthcare provider (72.2%), and had received a routine medical check-up in the past 12 months (76.4%). At baseline, participants reported that the reasons for not receiving the HPV vaccine were: (1) they didn't know there was a vaccine for HPV (29.2%), (2) they do not have enough information about the vaccine (48.6%), (3) their healthcare provider has not recommended the vaccine (29.2%), (4) the vaccine is only for females (1.3%), (5) they have not been to a healthcare provider lately (16.7%), (6) they do not know where to get a vaccine (15.3%), (7) they do not have healthcare insurance (4.2%), and (8) other reasons not listed (5.6%).

Preliminary analyses examining the differences between the three groups (i.e., narrative intervention condition, attentional control condition, standard-of-care condition) and personal characteristics revealed no differences between the three groups in age [$F(2, 69) = 0.95$, $p = .394$], gender $\chi^2(4, N = 72) = 4.51$, $p = .341$, race/ethnicity $\chi^2(12, N = 72) = 9.31$, $p = .676$, Hispanic/Latino identification $\chi^2(2, N = 72) = 1.55$, $p = .462$, sexual orientation $\chi^2(12, N = 72) = 15.07$, $p = .238$, university level $\chi^2(6, N = 72) = 6.34$, $p = .386$, political views $\chi^2(10, N = 72) = 10.28$, $p = .416$, healthcare insurance status $\chi^2(2, N = 72) = 0.14$, $p = .935$, and healthcare provider status $\chi^2(2, N = 72) = 0.79$, $p = .674$. However, significantly more participants indicated that they were in a relationship (not living together) in the standard-of-care condition (57.9%) compared to the narrative intervention condition (15.8%) and attentional control condition (26.3%) groups $\chi^2(6, N = 72) = 12.89$, $p = .045$.

Analyses examining a priori differences between the three groups on the outcome measures revealed no group differences on any of the measures. Specifically, the three conditions did not differ in their baseline scores of intentions [$F(2, 69) = 1.35$, $p = .265$], knowledge [$F(2, 69) = 1.22$, $p = .301$], perceived effectiveness [$F(2, 69) = 1.75$, $p = .182$], harms [$F(2, 69) = 0.01$, $p = .990$], barriers [$F(2, 69) = 0.43$, $p = .653$], uncertainty [$F(2, 68) = 0.62$, $p = .543$], perceived severity [$F(2, 69) = 0.01$, $p = .987$], susceptibility

[$F(2, 69) = 0.82$, $p = .445$], identity risk [$F(2, 69) = 1.20$, $p = .307$], causal risk [$F(2, 69) = 0.70$, $p = .502$], consequences [$F(2, 69) = 0.46$, $p = .635$], risk control [$F(2, 69) = 2.82$, $p = .067$], risk coherence [$F(2, 69) = 0.99$, $p = .377$], or risk-action-link coherence [$F(2, 69) = 0.62$, $p = .544$].

Table 6.1. *Demographic Characteristics of the Pilot RCT*

Variable	Total	Valid Percent
Age (18-26)	*M*=20.63 (*SD*=1.97)	
Gender		
Female	56	77.8
Male	15	20.8
Non-binary	1	1.4
Race/Ethnicity		
White/Caucasian	24	34.8
Asian	18	26.1
Other/Not Listed	15	21.7
Multi-Race	6	8.7
Black/African American	3	4.3
American Indian or Alaska Native	2	2.9
Native Hawaiian or Pacific Islander	1	1.5
Hispanic/Latino	42	58.3
Sexual Orientation		
Heterosexual/Straight	49	68.1
Bisexual	11	15.1
Queer	3	4.2
Prefer Not to Answer	3	4.2
Asexual	2	2.8
Gay/Lesbian	2	2.8
Pansexual	2	2.8
University Level		
1st Year/Freshman	7	9.7
2nd Year/Sophomore	14	19.4
3rd Year/Junior	27	37.6
4th Year/Senior	24	33.3
Relationship Status		
Single	40	55.6
In a relationship/Not Living Together	19	26.4
In a Relationship/Living Together	12	16.7
Married	1	1.3
Political Views		
Conservative	7	9.7
Neutral	28	38.9
Liberal	37	51.4
Has Healthcare Insurance	61	84.7
Has Primary Healthcare Provider	52	72.2

Time Since Medical Check-up		
1 Month	8	11.1
6 Months	25	34.7
12 Months	22	30.6
Greater than 12 Month	17	23.6

Table 6.2 presents the means, standard deviations, internal consistency (α), and correlations of the primary and secondary outcomes. Correlational analyses suggest significant patterns of associations among several variables; however, all were considered low correlation (< ± .50). The internal consistency for perceived harms (α = .63) was low. Perceived harms were measured with an adapted subscale from McRee et al.'s (2010) Carolina HPV Immunization Attitudes and Beliefs Scale (CHIAS). The original subscale has an internal consistency of α = .69. Item analysis indicated that removing the item "The HPV vaccine might cause short-term problems, like fever or discomfort" from the perceived harms subscale increased the internal consistency to α = .69. It could be argued that this item assessed a short-term side effect of the HPV vaccine rather than true perceived harms of the vaccine; thus, we have removed this item from the subscale for analyses.

Of the participants who were assessed for study eligibility ($n = 239$), approximately 28% reported already having received the HPV vaccine, a rate lower than recently reported for college students (49.1% in Kellogg et al., 2019; 62.2% in Thompson et al., 2019). Of the participants (n = 134) that completed the baseline survey, approximately 46% did not respond to the intervention survey invitation. Because participants received SONA credits for participation in the study, it may be the case that students did not need additional SONA credits and thus did not complete the intervention survey. Additionally, the study was open for participation at the end of the Spring semester and a 6-week summer session. We anticipate that conducting recruitment during a complete semester for the full RCT would be beneficial in increasing participation. Participants that responded to the survey invitation completed the post-intervention survey with very little missing data. The baseline and post-intervention measures reflected the expected patterns of correlations and showed sensitivity in terms of differences over time.

Responses immediately after viewing intervention.

Table 6.3 presents the descriptive and repeated-measures ANOVA results for primary and secondary outcomes. Across all analyses, the between-subjects group effects, which tested whether the combination of baseline and post-intervention means differed across intervention conditions, did not reach statistical significance.

Intentions. We found a significant main effect for time on intentions ($F(1, 69) = 4.24$, $p = .043$, $\eta^2 = .06$) such that intentions were higher at baseline ($M = 2.60$, $SD = 1.27$) than post-intervention ($M = 2.84$, $SD = 1.33$) for all groups. Planned comparisons revealed that intentions were not significantly different from baseline to post-intervention in any of the groups [narrative intervention condition ($t(24) = 1.81$, $p = .083$), attentional control condition ($t(23) = 0.13$, p = .900), standard-of-care condition ($t(22) = 1.94$, $p = .066$)]. Additionally, the Time X Group interaction did not achieve statistical significance.

Knowledge of HPV and the HPV vaccine. We found a significant main effect of time on knowledge ($F(1, 69) = 50.35$, $p = .000$, $\eta^2 = .42$) such that knowledge was higher at post-intervention ($M = 6.58$, $SD = 2.69$) than baseline ($M = 4.10$, $SD = 2.79$) for all groups. Further analysis revealed that participants in the narrative intervention condition ($t(24) = 5.98$, $p = .000$, $d = 1.20$), attentional control condition ($t(23) = 2.49$, $p = .020$, $d = .51$), and standard-of-care condition ($t(22) = 3.54$, $p = .002$, $d = .74$) all had significantly higher knowledge post-intervention than at baseline. We found a significant Time X Group interaction ($F(2, 69) = 5.20$, $p = .008$, $\eta^2 = .13$). Simple-effects analyses found a significant Time X Group interaction ($F(1, 47) = 11.78$, $p = .001$, $\eta^2 = .20$) such that there was a greater increase in knowledge over time in the narrative intervention condition compared to the attentional control condition. We did not find a difference in knowledge overtime in the narrative intervention condition compared to the attentional control condition ($F(1, 46) = 2.23$, $p = .142$, $\eta^2 = .05$).

Perceived effectiveness. We found a significant main effect of time on perceived effectiveness ($F(1, 69) = 16.10$, $p = .000$, $\eta^2 = .19$) such that perceived effectiveness was higher at post-intervention ($M = 3.73$, $SD = 0.91$) than baseline ($M = 3.31$, $SD = 0.98$). Additional analyses found that participants in the narrative intervention condition ($t(24) = 3.55$, $p = .002$, $d = .709$) and attentional control condition ($t(23) = 3.00$, $p = .006$, $d = .61$) had significantly higher perceived effectiveness post-intervention relative to baseline. We found no differences in perceived effectiveness between baseline and post-intervention for participants in the standard-of-care condition ($t(22) = .835$, $p = .412$). The Time X Group interaction did not achieve statistical significance.

Perceived harms. There was no significant main effect for time on perceived harms or Time X Group interaction effect.

Perceived barriers. There was no significant main effect for time on perceived barriers or Time X Group interaction effects.

Perceived uncertainty. A significant main effect of time on perceived uncertainty ($F(1, 68) = 22.85$, $p = .000$, $\eta^2 = .25$) was found such that perceived uncertainty was lower at post-intervention ($M = 2.17$, $SD = 0.96$) than baseline ($M = 2.65$, $SD = 0.68$). Planned comparisons revealed that participants in the narrative intervention condition ($t(24) = -4.71$, $p = .000$, $d = -0.95$) and standard-of-care condition ($t(22) = -2.30$, $p = .032$, $d = -.49$) groups had significantly lower perceived uncertainty post-intervention than at baseline. There was, however, no difference between perceived uncertainty at baseline and post-intervention in the attentional control condition ($t(23) = -0.90$, $p = .380$). Simple-effects analyses found a significant Time X Group interaction ($F(2, 68) = 4.06$, $p = .022$, $\eta^2 = .11$) such that there was a greater decrease in perceived uncertainty overtime in the narrative intervention condition compared to the attentional control condition. We did not find a difference in perceived uncertainty in the narrative intervention condition compared to the attentional control condition ($F(1, 46) = 2.15$, $p = .150$, $\eta^2 = .05$).

Perceived Severity & Susceptibility of the HPV Virus. There was a significant main effect of time on perceived severity ($F(1, 69) = 6.43$, $p = .014$, $\eta^2 = .09$) such that perceived severity was higher at post-intervention ($M = 6.72$, $SD = 2.62$) than baseline ($M = 5.96$, $SD = 3.02$) for all groups. Additional analysis revealed that perceived severity

was not significantly different from baseline to post-intervention in any of the groups [narrative intervention condition ($t(24) = 1.26$, $p =.221$), attentional control condition ($t(23) = 1.73$, $p =.097$), standard-of-care condition ($t(22) = 1.39$, $p =.179$)]. We found no Time X Group interaction. For perceived susceptibility, there was no significant main effect for time on perceived susceptibility and no Time X Group interaction.

Identity risk beliefs. Results revealed a significant main effect of time on identity risk ($F(1, 69) = 9.04$, $p = .004$, $\eta^2 = .116$) such that identity risk was higher at post-intervention ($M = 3.51$, $SD = 3.44$) than baseline ($M = 2.65$, $SD = 3.28$). Planned comparisons revealed that participants in the narrative intervention condition ($t(24) = 2.55$, $p =.018$, $d = .52$) and standard-of-care condition ($t(22) = 2.18$, $p =.040$, $d = .46$) had significantly higher identity risk post-intervention than at baseline whereas the participants in the attentional control condition ($t(23) = 0.82$, $p =.422$) did not. The Time X Group interaction did not achieve statistical significance.

Causal risk beliefs. For causal risk, we found a significant main effect of time on causal risk beliefs ($F(1, 69) = 10.70$, $p = .002$, $\eta^2 = .14$) such that causal risk beliefs were higher at post-intervention ($M = 2.53$, $SD = 0.70$) than baseline ($M = 2.25$, $SD = 0.67$). Further analyses revealed that participants in the narrative intervention condition ($t(24) = 2.15$, $p =.042$, $d = .43$) and attentional control condition ($t(23) = 3.50$, $p =.002$, $d = .71$) had significantly higher casual risk post-intervention than at baseline. Participants' causal risk scores in the standard-of-care condition ($t(22) =-.64$, $p =.531$) did not significantly differ from baseline to post-intervention. The Time X Group interaction did not achieve statistical significance.

Timeline risk beliefs. There was no significant main effect for time on timeline risk beliefs or Time X Group interaction effects.

Consequences. There was no significant main effect for time on consequences or Time X Group interaction effects.

Risk control beliefs. There was no significant main effect for time on risk control beliefs or Time X Group interaction effects.

Risk coherence. We found a significant main effect of time on risk coherence ($F(1, 69) = 18.83$, $p = .000$, $\eta^2 = .21$) such that risk coherence was higher at post-intervention ($M = 2.51$, $SD = 0.84$) than baseline ($M = 2.02$, $SD = 0.87$) for all groups. Further analyses revealed that participants in the narrative intervention condition ($t(24) = 4.21$, $p =.000$, $d = .84$) had significantly higher risk coherence post-intervention than at baseline whereas the attentional control condition ($t(23) = 1.51$, $p =.145$) and standard-of-care condition ($t(22) = 1.24$, $p =.079$) groups did not. The Time X Group interaction did not achieve statistical significance.

Risk-Action-Link Coherence. There was a significant main effect of time on risk-action-link coherence ($F(1, 69) = 9.74$, $p = .003$, $\eta^2 = .124$) such that risk-action-link coherence was higher at post-intervention ($M = 2.57$, $SD = 0.76$) than baseline ($M = 2.29$, $SD = 0.77$) for all groups. Further analyses revealed that participants in the narrative intervention condition ($t(24) = 2.81$, $p =.010$, $d = .56$) had significantly higher risk-action-link coherence post-intervention than at baseline whereas the participants in the attentional control condition ($t(23) = .30$, $p =.765$) and standard-of-care condition ($t(22) =

1.66, $p = .110$) did not. The Time X Group interaction did not achieve statistical significance.

Responses four weeks after viewing intervention. Participation in the four-week survey is ongoing.

Mediation/Moderation Analyses. There was insufficient power to conduct mediation and moderation analyses. However, analyses will be conducted with the full RCT of the intervention that will be conducted in the near future.

Discussion

The purpose of this study was to assess the feasibility of performing an RCT within the current population and to provide a preliminary pilot test of the efficacy of a newly designed theoretically-guided health communication video in increasing the intentions and uptake of the HPV vaccine in an adult, college population. The newly developed narrative intervention video aimed to promote intentions and behaviors that reduce the risk of contracting HPV by utilizing both the key concepts of narrative communication and CSM constructs to inform college students about HPV, the HPV vaccine, and HPV-related cancers. We also examined the narrative intervention condition's effects on increasing knowledge of HPV and the vaccine, perceived effectiveness, harms, barriers, and uncertainty of the HPV vaccine, perceived severity of and susceptibility to HPV, illness risk representations, and risk-action-link coherence.

Results of the study indicated that it is feasible to recruit participants to complete an intervention to increase HPV vaccine intentions and uptake in a Hispanic-majority university population. Participants who were assessed for study eligibility reported a lower HPV vaccination rate than recently reported in other studies of university students. This may indicate that the current study's population is an important target for HPV vaccine interventions. Of the participants who completed the baseline survey, the majority (approximately 54%) participated in the intervention and completed the post-intervention survey. Although participation in the one-month follow-up is ongoing, a total of 43% of participants have completed the one-month follow-up, that is; 80% of those eligible to complete the follow-up to date have done so. One of the aims of a full RCT is to examine the moderating effect of story-telling cultures (e.g., Hispanic/Latino and/or African American/Black compared to non-Hispanic white participants) on the relationship between the three intervention groups and intentions to receive and uptake of the HPV vaccine and the perceived realism and engagement with the narrative video. The pilot RCT indicates that participants' demographics are representative of a story-telling culture with almost 60% indicating that they identify as Hispanic/Latino, thus demonstrating that it is feasible to recruit a similar population for a larger RCT to examine moderating effects. Taken together, we anticipate that it is feasible to recruit and retain participants for the minimum sample size required (N = 150) for a full RCT.

The pilot RCT findings reflected the expected patterns of correlations and mean differences of survey measures over time. We discuss general findings from the pilot RCT below. For the primary outcome of intentions, participant intention means increased across all groups but none of the baseline-to-post-intervention group means reached statistical significance with this small sample. Participants in the narrative intervention

condition as well as the attentional control condition both reported higher perceived effectiveness of the HPV vaccine from baseline to post-intervention. There were significant decreases in uncertainty of the HPV vaccine for participants in the narrative intervention condition and standard-of-care condition. Further, there was a significantly greater decrease in perceived uncertainty over time in the narrative intervention condition compared to the attentional control condition. We found increased severity means across all groups, but none reached statistical significance. For identity risk, we found significant increases from baseline to post-intervention in the narrative intervention condition and standard-of-care condition. We also found increases in cause risk beliefs, risk coherence, and risk-action-link coherence for the narrative intervention condition. Contrary to what was expected, we did not find differences in perceived barriers to HPV vaccination, susceptibility to HPV, timeline risk beliefs, consequences, risk control beliefs, or decreases in perceived harms of HPV from baseline to post-intervention. Overall, the findings from the pilot, RCT suggest that the patterns of means of the groups tended to be in the expected direction. However, the estimates are imprecise due to the low sample size. A full RCT is necessary to provide a rigorous test of differences in group changes over time. Further, a full RCT is required to examine the complete hypothesized model (Figure 4.1).

CHAPTER SEVEN: GENERAL DISCUSSION

In the past decade, the overall percentage of adults who have received the recommended full series of the HPV vaccine has increased. However, rates are still relatively low, particularly in comparison to other recommended vaccines and there are disproportionate rates of vaccine uptake across U.S. geographic regions, races/ethnicities, and gender. Due to the COVID-19 pandemic, HPV vaccine rates have declined significantly with projections demonstrating that if uptake does not return to pre-pandemic rates the U.S. will see a significant rise in HPV-related cancers. As such, advancements in HPV vaccine interventions are essential for the return to the pre-pandemic vaccination rate as well as the continued general encouragement of catch-up vaccinations among adults. The current project was in response to the need for theoretically-guided health communications tailored to an adult, college population that promotes HPV vaccine intentions and uptake.

This project successfully developed and evaluated a theoretically-guided health communication video for college students containing information on HPV, the HPV vaccine, and HPV-related cancers. Analysis revealed that participants felt that the newly developed video was appealing, persuasive, interesting, believable, and of high quality. Participants also reported that they gained new information about HPV and the HPV vaccine from the video. Although analyses revealed that participants felt overall positively about the video, we suggest that an additional video refinement phase be conducted. The current project's barriers (i.e., time, monetary) prevented a second phase of video refinement which would allow for additional enhancements to the video quality such as creating smoother transitions between shots and improved background music volume. This project also demonstrated that it is feasible to recruit a unique population (e.g., university students at a Hispanic Serving Institution) to complete an RCT to examine the efficacy of a newly developed narrative intervention to increase HPV vaccine intentions and uptake. These findings will inform the next phase of the project where a full RCT will be conducted.

The current project is the first to our knowledge to utilize the ORBIT framework to develop, refine, and conduct a preliminary evaluation of an intervention to increase the intentions and uptake of the HPV vaccine. The ORBIT framework provides a process for the development of behavioral interventions and encourages the testing of interventions in a rigorous manner (much like the phases of clinical drug development). Furthermore, the ORBIT model aids in the translation of behavioral science into clinical applications and to dissemination into clinical practice. The ORBIT model was particularly advantageous for use in the current project because it focuses on the early stages of intervention development, outlines flexible phases, and provides for an iterative feedback process. Finally, it provides a documented evidence base for examining the intervention in subsequent efficacy trials.

There are several ways in which newly developed narrative video intervention is unique from previous HPV narrative communication interventions. First, we utilized the CSM, a theoretical framework of health cognitions and health behavior decisions to develop the contents and messages of the narrative video. We suggest that utilizing the CSM has the potential to enhance the narrative intervention's efficacy relative to a

narrative health communication that focuses on the narrative mechanisms of transportation, realism, and identification. Second, during each phase of the development and evaluation of the narrative video intervention, the target population (i.e., undergraduate students at UC Merced) was consulted. Likewise, the video actors were UC Merced students, and the video was filmed in a dorm on UC Merced's campus. Third, this project is the first to describe a process which can be utilized to develop comparable narrative-CSM videos that are tailored to specific audiences so as to maximize identification with the characters, coherence, and motivation for specific young adult audiences. Lastly, employing mixed-methods in the evaluation and development phases of his project (i.e., the think-aloud method, open-ended questions, survey) provided the opportunity for undergraduate students to have a voice in the development of the script and video content and to provide advice for further refinements. Having the target population involved in each phase of the evaluation and development of the narrative video ensured that it would be tailored specifically to the undergraduate students at UC Merced.

Preliminary results of the pilot, RCT suggest that several outcomes increased across all groups. For instance, we found that knowledge increased across all groups from baseline to post-intervention. This is surprising as the attentional control condition (i.e., CDC video on binge drinking) did not contain information about HPV or the HPV vaccine. We posit that merely posing questions about HPV, the HPV vaccine, and HPV-related cancer in the baseline questionnaire may have encouraged participants to engage with information about these topics (via internet searches, talking with friends/family, etc.) during the two-day interval between baseline and post-intervention surveys. There is also a possibility that participants gained knowledge through the questionnaires themselves. For example, a participant who has limited knowledge about HPV may infer from particular questions or statements (i.e., HPV can be spread from person to person just by skin-to-skin genital contact", "Females who receive the HPV vaccine are protected 100% against cervical cancer") during the baseline assessment that HPV is a sexually transmitted infection that is linked with cancer and there is an HPV vaccine. These preliminary findings will be examined further in a full RCT.

Limitations

The findings from this dissertation make important contributions to the literature; however, there are several limitations. First, barriers such as monetary and time precluded additional phases of script and video development and refinements. It is often difficult to work within the confines of funding in the development of intervention components; nevertheless, we believe that additional time for script and video development would aid in providing the required improvements. Second, the majority of participants in the pilot RCT identified as female, making it difficult to make comparisons between gender. Because HPV has been long thought to be an infection that only affects women, it may be that this study was self-selecting to women. Third, at the point of data analysis for this current project, the majority of participants had yet to complete the one-month follow-up. This prevented us from examining the efficacy of the narrative intervention video in increasing uptake of the HPV vaccine. The last group of

participants will be eligible to complete the one-month follow-up on July 30th, 2022, when we will determine the efficacy of the intervention in increasing HPV vaccination. Last, as mentioned previously, the pilot RCT lacked statistical power, and as such the estimates are imprecise. However, the patterns of means of the groups were in the expected direction and a full RCT will be conducted in the near future that will be powered to detect meaningful differences among intervention conditions. Although the sample size lacked statistical power, current 'rules of thumb' for overall pilot trial sample size range from 12 to 35 participants per condition (Julious, 2005; Browne, 1995; Whitehead et al., 2016). The current pilot randomized controlled trial meets this criterion with ≥ 23 participants per condition.

Concluding Remarks

In summary, we successfully developed and evaluated a theoretically-guided health communication video for college students containing information on HPV, the HPV vaccine, and HPV-related cancers and conducted a pilot RCT that will inform a full RCT to rigorously examine the differences in group changes over time and to examine the complete hypothesized model. Increasing the understanding of which intervention components are efficacious in increasing HPV vaccine intentions and uptake is vital for future refinements of the newly developed narrative intervention video as well as future interventions to increase HPV vaccine uptake in adults. Overall, the present project provides evidence that a CSM-guided narrative video capturing the key components of narrative communications may be effective in increasing HPV vaccine intentions, which is a first step in moving toward vaccine initiation.

Table 6.2. *Correlations and Descriptive Statistics for Primary and Secondary Outcomes*

Variable	1	2	3	4	5	6	7	8
1. Intentions	1							
2. Knowledge	.194	1						
3. Perceived Effectiveness	.403**	.298*	1					
4. Perceived Harms	-.238	-.380**	-.357**	1				
5. Perceived Barriers	.009	-.182	-.086	.220	1			
6. Perceived Uncertainty	-.325**	-.446**	-.338**	.403**	.385**	1		
7. Perceived Severity	.240*	.164	.132	-.091	.021	-.107	1	
8. Perceived Susceptibility	.296*	-.053	.203	-.142	.106	-.106	.259*	1
9. Identity Risk	.000	.202	.076	-.327**	-.156	-.164	.275*	.119
10. Causal Risk	.063	-.022	.037	-.155	.037	-.003	-.090	.114
11. Timeline Risk	.290*	.219	.214	-.144	-.061	-.298*	.419**	.336**
12. Consequences	.237	.181	.428**	-.193	.009	-.200	.389**	.107
13. Risk Control	.050	.271*	.264*	-.228	-.300*	-.185	.206	.177
14. Risk Coherence	.031	.222	.213	-.060	-.269*	-.346**	.112	.073
15. Risk Action Coherence	.403**	.298*	.446**	-.480**	-.079	-.367**	.303**	.278*
Mean	2.60	4.10	3.31	2.26	2.17	2.65	5.96	3.60
Standard Deviation	1.27	2.79	0.98	1.01	1.31	0.68	3.02	2.32
Possible Range	0.00-5.67	0.00-9.00	0.00-6.00	0.00-6.00	0.00-5.00	1.00-4.17	0.00-10.00	0.00-9.00
Internal Consistency α	.90	.78	.84	.69	.75	.78	-	-

Variable	9	10	11	12	13	14	15
9. Identity Risk	1						
10. Causal Risk	.091	1					
11. Timeline Risk	.108	.037	1				
12. Consequences	.226	-.033	.183	1			
13. Risk Control	.291*	.060	.322**	-.182	1		
14. Risk Coherence	.033	-.008	.065	-.133	.330**	1	
15. Risk Action Coherence	.139	.114	.274*	.097	.273*	.316**	1
Mean	2.61	2.25	5.91	2.39	2.86	2.02	2.29
Standard Deviation	3.27	0.67	1.81	0.61	0.63	0.87	0.77
Possible Range	0.00-15.00	0.50-4.00	1.33-9.67	1.11-4.00	1.60-4.00	0.17-4.00	0.00-4.00
Internal Consistency α	.86	.86	.80	.82	.76	.91	.86

Note. *p < .05, **p < .01, ***p < .001.

Table 6.3. *Descriptive and Repeated-measures ANOVA Results at Baseline and Post-Intervention*

	Baseline	Post-Intervention	Between-subjects effects (Group)				Within-subjects effects			
	M(SD)	*M(SD)*	df	*F*	*p*	η2	df	*F*	*P*	η2
Intentions	2.60(1.27)	2.84(1.33)	2	2.25	.114	.06	**1**	**4.24**	**.043**	**.06**
Intentions-Time x Group							2	.95	.391	.03
Knowledge	4.10(2.80)	6.58(2.69)	2	.05	.952	.00	**1**	**50.35**	**.000**	**.42**
Knowledge-Time x Group							**2**	**5.20**	**.008**	**.13**
Perceived Effectiveness	3.31(0.98)	3.74(0.91)	2	1.89	.160	.05	**1**	**16.07**	**.000**	**.19**
Perceived Effectiveness-Time x Group							2	2.14	.125	.06
Perceived Harms	2.26(1.01)	2.08(1.06)	2	.25	.776	.01	1	2.70	.105	.04
Perceived Harms-Time x Group							2	1.36	.263	.08
Perceived Barriers	2.17(1.31)	1.90(1.19)	2	1.20	.307	.03	1	3.61	.062	.05
Perceived Barriers-Time x Group							2	.41	.664	.01
Perceived Uncertainty	2.65(0.68)	2.17(0.96)	2	1.05	.354	.03	**1**	**22.85**	**.000**	**.25**
Perceived Uncertainty-Time x Group							**2**	**4.06**	**.022**	**.11**
Perceived Severity	5.96(3.01)	6.72(2.62)	2	.03	.971	.00	**1**	**6.43**	**.014**	**.09**
Perceived Severity-Time x Group							2	.12	.899	.00
Perceived Susceptibility	3.60(2.32)	3.99(2.57)	2	.20	.818	.01	1	2.43	.124	.03
Perceived Susceptibility-Time x Group							2	1.17	.318	.03
Timeline Risk	5.91(1.81)	5.95(1.89)	2	.06	.946	.00	1	.04	.844	.00
Timeline Risk-Time x Group							2	2.59	.082	.07
Identity Risk	2.65(3.28)	3.51(3.44)	2	.40	.670	.01	**1**	**10.70**	**.002**	**.14**
Identity Risk-Time x Group							2	1.56	.218	.04
Causal Risk	2.25(0.67)	2.53(0.70)	2	.12	.884	.00	**1**	**9.04**	**.004**	**.12**
Causal Risk-Time x Group							2	1.50	.231	.04

Consequences	2.42(0.61)	2.41(0.55)	2	.93	.399	.03	1	.04	.844	.00
Consequences-Time x Group							2	.32	.729	.01
Risk Control	2.86(0.63)	2.84(0.59)	2	1.82	.170	.05	1	.16	.691	.00
Risk Control-Time x Group							2	1.78	.176	.05
Risk Coherence	2.02(0.87)	2.51(0.84)	**2**	**3.47**	**.037**	**.09**	**1**	**18.83**	**.000**	**.21**
Risk Coherence-Time x Group							2	2.05	.137	.056
Risk Action Coherence	2.29(0.77)	2.57(0.76)	2	2.23	.109	.06	**1**	**9.74**	**.003**	**.124**
Risk Action Coherence-Time x Group							2	1.18	.314	.03

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Appendix A

CSM Constructs, Techniques, and HPV Vaccination Video Intervention Components

Construct	Technique	Example Message/Task
Representations	Communication between friends to change risk representations	Identity: *Description of HPV infection* 1) *the most common sexually transmitted infection* *Risks Associated w/ Contracting HPV* 2) *Early-onset of sexual behavior* 3) *Having many sexual partners* 4) *Weakened immune system* 5) *Men who have sex with men* 6) *Heavy alcohol use* 7) *Having an uncircumcised penis or having a sexual partner w/ an uncircumcised penis* 8) *Unprotected vaginal, anal, or oral sex* 9) *Damaged or punctured skin on genitals* 10) *Tobacco smoke*
		Cause: *Infection caused by the Human Papillomavirus; spread through skin-to-skin contact*
		Consequences: *Most HPV infections resolve on their own; however, some strains cause genital warts and high-risk strains cause cervical, vaginal, penile, anal, and head and neck cancers.* *HPV is the causal agent of:* *70% of head & neck* *91% of anal cancers* *91% of cervical cancers* *63% of penile cancers* *75% of vaginal cancers*

		Control: T*here is no cure for HPV; High-risk strains can be prevented with the HPV vaccine.*
		 Information about the Vaccine:
		 • *Safe, effective, and long-lasting protection against most HPV related cancers; does not protect against HPV strains that cause genital warts*
		 • *The HPV vaccine was FDA approved in 2016 and since then, more than 135 million doses of HPV vaccines have been given. Research shows that vaccines continue to be safe and effective. More than 12 years of safety monitoring show that the HPV vaccine has caused no serious side effects.*
		 • *The vaccine is a series of 3 doses. The second dose should be given 1-2 months after the first, and the third dose should be given 6 months after the first dose.*
		 • *Even if you suspect that you currently have or that you had an HPV infection you should still get the HPV vaccine.*
		 • *The most common side effects of the vaccine are mild and get better within 24-48 hours. These include:*
		     o *Pain, redness, or swelling in the arm where the shot was given*
		     o *Fever*
		     o *Dizziness or fainting (most common in adolescents)*
		     o *Nausea*
		     o *Headache*
		     o *Muscle or joint pain*

		• *The HPV vaccine is available at your primary care provider, Raley's, Walgreens, and CVS. Most insurances cover the HPV vaccine. Appointments can be made online at Walgreens and CVS.*
		Timeline: *Most sexually active people will be infected with HPV at some point in their life and can be repeatedly infected; The peak time for contracting HPV is shortly after becoming sexually active; It takes 15 to 20 years for cervical cancer to develop in women with normal immune systems & approximately only 5 to 10 years in women with weakened immune systems (between 40-50 years old); head and neck cancer is more prevalent in men and develops at around the age of 40-55 years old; Between 59 and 69 years old is when vaginal, penile, and anal cancers develop.*
		Coherence: *Discussion of the link between HPV and cancer. High-risk strains of the HPV virus can survive for several years in your body. Eventually, the virus can lead to normal cells transforming into cancerous cells.*
Risk-Action Link Coherence	Communication to encourage understanding of the relationship between specific actions and health risk	*Explanation of how the HPV vaccine stimulates the body to produce antibodies (e.g., "Just like a tetanus vaccine works to enable to the immune system to recognize and destroy tetanus bacteria before it takes over the body, the HPV vaccine stimulates the body to produce antibodies that, in future encounters with an HPV infection, bind to the virus and prevent it from infecting cells")*
Coping for Threat Control	Action Planning	*Please call the UC Merced Student Health Center at (209) 228-2273 to schedule an appointment with one of the providers to discuss HPV vaccination.*

Appendix B

Provisional Video Script Video Script

The format of the narrative video will include (1) a direct testimonial of a college woman (in her dorm room) telling a story to her roommates about what motivated her to get vaccinated, and (2) a conversation among the roommates where information about the HPV vaccine is discussed.

[Elena and her boyfriend Luis are studying (with laptops) in her dorm room. Sofia comes into her dorm room after being away for the weekend.]

Elena: Welcome back, how was your weekend back home?

Sofia: It was ok.

[Elena notices that Sofia seems sad]

Elena: Everything ok? You seem a little sad.

Sofia: Yea, I'm ok. Thanks for asking. You know how I told you before that my mom has been sick.

[Elena acknowledges with a head nod]

Elena: yea.

Sofia: I went with her to her follow-up appointment and the doctor told her that she has cervical cancer.

Elena: oh no! I'm so sorry!

Luis: Man, that's scary.

Elena: Are you doing ok?

Sofia: Obviously, I'm very scared, but I am trying to stay strong for my mom.

Luis: Yea, I can understand that.

Elena: So, what did the doctor say?

Sofia: They scheduled my mom to start treatment for her cervical cancer next week. She is going to have surgery and also will be taking some chemotherapy drugs. The doctor seemed pretty confident about being able to treat her cancer. I am still really scared about my mom having cancer.

Luis: yea, that's definitely scary. I'm glad to hear that the doctor seems confident about being able to treat her cancer.

Elena: Yea, I'm so glad to hear that it sounds like your mom will be ok.

Sofia: Yea… I will be taking some time off from classes to go home and help my mom after her surgery.

Elena: I think that's a good idea.

Sofia: I'm actually really glad I went to my mom's follow-up appointment with her. I learned a lot during my mom's appointment. Like, I didn't realize that most cervical cancers are caused by a virus called the Human Papillomavirus or HPV, for short. HPV is a sexually transmitted infection, and it's actually the most common STI.

Luis: yea, I've heard of HPV, but I didn't realize that it can lead to cancer!

Sofia: Yea, HPV is spread through skin-to-skin contact and most sexually active people will get HPV at some point in their life. Most HPV infections will clear up on their own, but some types cause genital warts. Other types can cause cervical cancers… like my mom has. It can also cause cancers of the vagina, penis, anus, and head and neck.

Luis: So, males can get HPV also?

Sofia: Yes, both males and females can get HPV.

[Elena is looking up HPV on her computer]

Elena: I just looked HPV up and it says that risks factors for getting HPV infections are early-onset of sexual behavior, having many sexual partners, a weakened immune system, men who have sex with men, heavy alcohol use, having an uncircumcised penis, or having a sexual partner with an uncircumcised penis, unprotected vaginal, anal, or oral sex, damaged or punctured skin on genitals and tobacco smoke.

Elena: Can I ask something personal?

Sofia: Sure.

Elena: How did your mom get an STI… she's been married to your dad for over 20 years, right?

Sofia: Yea, I wondered that too. The nurse told me that even though someone gets HPV shortly after sexual contact if you have the type of HPV that causes cancer, it can take up to 20 or even 30 years for cancer to develop. The nurse also told me that since there aren't any symptoms, most people don't even know they have HPV.

Luis: How does HPV cause cancer though?

Sofia: HPV can live for several years in your body, and it changes the normal cells in your body into cancer cells.

Elena: How do you get rid of HPV?

Sofia: Unfortunately, there is no cure once you have HPV, but there is a vaccine you can get that can greatly reduce your chances of getting HPV. It also reduces you risk of getting cancers caused by HPV.

Elena: Really? A vaccine?

Sofia: Yes, it's just like other vaccines that you get. Remember when we learned about the tetanus vaccine in microbiology last semester?

Elena: yes (smile)

Sofia: It's just like the tetanus vaccine where your immune system recognizes and destroys the tetanus bacteria before it takes over the body. The HPV vaccine stimulates the body to produce antibodies that, in future encounters with an HPV infection, bind to the virus and prevent it from infecting cells.

Luis: Is the HPV vaccine safe?

Sofia: Yes, it's safe and effective and has long-lasting protection. There aren't any serious side effects of the vaccine. The most common side effects are pain, redness, or swelling in the arm where the shot was given, fever, dizziness, nausea, headaches, or muscle pain, but these get better within 24-48 hours.

Elena: [pointing to her laptop screen and reading] Oh yea, it says here that even if you suspect that you currently have or that you had an HPV infection you should still get the HPV vaccine.

Elena: Are you going to get the vaccine?

Sofia: Yes, I already got my first dose. I did it in honor of my mom.

Elena: What a nice way to honor your mom. Did you say "first dose"?

Sofia: Yes, for people our age, like adults 18 to 26 years old the vaccine has three doses. Once you get the first dose, the second dose is usually given 1-2 months after, and then the third dose is given 6 months after the first dose.

Elena: oh, where did you get it?

Sofia: I got it this morning at the UC Merced's Rajender Reddy Health Center. I called the health center's number and made an appointment. Our UC Ship insurance covers all three doses of the HPV vaccine. You can also get it at your primary care provider's office and most pharmacies, like Walgreens and CVS. Most insurances cover the HPV vaccine.

Luis: Thanks for the info. I'm going to look into making an appointment to get my first dose.

Elena: Yea, I think we should all do it in honor of your mom.

Sofia: I think she would really like that.

Appendix C

One-on-One Interview Guide

Participant #_____

I. Introduction (XX minutes)

"We are asking UC Merced students about their feedback on a script for a newly developed video communicating information about Human papillomavirus (HPV), the HPV vaccination, and HPV-related cancers. The purpose of this one-on-one interview is to collect feedback on needed enhancements for the video script (or video). We will ask you to complete two tasks today."

Task 1: "The first task is to silently read short segments of the script (or watch short clips of the video) and then describe your thoughts out loud in your own words (or experiences) as you are reading the short segments (watching the video clips). We ask that you vocalize your thoughts, reactions, and anything confusing about the scrip segment (video clips)."

Task 2: "For the second task, we will be asking you open-ended questions about the script (video clips)".

[Interviewers will give no feedback in response to the participants' statements. Interviewers will only provide encouragement to the participants to continue to verbalize their thoughts on what they are reading (watching). Interviewers will take notes on the participant's thoughts, reactions, or anything the participants find confusing. Thoughts, suggestions, and any misperceptions about the content brought up during the think-aloud task will be used to iteratively refine the script (video).]

"Do you have any questions?" *[If yes, answer questions]*

[If No] "Let's begin the first task. You may begin reading the first segment (watching each clip). Please provide your thoughts as you read through this segment (watch each clip). Please stop reading when you get to the stop sign (does not need to be told to the participant because the video clip will end automatically)."

[Once the participant is finished with the first task you may move to task 2]

Task 2: "For the second task, I will ask a few short open-ended questions. Please answer the questions as openly and honestly as you can."

"Do you have any questions?" *[If yes, answer questions]*

[If No, begin asking questions]

1. This is a script for a video for undergraduate students at UC Merced. What do you think can be improved?
2. Do you think the language is appropriate for undergraduates at UC Merced?
3. Was there anything that you found confusing about the information in the script?

4. What did you like about the script?
5. What did you not like about the script?
6. Any other thoughts about the script that you'd like to let us know?

Additional questions for video clip one-on-on interviews

7. What do you think about the characters in the story?
8. Do you find the characters likable (or unlikable)?
9. Do you feel like this scenario could happen in real life?

Participants who viewed the video clips will receive a link to a short Qualtrics survey (~2 minutes) in the zoom chat. Once they have finished the interview, they will be directed to click the link that will take them to Qualtrics.

[After questions have been answered thank the participant]

"Thank you for participating in this one-on-one interview. You will receive your SONA credits within 24 hours."

Appendix D

Final Video Script

The format of the narrative video will include (1) a direct testimonial of a college woman (in her dorm room) telling a story to her roommate and roommate's boyfriend about what motivated her to get the HPV vaccine, and (2) a conversation among the students where information about the HPV vaccine is discussed.

[The setting is Elena's dorm room. Elena and her boyfriend Luis are studying on her bed (with laptops). Sofia comes into her dorm room after being away for the weekend. Sofia sets down her bags and sits in a chair (or other bed-depending on the room layout). It's clear that the three of them have a close relationship and are comfortable with each other.]

Elena: Welcome back, how was your weekend home?

Sofia: [Sofia looks sad/upset/down] Well, it could have been better.

[Elena notices that Sofia seems sad/upset.]

Elena: [Asks with concern] Everything ok?

Sofia: Yeah, I'm ok. Thanks for asking. You know how I told you before that my mom has been sick.

Elena: [Elena acknowledges expectantly with a head nod] Yeah.

Sofia: I went with her to her doctor's appointment, and she found out that she has cervical cancer.

Elena: [Elena answers with some shock and concern] Cancer? I'm really sorry to hear that!

Luis: [Luis has a concerned look on his face] Man, that's really scary.

Elena: [Questions with caring and concern] How do you feel about everything? Is there anything we can do for you?

Sofia: Obviously, I'm really scared, but I am trying to stay strong for my mom. I think I just really need support right now.

Luis: You definitely have our support. Whatever you need, let us know.

Elena: So, what else did the doctor say?

[Sofia is sitting at her desk (or on the other bed) and is talking while taking out her laptop]

Sofia: They scheduled my mom to start treatment next week. She is going to have surgery and chemotherapy. The doctor seemed pretty confident about being able to treat her cancer. She caught it early and with time she will be ok. But I am still really scared about my mom having cancer.

Luis: Yeah, that's definitely scary. I'm glad that the doctor seems positive about the situation.

Elena: Same, I'm happy that after surgery and chemotherapy your mom will be ok.

Sofia: I will be taking some time off from classes to go home and help my mom after her surgery.

Elena: I think that's a good idea.

[Pause a second; Luis is changing the subject]

Luis: What kind of cancer did you say it was?

Sofia: Cervical cancer.

Luis: What's that?

Sofia: It's cancer of the cervix… the organ connecting the uterus and vagina… part of a women's reproductive system.

Luis: [nods head in recognition] oooh, ok.

Sofia: I'm really glad I went with my mom to her follow-up appointment. I didn't know what cervical cancer was either. [Sofia is digging through her backpack for the HPV information sheet as she is talking; when she finds it she looks down and reads]. The nurse gave me this information sheet… I didn't realize that most cervical cancers are caused by a virus called the Human Papillomavirus… most people just say HPV. I've heard of HPV, but I didn't know that it is a sexually transmitted infection. The information sheet that the nurse gave me says that HPV is the most common sexually transmitted infection and 80% of sexually active people will get HPV at least once in their life.

Luis: Wow! yeah, I've heard of HPV, but I didn't realize that it can lead to cancer! How do you get HPV?

Sofia: HPV is spread through skin-to-skin contact during sex with someone who has the virus. Someone with HPV can spread it even if they have no signs or symptoms. [Pause] The good news is most HPV infections will clear up on their own. But other HPV infections can cause genital warts and other types can cause cervical cancer… like my mom has. It can also cause cancers of the vagina, penis, anus, and head and neck.

Luis: Really? So, guys can get HPV too?

Sofia: Yes, both males and females can get HPV.

Luis: I had no idea.

[Elena starts looking up HPV on her computer]

Elena: [Points to the computer screen] It says here that people who begin having sex at an early age, have many sexual partners, have a weakened immune system, and have unprotected vaginal, anal, or oral sex have a higher risk of getting HPV. It also says that men who have sex with men

or males with an uncircumcised penis or even having a sexual partner with an uncircumcised penis puts someone at a higher risk of getting HPV.

Luis: [Leans in and looks over at Elena's screen] oh yeah, and having damaged or punctured skin on the genitals, heavy alcohol use, and tobacco smoke are also risk factors for getting HPV.

Elena: I know this is a really personal question but how did your mom get an STI when she's been married to your dad for over 20 years?

Sofia: Yea, I wondered that too. Like, how does a woman who's been married for 20 years get cancer from a sexually transmitted infection? The nurse told me that HPV infections can live in your body for years, and if you have the type of HPV that causes cancer it can take up to 20 or even 30 years for cancer to develop. Since there aren't any symptoms, most people don't even know they have HPV. So, you or your partner could have HPV and you wouldn't even know.

Luis: How does a virus like HPV cause cancer though?

Sofia: HPV can live for several years in your body, and it changes the normal cells in your body into cancer cells.

Elena: How do you get rid of HPV?

Sofia: Unfortunately, there is no cure once you have HPV, but there is a vaccine you can get that can greatly reduce your chances of getting HPV. It also reduces your risk of getting cancers caused by HPV.

Elena: Really? A vaccine?

Sofia: Yes, it's just like any other vaccine that you get. Remember when we learned about the tetanus vaccine in microbiology last semester?

Elena: [smiles in recognition] yes!

Sofia: It's just like the tetanus vaccine. Once you get the vaccine, if you come into contact with tetanus bacteria, your immune system recognizes and destroys it before it takes over the body. Just like that, the HPV vaccine stimulates the body to produce antibodies that bind to the virus and prevents it from infecting cells.

Luis: Is the HPV vaccine safe?

Sofia: Yes, it's safe and effective and has long-lasting protection. There aren't any serious side effects of the vaccine. In fact, it has the same minor side effects as the flu vaccine, like pain, redness, or swelling in the arm, fever, dizziness, nausea, headaches, or muscle pain. All of these will get better within 24-48 hours.

Elena: [pointing to her laptop screen and reading] It looks like even if you think you have or that you've had an HPV infection you should still get the vaccine. Even if you aren't sexually active right now you should get it for future protection.

Luis: I'm not gonna lie, I'm a little afraid of shots. What about using a condom for protection instead of getting the vaccine?

Elena: [Rolls her eyes at Luis and bumps his shoulder with hers]

Sofia: Sure, using a condom can lower your chances of getting HPV but HPV can infect areas of your skin that the condom doesn't cover. Unfortunately, condoms don't fully protect against getting HPV.

Elena: [Says to Sofia] Are you going to get the vaccine?

Sofia: Yes, I got my first dose already because this situation with my mom has really freaked me out! [Pauses and directs her next statements to Luis] Don't worry Luis, it didn't hurt at all! It was very quick! Just like the flu vaccine. I did so that my family and I won't have to go through what my mom is going through right now.

Elena: That's great!

Luis: Wait, did you say, "first dose"?

Sofia: Yes, for people our age, like adults 18 to 26 years old the vaccine has three doses. Once you get the first dose, the second is given 1-2 months after, and then the third dose is given 6 months after the first.

Elena: oh, where did you get it?

Sofia: I got it this morning at the health center here on campus. I called the health center's number and made an appointment to talk with someone about getting the vaccine. I went in and spoke with one of the physician assistants. After our discussion, I decided that the right decision was to get the vaccine. [Pause] You can also get the vaccine at your primary care provider's office and most pharmacies. You even can make an appointment online.

Luis: Does our school insurance cover the cost?

Sofia: Yes, our UC Ship insurance covers all three doses of the HPV vaccine. Most insurances cover the vaccine.

Luis: Thanks for the info. I'm going to make an appointment to talk to one of the physician assistants at the health center and get my first dose.

Elena: Yea, I think I'm going to make an appointment also.

Sofia: Great! I know my mom would be happy to know you are both protecting yourselves.

Appendix E

CONSORT Checklist

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomized trial in the title	xvi, 1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	xvi, 1
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	1-11
	2b	Specific objectives or hypotheses	12
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	35-36
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	35-36
Participants	4a	Eligibility criteria for participants	36
	4b	Settings and locations where the data were collected	36
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	36
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	37-41
	6b	Any changes to trial outcomes after the trial commenced, with reasons	NA
Sample size	7a	How sample size was determined	41
	7b	When applicable, explanation of any interim analyses and stopping guidelines	NA
Randomization:			
	8a	Method used to generate the random allocation sequence	36

Sequence generation	8b	Type of randomization; details of any restriction (such as blocking and block size)	36
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	36
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	36
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	NA
	11b	If relevant, description of the similarity of interventions	NA
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	41-43
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	42-43
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analyzed for the primary outcome	43
	13b	For each group, losses and exclusions after randomization, together with reasons	43
Recruitment	14a	Dates defining the periods of recruitment and follow-up	37
	14b	Why the trial ended or was stopped	NA
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	44
Numbers analyzed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	45
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	45-47
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	NA

Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	NA
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	NA
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	51
Generalizability	21	Generalizability (external validity, applicability) of the trial findings	51
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	48
Other information			
Registration	23	Registration number and name of trial registry	36
Protocol	24	Where the full trial protocol can be accessed, if available	NA
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	NA

Appendix F

Intentions to Engage in HPV-related Behaviors

Intentions to Engage in HPV-related Behaviors

	Definitely will (6)	Very Likely (5)	Likely (4)	Possibly (3)	Unlikely (2)	Very Unlikely (1)	Definitely will Not (0)
What is the likelihood that you will:							
1. Get the HPV vaccine within the next 30 days.							
2. Get the HPV vaccine within the next 12 months.							
What is the likelihood that you will engage in the following behaviors over the next 6 months?							
3. Discuss the HPV vaccine with your mother.							
4. Discuss the HPV vaccine with your father.							
5. Discuss the HPV vaccine with a family member (other than your mother or father).							
6. Discuss the HPV vaccine with a friend.							
7. Discuss the HPV vaccine with a healthcare provider.							
8. Search for more information about the HPV vaccine.							
9. Recommend the HPV vaccine to a friend.							

Appendix G

Knowledge of HPV & HPV Vaccine

	True	False	I don't know
1. Men can not get the HPV vaccine.		X	
2. A person may be infected with HPV and have no symptoms.	X		
3. HPV can be cured with antibiotics.		X	
4. HPV can cause anal cancer.	X		
5. A person cannot get HPV if they use a condom.		X	
6. A person can have cervical cancer without having genital warts.	X		
7. HPV can be spread from person to person just by skin-to-skin genital contact.	X		
8. HPV vaccine requires 3 shots over a period of time.	X		
9. A person can get an HPV infection from getting the HPV vaccine.		X	
10. Females who receive the HPV vaccine are protected 100% against cervical cancer.		X	

Appendix H

Adapted Carolina HPV Immunization Attitudes and Beliefs Scale

Please rate the extent of your agreement with the statements below.	Strongly Agree (6)	Agree (5)	Agree A little (4)	Neutral (3)	Disagree A little (2)	Disagree (1)	Strongly Disagree (0)
The HPV vaccine might cause short-term problems, like fever or discomfort.							
The HPV vaccine is being pushed to make money for drug companies.							
The HPV vaccine might cause lasting health problems.							
The vaccine is safe and effective and provides long-lasting protection against HPV.							
I think the HPV vaccine is unsafe.							
I don't think I need a vaccine for a sexually transmitted infection like HPV.							
The HPV vaccine stimulates the body to produce antibodies that bind to the virus and prevent it from infecting cells.							
It would be hard to find a provider or clinic that has the vaccine available.							
I am concerned that the HPV vaccine costs more than I can pay.							
More than 12 years of monitoring have shown that there are no serious side effects caused by the HPV vaccine.							
The HPV vaccine is effective in preventing genital warts.							
The HPV vaccine is effective in preventing cervical cancer.							
The HPV vaccine is effective in preventing penial, anus, and health and neck cancers.							
I don't have enough information about the HPV vaccine to decide whether I want to get it.							
The HPV vaccine is so new that I want to wait a while before deciding if I will get it.							

| Other college students in my community are getting their HPV vaccination. | | | | | | | |
| The vaccine is given in a 3-dose series. | | | | | | | |

Appendix I

The Assessment of Illness Risk Representations

Imagery Subscale
We are interested in understanding some of the images that immediately enter your mind when you think about a specific topic. In order to investigate this, we would like you to list five images that you immediately associate with a particular topic. These may be single words or small phrases. It is important that you do this quickly—do not spend too much time thinking over your answers. Remember that it is your immediate impressions that we are interested in. Think for a moment about HPV. What are the first five images that come to your mind when you think about this condition? Please list these images below.

1._____

2._____

3._____

4._____

5._____

Now we want to be sure we understand if these images mean something positive or negative to you. Please rate your images in the order in
which you gave them on the scales below.

1.					
	Very Positive/Very Good	Somewhat Positive	Neutral	Somewhat Negative	Very Negative/Very Bad
2.					
	Very Positive/Very Good	Somewhat Positive	Neutral	Somewhat Negative	Very Negative/Very Bad
3.					
	Very Positive/Very Good	Somewhat Positive	Neutral	Somewhat Negative	Very Negative/Very Bad

4.					Very Negative/Very
	Very Positive/Very Good	Somewhat Positive	Neutral	Somewhat Negative	Bad
5.					Very Negative/Very
	Very Positive/Very Good	Somewhat Positive	Neutral	Somewhat Negative	Bad

Now we would like you to rate how vivid your images were overall. Please circle a number for each image using the following scale, ranging from ''no image at all (you only ''know'' that you are thinking of something)'' to ''perfectly clear and as vivid as normal vision.''

	Perfectly Clear and Vivid (4)	Reasonably Vivid (3)	Somewhat Vivid (2)	Vague and Dim (1)	No image at all (0)
1.	(4)	(3)	(2)	(1)	(0)
2.	(4)	(3)	(2)	(1)	(0)
3.	(4)	(3)	(2)	(1)	(0)
4.	(4)	(3)	(2)	(1)	(0)
5.	(4)	(3)	(2)	(1)	(0)

Identity Risk Beliefs
Listed below are several characteristics, behaviors, and symptoms. Please indicate the total number of characteristics, behaviors, or symptoms that you currently have.

Characteristic, Behaviors, or Symptoms:
Skin-to-skin sexual? contact with another person
Weakened immune system
Heavy alcohol use
Ever having unprotected sex
Having had multiple sexual partners
Tobacco smoking
Damaged or punctured skin on the genitals
Uncircumcised penis or unprotected sex with someone with an uncircumcised penis

Please indicate the number of features that you currently have:
____1   _____2   ____3   ____4   ____5 or more

| Abdominal and/or pelvic pain |
| Genital warts |

Do you think that these characteristics, behaviors, or symptoms puts a person at risk for HPV?

Characteristic, Behaviors, or Symptoms:	Definitely Yes (3)	Probably Yes (2)	Probably Not (1)	Definitely Not (0)
Skin-to-skin sexual? contact with another person				
Weakened immune system				
Heavy alcohol use				
Ever having unprotected sex				
Having had multiple sexual partners				
Tobacco smoking				
Damaged or punctured skin on the genitals				
Uncircumcised penis or unprotected sex with someone with an uncircumcised penis				
Abdominal and/or pelvic pain				
Genital warts				

Causal Risk

We are interested in what you consider might be the cause of HPV. As people are very different, there is no correct answer to this question. We are most interested in your own views about the factors that cause HPV rather than what others including doctors or family may suggest to you. Below is a list of possible causes for HPV. Please indicate how much you agree or disagree that they are causes for HPV by checking the appropriate box.

Possible Causes	Strongly Agree (4)	Agree (3)	Neither Agree nor Disagree (2)	Disagree (1)	Strongly Disagree (0)
Stress or worry					
HPV is hereditary-it runs in the family					
Diet or eating habits					
Pollution or hazards in the environment					

Poor immune function*										
Chance or bad luck										
Poor medical care in the past										
Accident or injury										
A germ or virus*										
Mental attitude- thinking about life negatively										
Lack of exercise										
Overwork										
Aging										
Emotional state-feeling down, anxious, lonely, empty										
Smoking tobacco*										
Alcohol use*										

Timeline Risk

	Strongly Agree (10)	(9)	(8)	(7)	(6)	Neither Agree nor Disagree (5)	(4)	(3)	(2)	(1)	Strongly Disagree (0)
People my age are likely to contract HPV at this time in their lives.											

	Certain to Happen (10)	(9)	(8)	Probably will Happen (7)	(6)	50-50 Chance (5)	(4)	Probably will not Happen (3)	(2)	(1)	No Chance (0)
How likely is it that a person your age would contract HPV now-at this age?											
How likely is it that a person of your age											

would contract HPV *in the next 10 years*?										

Consequences Risk (PS= psychosocial; P=pain; SL= shortened life)

	Strongly Agree (4)	Agree (3)	Neither Agree nor Disagree (2)	Disagree (1)	Strongly Disagree (0)
If I had HPV, it would cause difficulties for those who are close to me. PS					
HPV is a painful condition. P					
Having HPV would have no effect on how long I live. SL					
If I had HPV, I would not be able to participate in some work activities. PS					
If I had HPV, I would have to undergo painful treatments. P					
Having HPV would affect the way others see me. PS					
If I had HPV, I would not be able to participate in some social of leisure activities. PS					
If I get HPV, I will die fairly quickly. SL					
HPV would have serious financial consequences for me. PS					

Personal Control Over Prevention

	Strongly Agree (4)	Agree (3)	Neither Agree nor Disagree (2)	Disagree (1)	Strongly Disagree (0)
There are things I can do to prevent HPV.					
What I do will determine whether or not I contract HPV.					
My actions will have no effect on whether or not I contract HPV. (Reverse-scored)					
Preventing HPV depends on me.					
Nothing I do will prevent me from contracting HPV. (Reverse-scored)					

Risk Coherence

	Strongly Agree (4)	Agree (3)	Neither Agree nor Disagree (2)	Disagree (1)	Strongly Disagree (0)
The symptoms of HPV are puzzling to me.					
The risk of contracting HPV is a mystery to me.					
I don't understand the risk of contracting HPV.					
The risk of contract HPV doesn't make any sense to me.					
I have a clear picture of the risk of contracting HPV.					
I have a clear understanding of the risk of contracting HPV.					

Appendix J

Risk Action Link Coherence

	Strongly Agree (4)	Agree (3)	Neither Agree nor Disagree (2)	Disagree (1)	Strongly Disagree (0)
I have a clear understanding of how the HPV vaccine can reduce the chance of contracting HPV.					
I would find it easy to explain to someone else how the HPV vaccine can protect from contracting HPV.					
It doesn't make sense to me how people can reduce their risk of contracting HPV by getting the HPV vaccine. (Reverse-scored)					
How the HPV vaccine decreases the chances of contracting HPV is a mystery to me. (Reverse-scored)					
I have a clear picture of how the HPV vaccine decreases the chance of contracting HPV.					

Appendix K

Narrative Engagement Scale

Please indicate your agreement with the statements below.	Strongly Agree (6)	Agree (5)	Agree A Little (4)	Neutral (3)	Disagree A little (2)	Disagree (1)	Strongly Disagree (0)
1. At points, I had a hard time making sense of what was going on in the video.							
2. During the video, my body was in the room, but my mind was inside the world created by the story.							
3. My understanding of the characters is unclear.							
4. The video created a new world, and then that world suddenly disappeared when the program ended.							
5. I had a hard time recognizing the thread of the story.							
6. At times during the video, the story world was closer to me than the real world.							
7. I found my mind wandering while the video was on.							
8. The story affected me emotionally.							
9. While the video was on, I found myself thinking about other things.							
10. During the video, when the main character succeeded, I felt happy, and when they suffered in some way, I felt sad.							
11. I had a hard time keeping my mind on the video.							
12. I felt sorry for some of the characters in the program.							

Appendix L

The Religious Commitment Inventory-10

Choose the extent to which each statement is true for you.	Totally True of Me (4)	Mostly True of Me (3)	Moderately True of Me (2)	Somewhat True of Me (1)	Not At All True of Me (0)
I often read books and magazines about my faith.					
I make financial contributions to my religious organization.					
I spend time trying to grow in understanding of my faith.					
Religion is especially important to me because it answers many questions about the meaning of life.					
My religious beliefs lie behind my whole approach to life.					
I enjoy spending time with others of my religious affiliation.					
Religious beliefs influence all my dealings in life.					
It is important to me to spend periods of time in private religious thought and reflection.					
I enjoy working in the activities of my religious affiliation.					
I keep well informed about my local religious group and have some influence in its decisions.					

Appendix M

The Permissive Subscale of the Brief Sexual Attitudes Scale (BSAS)

	Strongly Agree (4)	Agree (3)	Neither Agree Nor Disagree (2)	Disagree (1)	Strongly Disagree (0)
I do not need to be committed to a person to have sex with them.					
Casual sex is acceptable.					
I would like to have sex with many partners.					
One-night stands are sometimes very enjoyable.					
It is okay to have ongoing sexual relationships with more than one person at a time.					
Sex as a simple exchange of favors is okay if both people agree to it.					
The best sex is with no strings attached.					
Life would have fewer problems if people could have sex more freely.					
It is possible to enjoy sex with a person and not like that person very much.					
It is okay for sex to be just a good physical release.					