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CHANGING HEALTH KNOWLEDGE, ATTITUDES, AND BEHAVIORAL INTENTIONS: AN ANALYSIS OF HOW MUCH EDUCATIONAL CONTENT SHOULD BE INSERTED INTO AN ENTERTAINMENT-EDUCATION PROGRAM

By

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ABSTRACT

CHANGING HEALTH KNOWLEDGE, ATTITUDES, AND BEHAVIORAL INTENTIONS: AN ANALYSIS OF HOW MUCH EDUCATIONAL CONTENT SHOULD BE INSERTED INTO AN ENTERTAINMENT-EDUCATION PROGRAM

By

Dhaval Shantilal Patel

The last two decades have witnessed the growth of entertainment-education (EE), a process of educating audiences about social issues through entertaining mass media to catalyze prosocial change. This study adds to the growing literature on entertainment-education by (a) determining the optimal educational dosage that should be inserted into an EE television program, (b) applying theories of cognitive load and boredom, and (c) providing a controlled, experimental test of television EE.

In order to accomplish these tasks, an experiment was conducted that manipulated the amount of prostate cancer education in an EE program. After random assignment to one of four treatment conditions (i.e., education level 1, education level two, education level three, and education level four), two hundred undergraduate students (50 per condition) from a large, Southern university watched a 32-minute video edited from a popular American primetime television drama. When the participants finished watching the video for their treatment condition, they completed a posttest measuring outcomes (i.e., knowledge, attitudes, and behavioral intentions), intervening variables (i.e., cognitive load and boredom), manipulation checks, confounds, and demographics.

Three hypotheses and two research questions were tested and asked. In terms of the hypotheses, curvilinear, ogive (i.e., small r-shaped curve) relationships were predicted between (a) education and outcomes, (b) education and intervening variables, and (c) intervening variables and outcomes. Additionally, two questions were raised. First, does cognitive load or boredom have more influence on knowledge, attitudes, and behavioral intentions, and second, what type of relationships exist between entertainment, education, and outcomes?

Data were analyzed with analysis of variance, analysis of covariance, correlations, and regression. Overall findings show no support for the three hypotheses, but they provide answers to the research questions. Specifically, manipulated education was not related to knowledge, attitude, or behavioral intention, but it was positively associated with cognitive load and boredom. Both cognitive load and boredom were inversely related to collective knowledge and attitudes, but only load was positively associated with behavioral intention. Cognitive load had a greater negative influence on outcomes than boredom. In contrast, perceived education was positively related to outcomes. Perceived entertainment was positively related to knowledge and behavioral intentions, but it had no relationship with attitudes. Finally, theoretical and practical recommendations are provided for future EE television programs and studies.

For Patricia and my family

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KEY TO ABBREVIATIONS

ANCOVA	--	Analysis of Covariance
ANOVA	--	Analysis of Variance
EE	--	Entertainment-Education

Introduction

The last twenty years have witnessed the development of a new process of social, behavioral, and health change entitled entertainment-education (EE) (Singhal & Rogers, 1999). Simply put, EE is the process of intentionally embedding prosocial, educational content in traditional entertainment media (i.e., television, radio, print) and genres (i.e., soap opera, game shows, etc.) in order to affect audiences' knowledge, attitudes, behavioral intentions, and practices about a particular issue. Since EE is not limited to only health issues, it also can be used to promote skills and community awareness of "political, social, and economic aims" (Fisher & Melnik, 1979, p. xiv). Regardless of the issue, EE is a strategy, not a theory; its use relies on conceptual frameworks, like Social Learning Theory (Bandura, 1977, 1986), to provide guidelines for constructing EE messages, understanding psychological processes, and evaluating intervention effectiveness.

Until now, researchers have focused on the effects of entertainment-education campaigns in order to document the strategy's impact, rather than building conceptual frameworks that aid to explain EE's effects. With a growing body of literature on EE's successes, some scholars have begun to shift some of their attention away from effects-based research to theory-building research in an attempt to understand why EE may or may not work (Brown & Cody, 1991; Lozano, 1992; Lozano & Singhal, 1993; Singhal & Rogers, 1999; Svenkerud, Rahoi, & Singhal, 1995). Much work needs to be accomplished in order to understand and construct a comprehensive, testable model that explains and

links the underlying psychological mechanisms that motivate audiences to change health behaviors after exposure to an EE intervention.

One of the first tasks that researchers must perform in order to develop theories and models about EE to understand the role of education. For the most part, the entertainment component of entertainment-education has received greater attention than the educational component (Singhal & Rogers, 1999; Singhal, personal communication, 2002). That is, most EE researchers have focused on examining the processes through which entertainment stimulates audiences to change (i.e., uses and gratifications, identification, involvement, affective responses, etc.). Unfortunately, very little focus has been on understanding how educational content (i.e., what type?, how much?, etc.) also factors into the conceptual equation.

Because of the limited, but growing, research on theoretical underpinnings about EE, this dissertation will add to the theoretical literature on EE by addressing two questions: (a) what is the optimal amount of educational information in an EE program?, and (b) how might educational theories of cognitive load and boredom explain the relationship between education and outcomes? Further, this dissertation supplements the EE literature by providing one of the first controlled experimental studies in the field. In terms of the first question above, this investigation determines experimentally the most appropriate and effective amount of education that should be inserted into an EE program in order to have the greatest impact on knowledge, attitudes, and behavioral intentions about a health issue. In other words, what proportion of an

EE program should be educational versus entertaining to have maximum impact on intended outcomes? How much education can be squeezed into an EE intervention before the audience begins to ignore the informational, health messages? And does increasing educational content over a certain point lead to diminishing returns? Theoretically speaking, this first goal is important because researchers have given very little attention to this issue, and virtually no research exists that empirically documents what educational dosage an audience can tolerate in an EE program (Singhal, personal communication 2001).

In terms of the second question above, this research explores the relationship between education and outcomes (i.e., knowledge, attitudes, and behavioral intentions) by examining theories previously not applied to EE. In the past, entertainment and mass media theories have been applied to explain EE's effects (Fielitzen & Linne 1975; Horton & Wohl, 1956; Katz, Blumler, & Gurevitch, 1974; Rubin & Perse, 1987; Rubin, Perse, & Powell, 1985). However, educational learning theories, which discuss cognitive load and boredom, may provide additional clues as to how and why the amount of educational information in an EE intervention can motivate or inhibit change in knowledge, attitudes, and behavioral intentions. In other words, can too much education in an EE program result in too much cognitive load, which in turn detrimentally influences changes in outcomes? Or if audiences are bored, as a function of too much information, will they be less motivated to learn, develop favorable attitudes and intentions, and perform positive behaviors? What cognitive variables best explain the effectiveness of an EE intervention? Conceptually speaking, these

variables have not been collectively measured or studied in an EE experiment previously.

Finally, this study provides one of the first true experimental tests of EE's effectiveness. Although quasi-experimental and non-experimental investigations of large scale EE campaigns exist, problems with randomization, true control/comparison groups, and contamination are common. Granted that artificiality is a limitation here, however, a lab experiment can control for many conditions and provide more confidence in assessing causal relationships.

Overall, this dissertation consists of four sections. First, a review of literature pertaining to entertainment-education's background, the relationship between entertainment and education, and the theoretical frameworks is discussed from which hypotheses and research questions are generated (see Chapters 1, 2, 3, and 4). Second, the data collection methodologies are explained (see Chapter 5). Third, the results of the data analyses are reported (see Chapter 6). Finally, a dialogue of the conceptual and practical implications for future directions is offered (see Chapter 7).

Chapter 1

EE Background and Study Purposes/Goals

Overview

This chapter introduces the research documented in the entertainment-education field. Using this information, the foundation for this dissertation's goals is laid down.

Backdrop on Entertainment-Education

Entertainment-education is "the process of purposely designing and implementing a media message both to entertain and educate, in order to increase audience members' knowledge about an educational issue, create favorable attitudes, and change overt behavior" (Singhal & Rogers, 1999, p. 9). Stated slightly differently, EE involves the design and implementation of media programs that incorporate persuasive, educational content in popular entertainment formats to influence audience members' knowledge, attitudes, and practices regarding the educational topic (Church & Geller, 1989; Singhal, Rogers, & Brown, 1993). More than altering knowledge, attitudes, and practices, entertainment-education serves as a channel for social change because many "public issues rely heavily on the media as a source of accurate information and a forum in which to debate it constructively to raise public awareness of problems, to consider options and to build a consensus about appropriate action" (Chadwick, 1998, p. 1). Ultimately, the purpose of EE is to contribute to directed social change, which is the process by which an alteration

occurs in the structure and function of a social system at the individual and community level (Singhal & Rogers, 1994).

A number of different reasons can be documented for the further development of the entertainment-education field. First, some research shows that traditional campaigns and commonly utilized theories of change are limited and often times are ineffective (Freudenberg, Eng, Flay, Parcel, Rogers, & Wallerstein, 1995; Lapinski & Witte, 1998; Rogers & Story, 1987; Wallack, 1990). Because campaign designers, scholars, and governmental officials spend large amounts of time, money, and energy to implement interventions only to realize later that they may be ineffective, they continually search for alternative approaches, such as entertainment-education. Second, an identified problem in mass media programming is to overly embed educational content to the point that audiences are "turned off" (Singhal & Rogers, 1999). Because of the strong emphasis on education, or information only, audiences appear unable to engage themselves with the mass media messages. This problem, labeled boredom-education, also identifies the need to include entertaining designs in the educational content. Finally, another problem, called entertainment-degradation, bolsters the growth of entertainment-education. Entertainment-degradation is a growing attempt to "degrade a message in order to increase its entertainment attractiveness" (Singhal & Rogers, 1999, p. 11). For example, an emphasis on sex, violence, and abuse in mass media attracts audience viewers, but it may degrade the value of the message as it produces antisocial effects or overpowers any prosocial message. Because studies have documented the antisocial,

degrading effects of the mass media (Brown, 1991), the potential and use of entertainment-education to yield prosocial impacts provides a counterpoint to overcome entertainment-degradation. Because of campaign ineffectiveness, boredom-education, and entertainment-degradation, public health practitioners, academic scholars, and governmental agencies are seeking out EE for the purposes of social change.

Although combining entertainment with education is not a new phenomenon, the intended use of entertainment-education as a process of social change is a relatively new concept (Singhal & Rogers, 1999). Bouman (1998) writes "the road to the roots of entertainment winds back into (pre)historic times, and leads through diverse landscapes of film and television, theatre, song, dance, and storytelling...all prove that entertainment has always been an integral part of human life, gratifying the need for amusement as well as the need for information" (p. 23). Additionally, Brown (1992) contends that peoples with rich oral traditions have historically used folktales with moral messages as a means of informal education. Only in the last two decades have researchers specifically begun to use entertainment media, such as television, radio, music, comic books, or live theater, as a vehicle to disseminate information and to educate the public about health and social issues (Montgomery, 1989; Shefner & Rogers, 1992; Singhal & Rogers, 1989; Winsten, 1994). Rather than disseminating information in traditional public service advertising, news programs, or educational documentaries, entertainment-education is a type of modern-day storytelling embedded in mass media marketing of ideas related to health promotion and

awareness (Rice & Atkin, 1989; Wallack & Dorfman, 1992). Regardless of its place in time, the entertainment-education strategy has moved from the older tradition of oral history to the multi-media, audiovisual lifestyles of modern-day communities.

Entertainment-education is becoming more commonplace domestically and internationally because the immense popularity of EE's storytelling approach has allowed a number of campaigns to be successful around the world (Backer, Rogers, & Sopory, 1992; Kincaid, Yun, Piotrow, & Yaser, 1993; Piotrow, 1994; Singhal & Rogers, 1989). In 1997, an estimated 75 entertainment-education campaigns had been implemented in more than 40 countries (Brown & Singhal, 1999). Ever since the mid-1970's, entertainment-education strategies in Mexico, India, Nigeria, Pakistan, Philippines, Turkey, the Gambia, Tanzania, and Egypt have addressed the issues of adult literacy, family planning, sexual responsibility, gender equality, and HIV prevention. Domestically, social issues, such as drunk driving, gay and lesbian rights, AIDS, child abuse, and drug use have been and are targeted in single entertainment-education messages or as long-lasting, reoccurring communication in a multitude of episodes (Backer & Rogers, 1993; Montgomery, 1989). For example, two of the most successful entertainment-education strategies in the United States were/are the Harvard Alcohol Project for Designated Drivers (Reinerman, 1988; Winsten, 1990, 1994) and Children's Television Workshop's Sesame Street (Children's Television Workshop, 1987; Lesser, 1974).

Purposes and Goals

Regardless of the setting or issue, several researchers have pointed out limitations in the EE strategy. Some scholars claim that EE studies overstate and misinterpret findings (Sherry, 1997). Others critique that entertainment-education's effects are limited to the individual level and produce only small short-term change. A few individuals point out that no true experimental tests of the entertainment-education strategy exist to confirm the validity of the claims. Most importantly, the field lacks a comprehensive theoretical framework (Singhal & Rogers, 1999; Yoder, Hornik, & Chirwa, 1996). Collectively, these critics shed light on how the field needs theoretical development through experimental testing, which are the core aims of this investigation.

The first purpose of this study is to add to the limited theoretical literature on EE by accomplishing two goals. Early researchers were primarily interested with the evaluation of EE's effects to develop credibility for the field by showing that EE interventions could be designed effectively to change audience knowledge, attitudes, behavioral intentions, and behaviors (Brown & Cody, 1991; Singhal, 1990; Singhal & Rogers, 1994; Valente, Kim, Lettenmaier, Glass, & Dibba, 1994). Singhal and Rogers (1988, 1999) explain that only since the mid-1980's have academic communication scholars begun to consider the potential study of how and why certain theoretical constructs in the entertainment-education setting may or may not change audiences. A few researchers are now attempting to provide loose theoretical frameworks for entertainment-education by identifying and combining key conceptual variables from established

theoretical frameworks from other disciplines (Brown & Cody, 1991; Lozano, 1992; Lozano & Singhal, 1993; Svenkerud, Rahoi, & Singhal, 1995).

For the most part, the development of theories about EE have been strongly influenced by examining and understanding the entertainment in EE, not the education, due to the importance of attracting audiences, maintaining ratings, and developing profits (Sabido, personal communication, 2001). From a practical stance, EE scholars have been applying ideas from mass media communication to understand how identification, parasocial interactions, uses and gratifications, affective arousal, and other related concepts influence audiences from an entertainment perspective when building models about EE.

On the other hand, very little effort has been allotted to examining the educational component of EE interventions to construct a comprehensive theory. Generally speaking, scholars and practitioners have known that their EE interventions must have entertainment value and educational content in order to be effective. However, determining just how much education should be included in an EE program has not been determined, which is the first goal of this dissertation. McGhee (1980) comments, "we simply have not yet discovered the right 'formula' to make informative programming interesting and popular to the mass of viewers" (p. 184). Even though two decades have passed, Singhal (2001) emails, "nobody has dared so far to outline a formula for combining entertainment and education; although there seem to be advantages to gain the synergy of both!" As a result, psychological issues like boredom and cognitive load that are linked to the type and amount of educational information have been

overlooked during the process of theory development for EE. As such, the second goal of this investigation is to apply the theories of cognitive load and boredom to understanding the role of education in entertainment-education. Regardless of the approach to theory development (i.e., entertainment or education), a comprehensive theory that explains EE's effectiveness still does not exist and more work needs to be done (Papa, Singhal, Law, Sood, Rogers, & Shefner-Rogers, 1998).

The second purpose of this investigation originates from another criticism of entertainment-education – that no causal claims can be made about EE because no controlled experiments have yet to be conducted. Controlled experimental testing of EE programs, which can provide greater confidence in results and interpretations of causal relationships, does not exist. Although a variety of methodologies (i.e., posttest-only surveys, content analysis, focus groups, interrupted times series, panel studies, etc.) are used to evaluate entertainment-education interventions, very few experiments that assess causality have been conducted since the 1970's (Singhal & Rogers, 1999). In reality, these few "experiments" are quasi-experimental because the treatment and comparison (control) groups are not randomly assigned, but rather pre-existing groups of participants are placed into conditions. Ethical considerations (Brown & Singhal, 1990, 1993), a lack of control over the treatment condition, and contamination are the major reasons that researchers have had a difficult time conducting controlled experiments with entertainment-education in the field.

Because of this limitation, the third goal of this study is to conduct a controlled experiment that may assess EE's effectiveness at changing health outcomes.

Overview of the Study

The primary question of interest in this study's experiment is how much educational content should be inserted into an entertainment-education program in order to be optimally effective in promoting health outcomes. Therefore, the amount of educational content is systematically varied across four conditions to assess how the quantity of educational content in an EE program affects outcomes.

This study has three types of measured variables (i.e., independent, intervening, and dependent). Education is the manipulated, independent factor which is defined in chapter 2. The dependent outcomes are knowledge, attitudes, and behavioral intentions, which are also three of the more commonly measured outcome variables in a health-related intervention. Knowledge can be conceptualized as a body of facts accumulated by a person in a course of time which allows one to apprehend the truth through reasoning about objects, actions and events, about performance, and what we know (Clarke, 1992). With knowledge, researchers can determine accurately if individuals have learned or obtained new information because a correct versus incorrect (i.e., truth) response can be measured. Attitudes are typically defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). Generally speaking, an attitude is an evaluation of an object, recommended response, or event. Behavioral intentions

are an individual's plan to carry out a recommended response or perform a certain behavior, or as Fishbein and Ajzen (1975) stipulate, they are decisions to act in a particular way. The Theory of Reasoned Action (Ajzen & Fishbein, 1975) posits that behavioral intention is theorized to be the immediate determinant of behavior. A meta-analysis of the Theory of Reasoned Action (Sheppard, Hartwick, and Warshaw, 1988) found an average correlation of 0.53 between behavioral intention and the performance of behavior. The significant correlation indicates that behavioral intention may serve as a proxy for behavioral measurement since behavior is not directly assessed in this study. Finally, cognitive load and boredom are the intervening, mediating factors which aid to potentially explain the relationship between amount of educational information in an EE program and the health outcomes. Both of the intervening variables are defined further in Chapter 3.

None of these factors has been measured or analyzed collectively in a single study. By including all of these variables in a single study, we can begin to construct conceptual frameworks about EE from an educational perspective. Although EE can be disseminated through different media, a television program is the selected EE intervention for this study. Future conversations about EE in this dissertation are limited to this medium.

Chapter 2

Entertainment Versus Education

Overview

This chapter outlines what entertainment and education are by (1) defining the two constructs, (2) discussing the relationship between them, and (3) previewing education's influence on knowledge, attitudes, and behavioral intentions through television. Collectively, this information sets up the theoretical frameworks explicated in Chapter 3.

Definitions of Entertainment and Education

Although a definition of entertainment-education has been previously offered, explicating each term is important even though this study focuses on the educational component of an EE intervention.

Some of the initial work on entertainment media began with a list of characteristics (i.e., affect, amusement, arousal, enjoyment, empathy, fantasy, fun, gratification, novelty, ritual, symbolism, vicarious experience, etc.), which described the attributes of entertaining shows (Tannenbaum, 1980). From these lists, 28 definitions of entertainment have been created and are found in the literature (Singhal & Rogers, 1999). Of these conceptualizations, Singhal and Rogers (1999) offer a commonly cited definition, which is also the explanation used here, as they point out that entertainment is a "performance or spectacle that captures the interest or attention of individuals, giving them pleasure and/or amusement" (p. 10).

Based on this definition, a television program must fulfill three criteria in order for it to be considered entertainment. First, the show must capture and maintain the attention and interest of the viewer. Second, the fare needs to elicit a sense of pleasure or amusement for the audience. Finally, the program should arouse emotion in the individual. Within the boundaries of television EE, a show, which is able to perform all three of these functions, can motivate audiences to change when inserted with pro-social, educational information. So, what is "education" within the context of EE?

A number of definitions exist in the literature, which characterize education based on type (i.e., informal versus formal), location/delivery system (i.e., classroom versus distance learning), and/or level (i.e., individual, community, or societal) (Jamison & McAnany, 1978). A more concrete definition, which is also applied here, is a formal or informal program of instruction or training that has the potential to develop an individual's skill to achieve a particular end by boosting his or her mental, moral, or physical powers (Singhal, 1990). Most explanations, along with Singhal's (1990), typically suggest that (a) our brains are probably never inactive, thereby having the ability to process information and adapt to our environment and (b) learning through education implies "creating intentions that have decision making and action implications" (Singer, 1977, 1980, p. 36). Both of these assumptions ultimately point out that educated audiences are active learners who process information and have the ability to change.

Based on this definition, a television show must fulfill two criteria in order for it to be considered educational in the EE context. First, the viewer must be

informed of the important issues related to the pro-social health topic (i.e., HIV is a virus which can be transmitted through unsafe sexual activity, HIV causes AIDS, etc.). Second, the program should provide the audience with a set of skills to deal with the pro-social health topic. For example, a television drama might provide the following instructions. Before having sexual activity, a female should (a) talk to the male partner about previous behavior, (b) ask the male partner to use a condom, and (c) discuss relevant issues with a doctor or an older, experienced family member. When both of these conditions are met, the educational television intervention may motivate audience change because it increases knowledge. However, we do not know if it needs to be perceived as entertaining as well in order to motivate behavior change.

The Relationship Between Entertainment and Education

The interplay between entertainment and education can be difficult to isolate and understand at times. Even though the previous discussion provides independent definitions for both, in reality the line between entertainment and education may not always be so clear. As a result, we should focus on two differences (i.e., manipulated versus perceived), which better expose the relationship between the two constructs.

Manipulated education in this study theoretically can be conceptualized as objective inputs. When producers, directors, and writers intentionally create a television drama with a certain amount pro-social educational content, they have consciously manipulated the amount of education. Operationally speaking, entertainment and education may be involved in zero-sum game where an

inverse relationship exists between the two (Sabido, personal communication 2001). If a show strategically is designed to be highly entertaining, then by definition, it must contain a low amount of educational content or vice-versa. EE television programs try to follow a 60-70% versus 40%-30% diet between entertainment and manipulated education in order to have an effect on knowledge, attitudes, and practices using previous, successful EE interventions, like the Archers in England, as a baseline (Sabido, personal communication 2001, Singhal & Rogers, 1999).

However, even well intended EE efforts often times produce unintended effects which may be detrimental (Singhal & Rogers, 1999). Since audience perceptions about how entertaining and educational a program is may differ from what the writers and directors conceptualized objectively, changes (i.e., good or bad) in outcomes may be different than originally intended. As a result, perceived entertainment and perceived education may be conceptualized as subjective outputs.

Since perceived entertainment and perceived education are perceptions, they, no longer play a zero-sum game. Instead, a matrix, as illustrated in Figure 1, best represents their relationship. Viewer perceptions can be categorized into one of four quadrants based on how entertaining and educational a drama is when the anchors of each axis are high versus low. In quadrants one and four, individuals may perceive the show to be both highly entertaining and high educational or just the opposite-not very entertaining and educational. In each of these cases, audiences have a congruent perceptual level. Of course, varying

levels of mixed perceived entertainment and perceived education are also possible (i.e., quadrants two and three). Because of these differences, this study manipulates education (in minutes) and measures perceived entertainment and perceived education (self-report items) (see Chapter 5).

To summarize the relationships between entertainment, education, and outcomes, we can draw a path model which links them together (see Figure 2). This model shows that individuals are first exposed to an EE program which has objective levels of education. Then, viewers may simultaneously perceive how entertaining and educational a program is. If the EE show is perceived to be entertaining, then audiences may also begin to assess the educational level of the program or vice versa. Depending on the amount of educational information perceived, changes in knowledge, attitude, and behaviors may occur. In others word, objective education may have an indirect influence on outcomes while perceptions may have direct impact on prosocial change.

The Effects of Television Education

With a basic understanding of education versus entertainment and different types, let us shift our attention to what type of educational impact television EE, or television in general, can have on its audiences. Since this dissertation only examines educational effects, the discussion is limited to changes in knowledge, attitudes, and practices. Overall, studies show that entertainment television, especially with intended educational insertions, can and does produce favorable changes in audience outcomes under certain conditions (Singhal & Rogers, 1999; Valente, 1997; Zigerell, 1991). On the other hand,

some scholars point out that entertainment television programming contains large dosages of antisocial messages that viewers may learn and begin to adopt, thereby suggesting the need for more research (Bryant & Zillman, 1986, 1994; Greenberg, Abelman, & Neuendorf, 1981; Greenberg & Busselle, 1996; Zillman & Bryant, 1982). However, only studies that discuss prosocial impact are highlighted in this context so that claims about television's educational effectiveness can be made.

Most people deliberately expose themselves to television programming, not to seek information, but to be entertained (Tannenbaum, 1980). Mendelsohn (1966) explains that "when most people are confronted with a choice between deriving pleasure from serious non-entertainment fare or from non-serious entertainment fare, they will choose the latter in much greater proportion than the former" (p. 143-144). McGhee (1980) concurs with this sentiment as he claims that even light entertainment programs are more attractive to audiences than educationally orientated programs. Some researchers claim that audiences can be educated and motivated by any type of moderate entertainment show, especially one that is perceived as highly entertaining, even if unintended by the source and unnoticed by the audience (Chaffee, 1998; Piotrow, Kincaid, Rimon, & Rinehart, 1997; Singhal & Brown, 1996; Wang & Singhal, 1992). As a result, Piotrow (1990) point out that the mass media, like television, tell us to how to dress, speak, think, and behave. In other words, television entertainment can have intended and unintended impact on audience knowledge, attitudes, and practices about a particular prosocial issue (Bouman, 1998).

With respect to learning outcomes, a series of investigations were initiated in the 1960s and 1970s, measuring student knowledge, attitudes about specific educational content, and testing performance as a function of entertaining television and video exposure (Chu & Schramm, 1975; Purdy, 1978; Reid & MacLennan, 1967). Generally speaking, findings supported the contention that individuals "mastered a certain amount of content or set of skills," and students "often leave with their attitudes toward the subject matter and its value changed" (Zigerell, 1991 p. 120). Specifically, Gibbon, Palmer, and Fowles (1975), and Lesser (1972, 1974) wrote about evaluation efforts which analyzed Sesame Street and The Electric Company, two programs created by Children's Television Workshop. In these entertainment shows, children were exposed to highly animated, musical, humorous, and colorful characters, attempting to teach young viewers, that captured children's attention and provided an effective means to educate (Lesser 1972, 1974). Lesser (1974) writes, "the major finding-that children who watched more learned more-held true for children of different ages, sexes, geographical locations, socioeconomic statuses, and IQ's, as well as for children watching either at home or at school" (p. 220). Kaplan and Pascoe (1977) found that the use of entertaining and humorous examples improved long-term retention of educational information, and humor facilitated children's learning (Hauck & Thomas, 1972). These examples began to provide evidence that entertaining television shows could have positive impact on children's knowledge and testing behaviors, but what about television's educational effects on adults?

Advertising scholars have provided data about how entertaining television commercials, which contain humor, are effective at persuading adult audiences to change attitudes and behaviors about products. Phillips (1968) and Weingarten (1967) point out that humor, as a component of entertainment, increases product sales, and other studies show a positive, correlative relationship between humor, commercial information retention, and attitude change (Markiewicz, 1972; Taylor, 1972).

Researchers on persuasive processes began to study vividness (i.e., imagery-provoking, colorful, sensory, pictorial, etc.), as a characteristic of video entertainment, and showed that more vivid television entertainment content increased interest and attention by viewers (Eagly & Chaiken, 1993). Since vivid information can attract and hold viewer attention, a number of investigations pointed out that media messages which were highly entertaining as a function of vividness could have persuasive impact on knowledge and attitudes under certain conditions when used in health appeals (Nisbett & Ross, 1980; Robberson & Rogers, 1988; Rook, 1987; Sherer & Rogers, 1984).

The greatest amount of research on EE's prosocial effects is found in the literature with adults. For example, an evaluation (i.e., 1993-1997) of a Tanzanian EE intervention indicated strong, positive changes in knowledge, attitudes, and practices about family planning. Knowledge about family planning methods increased from 67% to 81% in the treatment group. A five percent shift in those who were exposed was observed in attitudes (i.e., "always approved of family planning methods"), and 11% more (i.e., 26% to 37%) married women in

the target audience after the EE intervention reported always using family planning methods (Singhal & Rogers, 1999).

Collectively, this review shows that (a) educational information in an entertainment television show can have prosocial impact on knowledge, attitudes, and behaviors, especially when the program is perceived as entertaining and (b) typically those exposed (i.e., more information) versus not exposed (i.e., no or less information) are more likely to change as a function of educational content-that is as amount of education increases knowledge, attitudes, and practices also change incrementally.

At the same time, these investigations (a) do not discuss the underlying psychological, theoretical mechanisms, which explain how and why educational content is processed and (b) do not explicate the type of relationship (i.e., linear versus non-linear) between education and outcomes other than suggesting that more educational information typically results in positive changes. As a result, the following chapter introduces two key intervening variables (i.e., cognitive load and boredom), which have been shown in other settings to moderate the association between education and outcomes, and applies them to EE television interventions.

Chapter 3

Theoretical Foundations: Cognitive Load and Boredom

Overview

Two bodies of conceptual frameworks are discussed in this chapter. Theories of Cognitive Load and Boredom are reviewed in order to understand how these two cognitive, psychological variables can moderate the relationship between education and health outcomes. For each conceptual framework, definitions, explanations, examples, and applications to television EE are offered.

Cognitive Load

The concept of cognitive load has received much attention in the educational psychological literature (Jeung, Chandler, & Sweller, 1997). Cognitive load is defined as the demand made by a task on an individual's mental effort for the successful completion of that task (Halford, 1993). Researchers have developed a conceptual framework, called Cognitive Load Theory (Sweller, 1989, 1993; Sweller & Chandler, 1994), which explains how cognitive load affects information processing, learning outcomes, and memory. Moreover, this theory helps to explain the relationship between (a) education and cognitive load and (b) cognitive load and outcomes.

Cognitive Load Theory (Sweller, 1989, 1993; Sweller & Chandler, 1994) provides a lens with which to understand an individual's cognitive structures that allow one to process information from the external environment. After a person has been exposed to external stimuli, he/she begins to process and understand the message's content. This cognitive act works on the premise that: (a) people

possess a limited working memory (Miller, 1956), (b) individuals have an immense long-term memory (Chase & Simon, 1973), which contains schemas for learning (Chi, Glaser, & Rees, 1982; Larkin, McDermott, Simon, & Simon, 1980), and (c) humans can automatically process information (Kotovsky, Hayes, & Simon, 1985).

When the individual begins to process the stimuli in order to understand its message and complete tasks, Sweller (1989) and Halford (1993) argue that he/she must operate within a limited cognitive space found in his/her working memory. Located within specific loci of the brain which neurological interact is a finite amount of cognitive resources, defined as an individual's ability or power to deal with a task (Halford, 1993). Because of the limited resources, individuals can get exhausted as the abilities become depleted and the limited space becomes loaded or demanded with too much information, resulting in cognitive load (Halford, 1993). Given that a person's working memory is limited in space and resources, optimal utilization of cognitive resources is essential to learning. If not, the brain tires out, shuts down, and ultimately stops processing more information.

While the theory can appear to be abstract, it does provide some practical points for understanding the relationships between education, cognitive load, and outcomes. Chandler and Sweller (1992) conclude that many things related to external stimuli can load the brain's working space, thereby moderating learning (i.e., comprehension, knowledge acquisition, and recall). For example, the inherent complexity of the message/problem itself, the delivery channel,

instructional format, and informational volume can lead to cognitive load. When individuals are required to direct attention to multiple stimuli, or sources of information, the need to integrate different, too much, and difficult educational information can create extraneous cognitive load and diminish existing cognitive resources within a given time frame. Until this point (i.e., resources and the cognitive working space are available), increases in educational information in a given time period lead to direct processing of content, thus observing changing in outcomes. After a certain point (i.e., resources and the cognitive working space are used up), increases in educational information do not elicit a linear change, but rather an individual's rate of change gradually slows down and produces a law of diminishing returns on learning outcomes. Thus, a curvilinear, ogive (i.e., small r shape) relationship exists between amount of education and cognitive load[1]. However, what does Cognitive Load Theory (Sweller, 1989, 1993; Sweller & Chandler, 1994) tell us about the relationship between cognitive load and knowledge, attitude, and behavior?

Studies of Cognitive Load Theory (Sweller, 1989, 1993; Sweller & Chandler, 1994), which evaluate cognitive load and its impact on outcomes (i.e., knowledge gain or behavioral performance on exams) by altering various factors (i.e., delivery format, difficulty of the task, time frame, content volume, number of messages, etc.), provide greater certainty in the theory and suggest a non-linear association (Blessum, Lord, & Sia, 1998; Iselin, 1989; Jeung, Chandler, & Sweller, 1997; Mousavi, Low, & Sweller, 1995; Pillay, 1997). Singer (1980) points out that after a system is overloaded one experiences a blur and "cannot

take time for replaying so that information can go from short to long term," thereby eventually producing limited changes in outcomes. In other words, until the brain is overloaded, the use of cognitive resources can produce a linear relationship between cognitive load and knowledge, attitudes, and behaviors. Over time, mental resources become depleted, the limited working memory becomes overloaded, and the brain can not continue to process information at the same rate as before the brain became overloaded. Other researchers also claim a non-linear relationship between load and outcomes. McCall and McGhee (1977) and Kagan (1967, 1971) conclude that non-linear associations exist between cognitive load (i.e., mental effort) and learning (i.e., attention and comprehension) with moderate levels of effort by the viewer having the most impact. As a result, a curvilinear relationship emerges which has a law of diminishing impact (i.e., ogive, small r-type curve) between cognitive load and outcomes.

With this review of cognitive load, we can now briefly discuss it in the context of television EE. Individuals who are exposed to EE television programs can potentially become overloaded with intentional, inserted educational information and entertaining stimuli. In other words, load is a byproduct of being exposed to, processing, and understanding educational and entertainment content. Piaget (1952, 1962) claims that processing entertainment and educational content exercises one's mental capabilities in an attempt to understand real life objects and events, and McGhee (1979) argues that

organisms enjoy processing information which requires some optimal, moderate effort for meaningful comprehension.

When watching a television EE drama, viewers are required to analyze many different stimuli, like characters, story lines, relationships, messages, recommended behaviors, etc., in order to understand the program and be able to apply it to their own life. However, the sheer volume of different entertainment characteristics and educational information can overload the viewer. Although watching an EE television program does not constitute a task per se, exposure to and processing of the same educational topic in a given time period can result in topic specific cognitive load, or topical saturation. This study, then, is dealing with topic specific load by varying objective amounts of education in the four treatment groups. After a certain point, there would be diminished effectiveness on knowledge, attitudes, and behaviors as the brain begins to temporarily shut down due to too much cognitive load. Keep in mind though that individual differences may explain why certain individuals prefer heavy-educational loaded content programs, thereby producing changes in outcomes.

Boredom

Boredom is a documented construct in a multitude of areas, and it has been approached from a variety of philosophical, sociological, and psychological perspectives (Caldwell, Darling, Payne, & Dowdy, 1999). Though the research on boredom is limited and the concept is largely unexplored (Vodanovich & Watt, 1999), a growing body of studies shows boredom's negative impact on many outcomes in the areas of education, organizational psychology, training and

management, and interpersonal relationships (Maroldo, 1986; Robinson, 1975). Before these studies' results can be discussed, the two major perspectives (i.e., psychological and social control), or theories of boredom, must be presented. These theories (a) provide a concrete definition of boredom that can be applied in this dissertation, (b) suggest a relationship between education and boredom, and (c) show an association between boredom and outcomes.

The first set of theories about boredom is based in psychology. Researchers there claim that boredom stems from (a) a lack of awareness, or knowledge, of stimulating activities during leisure time (Iso-Ahola & Weissinger, 1987), (b) a lack of intrinsic motivation to act on the desire or want to reduce boredom (Iso-Ahola & Weissinger, 1987; Weissinger, Caldwell, & Bandalos, 1992), and (c) a discrepancy between a person's skill and the challenge of the task at hand, or aptly labeled as the Understimulation Model of Boredom (Csikszentmihalyi, 1990; Larson & Richards, 1991).

Briefly, the first psychological boredom theory suggests that when humans are faced with free time they do not know what type of stimulating activities to pursue because they have been constantly told what to do by others. In this case, people may lack the ability to identify changes that could be made when they have leisure time (Caldwell, Darling, Payne, & Dowdy, 1999). The lack of intrinsic motivation perspective claims that individuals become bored because they do not have the drive, or self-determination, to find mechanisms with which to reduce their state of boredom. According to this idea, individuals may not be able to perceive ways in which they could act on a desire to alleviate boredom

(Caldwell, Darling, Payne, & Dowdy, 1999). Finally, the Understimulation Model of Boredom advocates a mismatch between one's skill and the challenge at hand. Individuals become bored when the task at hand does not fully make use of a person's cognitive skills, thereby being understimulated (Keating, 1990).

While these explanations have their share of advocates, social control theories of boredom may better serve as an explanatory framework in this investigation because they include mental effort. Social Control Theories of Boredom, in particular the Forced Effort Theory of Boredom (Larson & Richards, 1991), discuss how boredom originates from routine aspects of performing a task. This perspective suggests that individuals are likely to become bored because they are restricted in their freedom to perform tasks, thereby causing the tasks to become routine and repetitive. During the activity, individuals are forced to expend cognitive energy and effort on tasks construed as homogenous.

Based on the social control orientation, boredom can be defined as "an aversion for repetitive experience of any kind, routine, dull work...under conditions when escape from constancy is impossible" (Zuckerman, 1979, p.103). This conceptualization is expanded by Mikulas and Vodanovich (1993, p. 3) as they explain that boredom is "a state of relatively low arousal and dissatisfaction, which is attributable to an inadequately stimulating situation." These definitions summarize and provide three criteria for determining if and when a person is bored while watching a television EE show. First, they suggest that boredom is an ephemeral state, which is transitory and changing over time and situations (Watt & Ewing, 1996). For example, individuals may not be bored

initially while listening to a lecture, but over time they may become bored performing the same activity. Second, boredom arises from situations and tasks, which are perceived as repetitive and not stimulating, resulting in dissatisfaction. For example, students who attend a professor's lecture may find the act of listening and taking notes over the course of one hour as repetitive and unstimulating. Naturally, they become dissatisfied with the professor and get bored. Finally, boredom is a conscious condition, which requires individuals to exert cognitive energy to perform a task and to perceive the activity as dull. In other words, a person who expends mental effort is much more likely to get bored than someone who does not use as many cognitive resources.

With this conceptual backdrop on boredom, attention now can be directed to studies, which assess social control theories of boredom and the relationship between education, boredom, and outcomes. Similar to cognitive load, a curvilinear, ogive relationship exists between education and boredom and between boredom and knowledge, attitudes, and practices.

In educational psychology, research with preschoolers, high school students, and college students shows that boredom can have detrimental effects on learning and behavioral performance on tests, as indicators of academic achievement (Drory, 1982; Freeman, 1993; O'Hanlon, 1981; Maroldo, 1986; Robinson, 1975). These studies produce the following common results.

First, when children and teenagers in kindergarten through high school settings are exposed to increasingly greater amounts of information during an instructional period, their level of boredom increases to a point and then begins

to plateau off curvilinearly, like an ogive (i.e., small r shape) curve (Spann, 1992; Vodanovich, Verner, & Gilbride, 1991). In other words, as the volume of information increases within a given time period, children show immediate changes in learning outcomes (as evidenced by testing performance), but eventually the learning curve levels off. Although one can argue that the curvilinear association is really an inverted U shape because students become unbored after leaving the classroom, this study only examines knowledge, attitudes, and practices in the setting of the classroom. As a result, an ogive relationship best describes the relationship between education and boredom.

Second, a non-linear relationship can be found between boredom and intended outcomes. Studies show (i.e., Drory, 1982; Wlodkowski & Jaynes, 1992) unbored children and workers (i.e., truckers) are motivated to learn and perform favorably to a point until their attention span no longer allows them to continue. As individuals become bored, cognitive processing slows down due to depletion of mental resources and repetition of activity (i.e., listening to a teacher or driving a truck). Then, the linear relationship between boredom and knowledge, attitudes, and practices levels off as the rate of learning produces diminishing returns on changes in knowledge, attitudes, and behaviors. At this point, more boredom, if possible in the mind of the individual, can not lead to similar changes in outcomes. These studies show that low to moderate levels of boredom are more effective at producing intended behaviors in school or on the job, but the impact on performance is slowly diminished as the dull, activity continues (i.e., high boredom). Thus, an ogive relationship is observed between

boredom and outcomes. Further evidence for this relationship is offered by three experiments, which showed boredom as a limiting condition on exposure effects when dealing with educational learning outcomes (Bornstein, Cornell, & Kale, 1990).

Third, students typically experience two phases (i.e., unbored and bored) during instruction (Harrington-Lueker, 2000; Wlodkowski & Jaynes, 1992). Initially, students are not bored and later they may transition into a state of boredom as the amount of information continues to increase. The point between unboredom and boredom can be attributable to cognitive perceptions about the activity at hand being dull, repetitive, and unstimulating. Boredom is not alleviated until after the lecture when the student has the choice to spend cognitive energy on other arousing activity. Because of the two different phases, the rate of learning during both is different. Students learn more (i.e., faster, linear rate of learning) during their unbored phase (i.e., low to moderate) as evidenced by higher test scores. On the other hand, students know less (i.e., slower, non-linear rate of learning) about lecture information when it is discussed after boredom (i.e., moderate to high) occurs as demonstrated by inadequate performance on tests. Because the rate of learning has been found to be faster during the unbored phase as compared to the bored phase (Bijmolt & Wedel, 1995; Spann, 1992), relationships between education, boredom, and outcomes (i.e., knowledge and testing performance) appear to be curvilinear.

Another set of studies from a clinical perspective points out the relationship between boredom, attitudes, and behaviors. Overall, a strong

relationship exists between the degree of boredom and an attitude and/or behavior. In certain examples, boredom is reported to have a significant, positive association with attitudes about depression, anxiety, hopelessness, and loneliness (Farmer & Sundberg, 1986; Vodanovich, Verner, & Gilbride, 1991; Watt & Vodanovich, 1992), such that as boredom increases, so does the level of negative affect and conditions (i.e., depression, anxiety, etc.). At the same time, certain behaviors (i.e., drug use, gambling, eating disorders, unprotected sex), which can be linked to some aforementioned attitudes, also have a strong, positive relationship with boredom (Abramson & Stinson, 1977; Arnett, 1990; Blaszcznski, McConaghy, & Frankova, 1990; Ganley, 1989; Samuels & Samuels, 1974). Although positive relationships between degree of boredom and attitudes/behaviors are documented, to what extent is the association linear versus curvilinear? In other words, does a law of diminishing returns exist on attitudes and associated behaviors if an individual can only be bored to a certain maximum point? The answer to this question appears to be yes as evidenced by recent studies on sexual boredom in interpersonal relationships. Although scholarship on sexual boredom does not directly relate to EE, television, or educational impact, research findings from this area may offer insight into how boredom, generally speaking, can influence attitudinal and behavioral change. By using the major results on sexual boredom as a baseline, we could better understand how boredom affects viewers of television EE and their attitudes and practices.

Scholars are particularly interested in understanding how sexual boredom in married couples influences attitudes about sex, commitment, termination, conflict, success, and divorce because boredom in this context can be viewed as a symptom of greater underlying problems in the relationship (De Chenne, 1988). Some studies show sexual boredom as being strongly associated with attitudes about and behaviors related to the termination of a marital relationship, loss of sexual interest in married middle aged couples and even dating couples who end their commitment (Counts & Reid, 1986; Gigy & Kelly, 1992; Hill, Rubin, Peplau, 1976; Hudson, 1974; Watt & Ewing, 1996). Regardless of the length of the relationship, these studies and others support the notion that sexual boredom can have detrimental impacts in the following manner. As the level of sexual boredom increases for partner A, the amount/degree of negative attitudes (and possibly behaviors) about person B and the relationship increase significantly in a linear manner until a point. Partner A has spent all of his/her cognitive resources attempting to alleviate the boredom, generating negative attitudes and desires, or performing destructive behaviors (i.e., intrapsychic conflict, tension) (De Chenne, 1988; Greenson, 1953). Over time, partner A has depleted resources with which to create new attitudes or behaviors. More boredom, if possible, at this point can only produce marginal changes, if any, in sexual, relational attitudes and relational behaviors because the limited cognitive energies have been used. Collectively, this research supports a curvilinear relationship between boredom and knowledge, attitudes, and behaviors.

Reviewing the literature on boredom allows us to apply it within the context of entertainment-education. Watching television can be a dull, unstimulating, boring activity depending on a drama's educational and entertainment content. For example, having too many educational topics in a program may be perceived as boring. On the other hand, characters and storylines which are not created, developed, or produced well can also potentially be dull and unexciting. In other words, boredom can be a function of entertainment value and/or educational content. Inserting large dosages of educational content, which may be perceived as dull and boring, may compromise the perceived entertainment value. Within a given time frame, certain characters and story lines may not be developed as adequately as they need to be in order to be highly entertaining. Although changes in knowledge, attitudes, and practices should be reported initially, over time only marginal effectiveness on intended outcomes may be observed with high levels of educational information.

Chapter 4

Hypotheses and Research Questions

Education and Outcomes: Hypothesis One

A review of the literature (see Chapters 2 and 3) suggests a law of diminished impact on health behavior outcomes (i.e., knowledge, attitudes, and behavioral intentions) as the amount of education increases in a given time period for an EE program. As education increases to a point, positive changes in outcomes should be reported. However, as the level of education continues to increase, the rate of change slows down (i.e., law of diminishing return). As a result, if different individuals receive varying levels (i.e., education level 1, education level 2, education level 3, and education level 4) of educational information in a specified time frame during a television EE program, the following predictions could be made:

H1: An ogive (e.g., small, r-shaped) relationship exists between education and the outcomes (i.e., knowledge, attitudes, and behavioral intentions) after exposure to an entertainment-education television program (see Figure 3) such that education level 4 will be equally effective as educational level 3 education which will be significantly more effective than education level 2 which will be significantly better than education level 1 at changing knowledge, attitudes, and intentions.

Education and Intervening Variables: Hypothesis Two

In order to understand why the relationship between education and outcomes is curvilinear, psychological research on cognitive load and boredom

was discussed (see chapter 3). From this review, the association between education and the intervening variables (i.e., cognitive load and boredom) is also constrained by a law of diminishing returns. As education increases, cognitive load should also rise until the brain finally shuts down when the level of cognitive load plateaus. Similarly, the rate of boredom increase should proportionally match the rate of educational increase until again the mind tunes out when the level of boredom levels off. As a result, if different persons view the same television EE show which has been manipulated on varying levels (i.e., education level 1, education level 2, education level 3, and education level 4) of educational information, the following hypothesis could be suggested:

> H2: An ogive curve (e.g., small, r-shaped) relationship exists between education and the intervening variables (i.e., cognitive load and boredom) after exposure to an entertainment-education television program (see Figure 4) such that education level 4 will be equally effective as education level 3 which will be significantly more effective than education level 2 which will be significantly better than education level 1 at changing cognitive load and boredom.

Intervening Variables and Outcomes: Hypothesis Three

Similar to the other set of relationships, research documents a law of marginal returns on outcomes (i.e., collective knowledge, attitudes, and behavioral intentions) as function of cognitive load and boredom as well. As a result, if different television EE viewers watching a program receive varying levels (i.e., education level 1, education level 2, education level 3, and education

level 4) of educational content during a specified time frame, the following predictions could be made:

> H3: An ogive curve (e.g., small, r-shaped) relationship exists between the intervening variables (i.e., cognitive load and boredom) and the outcomes (i.e. knowledge, attitudes, and behavioral intentions) after exposure to an entertainment-education program (see Figure 5) such that cognitive load and boredom level 4 will be equally effective as cognitive load and boredom level 3 which will be significantly more effective than cognitive load and boredom level 2 which will be significantly better than cognitive load and boredom level 1 at changing knowledge, attitudes, and intentions.

Relative Impact of Intervening Variables on Outcomes: Research Question One

Given that the literature on cognitive load and boredom posits the same type of association and impact with/on knowledge, attitude, and behavior, a central piece of the puzzle is left out. Researchers have yet to point out which of these two psychological variables has greater influence on changing television EE viewers' knowledge, attitudes, and behaviors when they, the viewers, are exposed to differing amounts of educational content. Therefore, the following research question must be addressed:

> RQ1: Which intervening variable, cognitive load or boredom, better explains collective knowledge, attitudes, and behavioral intentions?

Relationships Among Entertainment, Education, and Outcomes:

Research Question Two

When we try to understand the relationship between manipulated education and perceived entertainment/education, a few observations must be noted. First, inputs do not always match outputs. Manipulated, intended levels of education, while theoretically can, will, in reality, never correlate perfectly with perceptions. Second, which of the two (manipulations versus perceptions) is more critical to understanding outcomes when attempting to design and evaluate a television EE program? If the two do not match, then the power of perceptions may be more persuasive to the viewer and his/her decisions to change behaviorally. As a result, the following research questions are asked about the relationships among entertainment, education, and outcomes:

RQ2a: What is the correlation between manipulated education and perceived entertainment?

RQ2b: What is the correlation between perceived education and perceived entertainment?

RQ2c: What are the correlations between manipulated education and knowledge, attitudes, and behavioral intentions?

RQ2d: What are the correlations between perceived education and knowledge, attitudes, and behavioral intentions?

RQ2e: What are the correlations between perceived entertainment and knowledge, attitudes, and behavioral intentions?

Chapter 5

Methods

Experimental Design

A posttest only, experimental design was utilized with four treatment groups, where individuals were exposed to varying levels of education (i.e., education level 1, education level 2, education level 3, and education level 4) embedded in a 32-minute primetime television drama video containing a health education storyline on prostate cancer. By definition (see Chapter 2), this program fulfills the criteria of EE, and it can be labeled an EE show. (An in-depth explanation of each of the experimental conditions is provided later.)

This investigation had independent, intervening, and dependent variables. The independent variable was the amount of education in the EE program. The intervening factors were cognitive load and boredom. The dependent outcomes were knowledge, attitude, and behavioral intention.

Participants

Two-hundred-eighty undergraduate students (e.g., 80 for the pilot study and 200 for the study proper) were recruited from communication courses at a large Southern university. Two hundred participants (i.e., 50 per treatment condition) are more than adequate to ensure statistical power. Power analysis suggests that 39 participants per group are needed to achieve the conventional alpha and beta standards of .05 (two-tailed) and .80, respectively, for a four-group study with medium effect sizes expected (Cohen, 1988, p. 317). By

increasing the number of participants per group to 50, our power to detect differences, if they in fact exist, goes up to .90.

Stimulus Materials

Four different stimulus videos that differ in their level of health education were created and used. All stimulus materials were 32-minute edited videos from a popular American primetime television drama entitled NYPD Blue, which contains a health education storyline about prostate cancer over the course of nine one-hour episodes including commercials.

Generally speaking, this storyline is about a male character that is diagnosed with prostate cancer, is treated for the disease, and recovers from the experience. Since the show intentionally highlights the course of the character and his relationship with cancer (i.e., from early symptoms to diagnosis and surgery to coping/recovery), the drama fully represents the progressional gamut of the health problem.

In order to create the stimulus videos, a number of steps were taken. First, the researcher watched all nine episodes to determine the nature of the educational and non-educational content in the entire storyline by marking when and where in each episode any prostate cancer education was included (i.e., units of prostate cancer information). This step helped to operationalize educational content as any information about prostate cancer or any aspect of the prostate cancer storyline, which provided educational information about the disease. Using the entire scene as the unit of analysis helped to simplify the coding process because the scriptwriters intentionally set off each scene

containing any prostate cancer information between dramatic, non-educational sequences or transitional scenes. Therefore, any viewer of the storyline could potentially differentiate between all educational and non-educational scenes. This coding is unique from other content analyses due to the unit of analysis being the scene rather than each educational message. In order to create a coherent storyline, the unit of analysis had to be the entire scene.

To ensure that the researcher had included accurately all of the educational content in the storyline, the next step of the process was to use two other researchers (i.e., undergraduate collegiate students) and train them. Their training consisted of: (a) learning to differentiate between prostate cancer educational content versus non-prostate cancer educational content, and (b) watching and practicing with storyline scenes which were not used in the development of the stimulus videos. After the two undergraduate researchers could correctly identify and label practice scenes, they were told to view all of the nine episodes and mark scenes related to the drama's prostate cancer storyline. Both researchers were told to mark the beginning and end of each scene, or unit, which contained any prostate cancer information. The researchers had 100% agreement as they found fourteen educational units, which comprised about 32 minutes from the first episode to the ninth show. Since both undergraduate researchers agreed with each other and the principal researcher, confidence about the process and accurate inclusion of all scenes containing prostate cancer information was increased significantly.

Collectively, within the 14 educational units, or scenes, a number of various messages about different aspects of prostate cancer can be found. Table 1 contains all of the educational units and examples of the different messages found in the show by unit.

In the end, four 32-minute videos were edited from the drama series, which varied on their amount of prostate cancer information. The videos were created from the 14 educational units in addition to non-educational, drama filler scenes (see Table 2). The 14 educational units were categorized into core units and incremental units. The core units (n=6) comprised the baseline story used in the education 1 video. Incremental units (n=8) were added to the baseline core units to create the other experimental treatment groups' videos (i.e., education level 2, education level 3, and education level 4) by varying the level of prostate cancer educational information. The filler scenes were edited from non-educational storylines about police business and transitional venues. Additionally, the fillers were placed between each educational unit, not at the beginning or end of the video, and they were all of approximately equal time for a given treatment condition. The purpose of the filler was to be able to (a) make a video of 32 minutes in the education level 1, 2, and 3 conditions and (b) produce a coherent storyline which attempted to reflect the show realistically. The four experimental condition videos vary in the following manner:

- Education Level One Condition: six educational units plus fill-in non-educational drama scenes (e.g., baseline core educational story + filler)

- Education Level Two Condition: nine educational units plus fill-in non-educational drama scenes (e.g., baseline core educational story + 3 new incremental educational units + filler)
- Education Level Three Condition: 12 educational units + fill-in non-educational drama scenes (e.g., baseline core educational story + the 3 incremental educational units from the education level two condition + 3 new incremental educational units + filler)
- Education Level Four Condition: 14 educational units (e.g., baseline core educational story + the 3 incremental educational units from the education level two condition + the 3 incremental educational units from the educational level three condition + 2 new incremental educational units)

To better understand the four conditions' videos, Table 3 summarizes the number of educational and non-educational minutes in each group. A review of the table shows that the total video time in each condition is about 32 minutes. The slight variation in total time is due to certain filler scenes, which differed in length by a few seconds.

Instrument and Measures

One posttest questionnaire was created for both the pilot test and study although the instrument used for the dissertation phase had been modified from the original version which was pretested during the pilot period (see Appendices A and B). The pencil and paper survey took approximately 20-30 minutes to complete, and it contained primarily close-ended measures. A 7-point Likert

scale was used for all close-ended questions with the exception of knowledge items (i.e., trichotomous response choice). The survey was divided into two sections. Section one addressed the outcomes, intervening variables, confounds, and manipulation checks. Section two covered sociodemographic information.

Knowledge: Thirty-one items assessed collective knowledge about prostate cancer based specifically on messages contained in the television program about prostate cancer in the pilot. Participants could respond in one of three ways to the close-ended statements (i.e., correct, incorrect, or don't know).

For the dissertation survey, 29 of the 31 original questions were retained. With regard to the 29 item scale, higher mean scores represented more knowledge when correct responses were dummy coded as 2 and incorrect/don't know choices were coded as 1 (i.e., 58 = highest, all correct knowledge; 29=lowest, no correct knowledge). The collective knowledge scale used in the study was reliable (alpha=.78).

The collective knowledge measures were actually comprised of two groups of indicators (i.e., core=18 items and incremental=11 items). Core knowledge referred to information found in the baseline story, which was used in all experimental conditions. The incremental knowledge represented educational content, which was added progressively to each experimental condition's storyline stemming from the baseline story. For the core knowledge (i.e., 18 items) (i.e., 36=highest, all correct knowledge; 18=lowest, no correct knowledge) and incremental knowledge scales (i.e., 11 items) (i.e., 22=highest, all correct

knowledge, 11=lowest, no correct knowledge), higher mean scores also suggested more knowledge. Regardless of which experimental condition participants were randomly assigned to, they were asked to respond to both sets of knowledge items.

Attitude: Two types of attitude objects were presented in the television intervention: (a) seeking/providing social support and (b) going to the doctor. Five general attitude measures with six subparts for a total of 30 items were designed, specifically addressing both objects, which were measured on a 7-point scale (i.e., 1=negative evaluation of the behavioral object, 7= positive evaluation of the behavioral object). Participants were asked to consider older male figures and themselves when assessing attitude. Since the target participants were between 18-24 years of age, they may not be able to identify with prostate cancer. However, by asking participants to think about older males who may be at risk for prostate cancer, changes, if any, in attitude can be better assessed.

In the dissertation phase, 25 attitudinal indicators from the initial 30 were retained and used. The attitudinal composite variable was scaled from 1 (i.e., lowest score indicating strong negative, unfavorable attitude) to 7 (i.e., highest score indicating strong positive, favorable attitude). Cronbach alpha was .85, thereby suggesting a reliable set of items.

Behavioral Intention: Two categories of recommended behavioral responses were contained in the primetime drama's storyline: (a) seeking/providing social support and (b) going to the doctor. Based on these

behaviors, 11 measures were used to evaluate behavioral intention using a 7-point Likert scale (i.e., 1=strongly disagree, 7=strongly agree). Again, individuals were prompted to think about themselves and older male figures when responding to these indicators.

The dissertation instrument actually increased the behavioral items by 1 (n=12) due to one of the pilot study measures being double-barreled and being converted into two separate items. The behavioral intention composite variable was scaled from 1 (i.e., lowest score indicating strong, negative intentions) to 7 (i.e., highest score indicating strong positive intentions), and the index was reliable (Cronbach's alpha=.93).

Cognitive Load: Five items were revised from scales that were validated to assess Cognitive Load Theory. Participants responded to a 7-point Likert scale where 1 represented strongly disagree to 7 which indicated strong agreement to the statements. An indicator was eliminated from the pilot study for the dissertation survey (n=4). For the cognitive load index (i.e., 4 items on a 7 point Likert scale), higher mean values represented higher cognitive load (i.e., 1=lowest, minimum cognitive load; 7=maximum cognitive load). Cronbach's alpha was .91.

Boredom: Six items (i.e., 1=strongly disagree to 7=strongly agree) were adapted from two validated scales (i.e., Farmer and Sundberg's Boredom Proneness Scale,1986, and the Sexual Boredom Scale,1996) for use in this study to measure the level of boredom. Of the six items, only five were retained for the dissertation. The final boredom scale's (i.e., 5 measures on a 7-point

Likert-type scale) mean values ranged from 1 to 7 with higher scores expressing more boredom, and the index was highly reliable (alpha=.93).

Confound Checks: Eight items assessed potential confounds due to the intervention materials. Although the videos vary on the amount of education, the video should not have differed otherwise with regard to perceived quality, realism, length, etc. The eight confound checks were as follows: "The video is a quality production," "The video is easy to understand," "The video is easy to watch," "The video is clear," "The video is a realistic portrayal" (i.e., do all the videos contain a message(s) that seem realistic?"), "The story line is easy to follow" (i.e., since the videos are edited from eight shows, do all of the videos have a coherent story line?), "I understood the issues discussed in the video," and "It is easy to get the point of this video" (i.e., are all of the videos perceived similarly with regard to ease of comprehending the message(s)?—one can conceptualize this idea as a form of readability). All questions were assessed using a 7-point Likert scale (i.e., 1=strongly disagree, negative perceptions of the video; 7=strongly agree, positive perceptions of the video), and all eight measures were used again in the dissertation tool.

Manipulation Checks: Thirteen indicators measured the manipulation's intended effect with regard to entertainment and education. These items assessed the extent to which the videos were perceived as entertaining and/or educational. Certain measures are about entertainment characteristics while the remainder asked about the video's educational content.

Of the 13 indicators, 6 items (e.g., five closed-ended and one open-ended) were written to evaluate each video's entertainment level. The five closed-ended items were "The video is entertaining," "The video is fun to watch," "The video captures my attention," "The video maintains my interest," and "The video arouses my emotions." The one open-ended item was "What percentage (0%-100%) of the video is entertaining to me?"

Three items were kept for the dissertation survey. The two closed-ended measures were scaled from 1 (i.e., strongly disagree which represented a perception of low entertainment) to 7 (i.e., strongly agree which suggested perceptions of high entertainment). The one open-ended item was again measured from 0% to 100%.

The remaining seven measures (e.g., five closed-ended and two open-ended items) checked each video's perceived educational level (i.e., "The video is educational," "The video is boring to watch," "The video provides a lot of good (quality) information about prostate cancer," "The video shows me skills I may need to help older at-risk male figures," "I learned a lot about prostate cancer from this video," "What percentage (0%-100%) of the video is educational?", and "How much video time (0 minutes-32 minutes) was educationally informing about prostate cancer?"

Of the seven measures, the dissertation instrument only used three items. The two closed-ended measures were scaled from 1 (i.e., strongly disagree perceptions of low education) to 7 (i.e., strongly agree, perceptions of high education). The one open-ended item was again measured from 0% to 100%.

Demographics: Thirteen items were designed to measure basic socio-demographic information. In addition to typical questions about age, race, etc., a number of indicators evaluated the extent to which participants watched the program and had experience with family members who had been screened, diagnosed, or treated for prostate cancer.

Pilot Study: Procedure and Results

Pilot Procedures: A pilot study was conducted to ensure the reliability of the survey instrument and to check for the manipulations and any potential confounds. Eighty participants (i.e., 20 per condition) were recruited for the pilot study. An in-class verbal announcement of the study was made so that students could sign-up to participate voluntarily. They were told that they would receive extra credit for class assignments in exchange for their time. Based on their sign-up date and time, students were invited to a central lab, which had four treatment condition rooms--each set-up with a video cassette player. As the participants began to arrive, individuals were randomly assigned and placed into one of the four experimental rooms by being given a number from 1 to 4 as they entered the door of a central lab room. This method of randomization aided to reduce any volunteer bias with regard to friends or roommates signing up together, arriving together, and desiring to be placed together in the same experimental condition. In the common sitting area, the researcher discussed issues of informed consent, and participants voluntarily signed a waiver of consent. Then, participants were told to go their assigned room (based on their given number) and watch the 32-minute video designated for their treatment

condition. After viewing the EE video, participants filled out a pencil and paper posttest, which measured knowledge, attitudes, behavioral intentions, cognitive load, boredom, confound checks, manipulation checks, and demographics. In the end, participants were debriefed as to the purposes of the study, given brochures (prevention information) about prostate cancer, and asked to refrain from discussing the study with any other student. Before data analysis of the pilot study data began, signed informed consent waivers are placed into a locked file cabinet away from the completed surveys to protect anonymity.

Pilot Participant Demographics: Table 4 summaries the sociodemographic characteristics of the typical pilot study participant. Most respondents were Caucasian (83%), female (78%), single (98%), and sophomores/juniors (82%). The mean age was 20.3 years. A majority (77%) had never watched the television show, NYPD Blue, used in the study.

Pilot Reliability Analysis: Table 5 summaries the Cronbach's reliability coefficients for the piloted scales (i.e., knowledge, attitudes, behavioral intentions, cognitive load, and boredom). Using the .80 standard, the indices for attitude (alpha=.87), behavioral intention (alpha=.92), cognitive load, (alpha =.85), and boredom (alpha=.84) were highly reliable. The collective knowledge scale's reliability was .71.

Pilot Confound Checks: Collectively, very little difference was perceived in the four stimulus videos. Individuals in all experimental conditions (i.e., education level 1, education level 2, education level 3, and education level 4) found the videos to be similar in quality [level 1 M=4.84, SD=1.34, level 2

M=5.35, SD=.86, level 3 M=4.90, SD=1.55, level 4 M=5.63, SD=1.26, F(3,74)=1.67, ns], easy to understand [level 1 M=5.53, SD=1.02, level 2 M=5.25, SD=1.55, level 3 M=5.80, SD=1.28, level 4 M=5.53, SD=1.30, F(3,74)=.59, ns], easy to watch [level 1 M=5.74, SD=1.04, level 2 M=5.20, SD=1.54, level 3 M=5.45, SD=1.76, level 4 M=5.84, SD=1.38, F(3,74)=.77, ns], realistic [level 1 M=6.47, SD=.84, level 2 M=6.30, SD=.86, level 3 M=6.70, SD=.57, level 4 M=6.36, SD=.68, F(3,74)=1.08, ns], easy to follow [level 1 M=6.11, SD=.88, level 2 M=5.40, SD=1.57, level 3 M=6.15, SD=.88, level 4 M=6.05, SD=.91, F(3,74)=2.04, ns], to contain understandable issues [level 1 M=6.32, SD=.88, level 2 M=5.85, SD=1.31, level 3 M=6.30, SD=1.26, level 4 M=6.05, SD=1.17, F(3,74)=.71, ns], and easy to get the point [level 1 M=6.28, SD=.89, level 2 M=6.03, SD=1.15, level 3 M=6.18, SD=1.28, level 4 M=5.99, SD=.95, F(3,74)=.87, ns].

The only characteristic, which appeared to be different, is the extent to which the video was clear ($F=3.06$, $p<.05$). How the word "clear" was interpreted by the viewer is open to question which may help to explain why the videos were not perceived to be similar on this characteristic. In other words, did the word "clear" suggest a pristine, clean, non-fuzzy picture or did it imply a logical, easy to understand video? This ambiguity may have attributed to the perceived difference in clarity. Specifically, the education level 2 video was perceived as less clear (M=4.95, SD=1.76) than the education level 3 video (M=6.10, SD=.91, $t(74)=-2.84$, $p<.01$) and the education level 4 video (M=5.89, SD=1.10, $t(74)=-2.31$, $p<.05$). Overall though, the stimulus videos did not seem to be different

from each other, and the mean responses to all items were above the midpoint of the 7-point Likert scale, thereby suggesting strong, positive perceptions of the different videos.

Pilot Manipulation Checks: The four treatment videos were manipulated to be educationally dissimilar, and accordingly individuals in the experimental groups perceived different educational levels as intended. An analysis of variance (ANOVA) was employed to compare the mean scores for the perceived education measures (level 1 M=3.86, SD=.82, level 2 M=4.53, SD=1.11, level 3 M=5.26, SD=.86, and level 4 M=6.65, SD=.88). The results indicated significant differences existed between the groups, $F(3,74) = 6.16$, $p<.05$. Three sets of comparisons (i.e., level 1 versus level 2, level 2 versus level 3, and level 3 versus level 4) showed that each pair was significantly different with the education video manipulated with more prostate cancer information being perceived as more educational then the stimulus video containing less educational content.

Modifications to Study due to Pilot

After the data were analyzed, the results helped guide the refinement of the stimulus videos and survey before they were used in the dissertation study. Because the pilot results showed no significant confound differences and the manipulations worked in their intended manner, the stimulus videos did not need to be altered. However, the survey needed to be refined due to unreliable indicators. Analyses suggested that deleting certain indicators for a given scale would improve its Cronbach's alpha. An examination of Table 5 shows the

number of items piloted for each scale and the number of retained indicators per scale for the dissertation data collection phase.

Dissertation Study: Procedure

After the pilot test, 200 students (i.e., 50 per condition) from another set of large classes were asked to volunteer for the dissertation study. The same process of recruitment, randomization, collection, and analysis used in the pilot were employed for the study. The major difference was the posttest survey. While it measured the same variables, certain items were eliminated based on the pilot reliability analysis.

Chapter 6

Results

Overview

This chapter reports the data analysis from the dissertation study. Results of the participant demographics, descriptives, confound checks, manipulation checks, hypotheses validation, and research questions are discussed.

Statistical Analytic Procedures

In order to analyze the dissertation data, a number of steps and different statistical tools were utilized. Because the hypotheses and research questions in this study predict or ask about curvilinear relationships, tests assessing curvilinearity must be employed initially. The first step in determining curvilinearity is to create bivariate scatterplots of the variables of interest and visually inspect the graphs. If the visual evidence uncovers non-linearity, then we can do a curvilinear trend analysis. With ANOVA, non-linear trends can be assessed by testing for quadratic and other higher degree order (i.e., cubic, 4^{th}, 5^{th}, etc.) effects. In the end, the ANOVA results tell us the extent to which significant linear versus significant quadratic effects are found in the data. Second, if no or little non-linearity is apparent, traditional linear based statistical methods, which are robust to slight insignificant non-linearity are used. If little non-linearity is present, then ANOVA, multiple regression, and correlational analysis will be used.

Participant Demographics

The sociodemographic characteristics of the typical student who participated in the study can be found in Table 4. Most respondents were Caucasian (81%), female (79%), and single (97%). However, two percent were widowed. This finding is unusual given the participants' range of age (i.e., 18-24). Since all of the widowed participants were female, it is possible that they were married to husbands who served in the military and unfortunately died in service, especially considering that the university that the participants attend is one steeped in a strong military history and tradition. With regard to educational level, most reported they were sophomores and juniors (80% collectively). The mean age of the respondents was 20.4 years. An overwhelming majority (78%) had never watched the television show, NYPD Blue, with very few (4%) watching almost every week.

With regard to personal and family history with prostate cancer, an overwhelming majority had not gotten information from a doctor (95%) or had spoken with a male about the disease (81%). When asked about if an older male in the participants' life had been screened, diagnosed, or treated for prostate cancer, most did not know or they reported no. Finally, father was the first older male figure that came to mind for 84% of the participants. Based on these data, individuals appeared to have limited personal or familial experience with the cancer. Table 4 shows the specific sociodemographics.

Descriptives

Table 6 summarizes the descriptives (i.e., mean, standard deviation, minimum, and maximum) for the composite collective knowledge, core knowledge, incremental knowledge, attitude, behavioral intention, cognitive load, and boredom variables. For certain indices (i.e., collective knowledge, core knowledge, attitude, cognitive load, and boredom), the mean of the composite variable was above or below the scale's potential mean, but all variables' distributions were still approximately normal according to histograms.

Preliminary Analyses

The data were screened for missing data, outliers, and normality. With regard to missing data, participants adequately completed the instrument, and most responded to all items. The Mahalanobis distance test found no significant outliers. Expected normal distributions were calculated using Blom's proportional estimated formula. Based on observed cumulative probability versus expected cumulative probability curves for each variable, all composite variables appeared to be normally distributed as no data point for a given variable was more than .1 standard deviation from the expected distribution value.

Confound Checks

The four experimental conditions' videos were checked for confounding differences, and overall participants reported strong, positive perceptions of the videos with respect to quality, ease of understanding, ease of watching, clarity, realism, ease of following, understandability of the issues, and ease of getting the point. Although some slight differences emerged between the four stimulus

videos when an ANOVA was performed for each of the eight characteristics by group, no video confound appeared to exist because (a) no systematic bias against one video across all eight, or even a majority, of the confounding characteristics emerged, and (b) the mean response scores to all items were clearly above the midpoint of the 7-point Likert scale, thereby suggesting strong, positive perceptions of the different videos.

With respect to quality, the education level 4 video was perceived higher in quality than the three other tapes [level 1 M=5.14, SD=1.43, level 2 M=5.22, SD=.84, level 3 M=4.88, SD=1.47, level 4 M=5.68, SD=1.19, $F(3,196)=3.53$, $p<.05$], but all stimulus tapes were perceived to be of good quality as indicated by strong mean quality scores.

No differences were found on the ease of understanding the videos [level 1 M=5.66, SD=.98, level 2 M=5.12, SD=1.56, level 3 M=5.60, SD=1.32, level 4 M=5.62, SD=1.21, $F(3,196)=1.96$, ns].

A few differences emerged when the videos were compared on their ease of watching, particularly with the education level 2 and level 3 tapes being slightly harder to watch than the other two [level 1 M=5.90, SD=.99, level 2 M=5.08, SD=1.51, level 3 M=5.08, SD=1.82, level 4 M=5.88, SD=1.19, $F(3,196)=5.48$, $p<.01$]. The overall positive perceptions indicate an ease of watching the storyline, regardless of which experimental video was viewed.

When participants were asked about each video's clarity, the education level 2 tape was perceived as somewhat less clear than the other three [level 1 M=5.74, SD=1.16, level 2 M=4.74, SD=1.75, level 3 M=5.94, SD=.92, level 4

M=5.98, SD=.96, F(3,196)=11.06, p<.01]. However, the personal interpretation of "clear" (i.e. clean, non-fuzzy video picture or logical, easy to understand storyline) may have confused the viewer.

With respect to realism of the storyline, the education level 1 and 3 stimulus tapes were perceived as more real than the videos used in the education level 2 and 4 conditions even though the viewers strongly reported that all videos were extremely realistic as evidenced by the extremely high mean realism scores [level 1 M=6.68, SD=.62, level 2 M=6.22, SD=.89, level 3 M=6.62, SD=.60, level 4 M=6.38, SD=.64, F(3,196)=4.71, p<.01].

The high mean scores representing the degree to which the four different videos were easy to follow suggested overall comparable videos although the education level 1 tape was significantly the easiest to follow [level 1 M=6.28, SD=.76, level 2 M=5.24, SD=1.56, level 3 M=6.06, SD=.92, level 4 M=6.02, SD=.94, F(3,196)=8.77, p<.01].

All of the videos were perceived as containing understandable issues as suggested by the positive perceptions measured on the 7-point Likert scale, but the tape used in the education level 1 condition was reported as having issues as most understandable [level 1 M=6.50, SD=.71, level 2 M=5.74, SD=1.34, level 3 M=6.22, SD=1.25, level 4 M=6.08, SD=1.19, F(3,196)=3.79, p<.05].

Finally, a few differences were present when examining the extent to which individuals got the point or message of the tape in each of the conditions. Overall, respondents agreed that it was easy to get the point of the video as reflected by the high mean scores, but the education level 3 and 4 videos'

messages were slightly harder to get when compared to the other conditions [level 1 M=6.12, SD=.69, level 2 M=6.20, SD=.78, level 3 M=5.70, SD=1.31, level 4 M=5.14, SD=1.60), F(3,196)=8.76, p<.01].

Although some slight differences were present, the lack of a systematic bias against a particular tape on a majority of the potential confound characteristics and the substantially strong, positive perceptions of all the videos suggested that the slight differences between certain videos may not be significantly problematic. In order to be sure though, an analysis of covariance (ANCOVA) was performed to check and control for the effects of the seven significantly potential confounds (i.e., quality, ease of watching, clarity, realism, ease of following, understanding the issues, and ease of getting the point of the video). For ease of presentation, only ANOVA results are reported if the ANCOVA did not show different findings than the one-way analysis of variance. If different results were found when controlling for the video confounds, then only the ANCOVA results are provided.

Manipulation Checks

The manipulation checks revealed a significant main effect due to educational level across the four stimulus videos, F (3,196) = 5.23, p<.01, but the differences between educational groups were not in the intended manner always. Those in the education level 4 group (M=6.09, SD=.75) did not perceive their tape to be significantly more educational than those in the education level 3 condition (M=6.30, SD=.95) (t=1.08, df=196, ns). Viewers in the education level 3 condition (M=6.30, SD=.95) did report substantially more educational content

over counterparts in the education level 2 treatment (M=5.56, SD=1.26) (t=-3.79, df=196, p<.01). Finally, the education level 2 group (M=5.56, SD=1.26) was compared to the education level 1 condition (M=6.09, SD=.87) (t=2.71, df=196, p<.01), and significant perceptual educational levels existed. However, those differences were in an opposite direction-that is, those exposed to the education level 1 video actually perceived more educational information than the viewers who watched the education level 2 tape.

These incongruencies between manipulated and perceived educational levels should not be cause for alarm. First, the videos were created with significantly different amounts of prostate cancer education as measured objectively by the number of prostate cancer content minutes contained in each video (see Table 3). Because of this objective, concrete distinction between groups, we can still make comparative observations. Second, the literature on education and entertainment that has been reviewed previously (see Chapter 2) suggests that objective, intentionally designed inputs (i.e. manipulated education) may not equal subjective, perceived outputs (i.e., perceived education and perceived entertainment). In other words, audiences of an EE television program may not perceive what they see in the same way that scriptwriters, producers, and directors do. So, the differences in this study tend to agree with previous research, which suggest that because there are objective differences between groups in number of educational minutes, it is valid to compare groups.

Testing for Non-Linearity

Seventeen bivariate scatterplots were created to assess curvilinearity. Based on the visual data, no plots revealed ogive curvilinear relationships. The scatterplots are discussed in greater detail when the analyses for the hypotheses are reported.

Hypothesis One

Hypothesis one predicted an ogive curve between education and the collective knowledge, attitude, and behavioral intention outcomes. Overall, the data do not support curvilinear relationships as evidenced by the scatterplot data and ANOVA analysis (see Tables 7 and 8).

Scatterplots: Five bivariate plots were created, and they offer visual data. The education-collective knowledge, education-core knowledge, education-incremental knowledge, education-attitude, and education-behavioral intention plots did not show ogive patterns.

Education-Collective Knowledge ANOVA: An ANOVA trend analysis uncovered no non-linear relationships, and the video confounds did not need to be controlled. The ANOVA suggested no significant differences between the four collective knowledge mean scores [level 1 M=51.06, SD=3.20, level 2 M=49.60, SD=3.90, level 3 M=50.38, SD=5.04 and level 4 M=49.00, SD=5.01, $F(3,195)=2.12$, ns]. Because the F test was non-significant, hypothesized comparisons between the groups were not performed. Hypothesis one was not supported.

Education-Core Knowledge: The ANOVA trend analysis revealed no quadratic effects, and no video confounds did not need to be controlled. The ANOVA results suggested no significant differences between the four experimental conditions when the core knowledge scores were compared [(level 1 M=32.76, SD=2.31, level 2 M=31.76, SD=2.77, level 3 M=32.40, SD=3.21, and level 4 M=32.06, SD=3.02), F(3,195)=1.15, ns]. Because the F test was non-significant, comparisons between the groups were not performed.

Education-Incremental Knowledge: No ogive curve was detected by the ANOVA trend analysis. When controlling for the video confounds, ANCOVA results suggested no significant differences between the four experimental conditions [(level 1 adjusted M=18.17, SE=.27, level 2 adjusted M=18.00, SE=.27, level 3 adjusted M=17.76, SE=.27, and level 4 adjusted M=17.19, SE=.27), F(3,189)=2.31, ns]. These data suggest that exposure to more educational content did not result in incremental knowledge gains. Because the F test was non-significant, comparisons between the groups were not performed.

Education-Attitude ANOVA: The ANOVA trend analysis did not produce a significant quadratic effect, and the video confounds did not need to be controlled. The ANOVA analysis revealed that the treatment conditions did not produce differences in attitudes about prostate cancer [(level 1 M=5.57, SD=.70, level 2 M=5.41, SD=.70, level 3 M=5.36, SD=.64, and level 4 M=5.37, SD=.87), F(3,195)=.87, ns]. Because the F test was non-significant, predicted comparisons were not performed. These results do not support hypothesis one.

Education-Behavioral Intention ANOVA: The ANOVA trend analysis did not reveal a quadratic effect. When controlling for the video confounds, the ANCOVA showed no differences between the four treatment groups [(level 1 adjusted M=4.46, SE=.18, level 2 adjusted M=4.47, SD=.18, level 3 adjusted M=4.59, SD=.18, and level 4 adjusted M=4.96, SD=.18), F(3,189)=1.59, ns]. Because the F test was non-significant, predicted comparisons were not performed. Hypothesis one was not supported.

Hypothesis Two

Hypothesis two predicted an ogive curvilinear relationship between education and the intervening variables (i.e., cognitive load and boredom). Overall, the data do not support the predictions as uncovered by the scatterplots and the ANOVA results (see Tables 9 and 10).

Scatterplots: Two bivariate diagrams (i.e., education-cognitive load and education-boredom) were examined for visual evidence, and neither plot showed an ogive pattern.

Education-Cognitive Load ANOVA: The ANOVA trend analysis revealed a marginal quadratic pattern (F=4.29, p=.04), and the video confounds did not need to be controlled. The ANOVA pointed out differences in cognitive load (level 1 M=1.87, SD=.98, level 2 M=2.14, SD=.98, level 3 M=2.44, SD=1.34, and level 4 M=3.56, SD=2.17), F(3,196)=13.09, p<.01]. As the level of educational information increased so did the amount of cognitive load even though respondents overall did not perceive very strong levels of cognitive load as evidenced by low cognitive load mean scores across all four conditions. Even

then, education level 4 content must have a stronger, direct effect on load as compared to the other educational conditions. Because the quadratic effect appears to be shaped like the right side of the letter U, the rate at which information overload develops as a function of the amount of education may be somewhat non-linear.

Planned contrasts (i.e., between education level 1-2, education level 2-3, and education level 3-4) revealed a significant difference between the education level 3-4 pair with more cognitive load reported for the education level 4 condition ($t=-3.86$, $df=196$, $p<.01$). In addition, Tukey's multiple range test indicated significant difference between the education level 1 and education level 4 groups ($p<.01$) as well as the education level 2-educationa level 4 pair ($p<.01$). Again, these results suggested that those in the education level 4 condition reported more cognitive load than those in the education level 2 or education level 1 treatments. Hypothesis two was not supported.

Education-Boredom ANOVA: The ANOVA trend analysis showed no quadratic effect, and the video confounds did not need to be controlled. Although individuals did not perceive any video to be strongly boring as evidenced by low mean scores, ANOVA results showed significant differences between groups with respect to boredom, such that boredom increased with more educational content [(level 1 $M=1.92$, $SD=1.20$, level 2 $M=2.36$, $SD=1.48$, level 3 $M=2.49$, $SD=1.61$ and level $4=3.51$, $SD=1.91$), $F(3,195)=9.12$, $p<.01$].

Planned contrasts (i.e., between education level 1-2, education level 2-3, and education level 3-4) revealed a significant difference between the education

level 3-educational level 4 pair with more boredom experienced in the education level 4 condition ($t=-3.20$, $df=195$, $p<.01$). Moreover, Tukey's multiple range test indicated significant differences between the education level 1 and education level 4 groups ($p<.01$) as well as the education level 2-education level 4 pair ($p<.01$). Similarly, these results suggest that education level 4 prostate cancer education results in greater boredom as compared to less amounts of educational content. These data do not support hypothesis two.

Hypothesis Three

An ogive curve between the intervening variables (i.e., cognitive load and boredom) and the collective knowledge, attitude, and behavioral intention outcomes was predicted by hypothesis three. Generally speaking, the scatterplot data and ANOVA analysis do not support the predictions (see Tables 11 and 12).

Before any ANOVA analyses could be performed between the intervening variables and the outcomes, four groups (i.e., level 1, level 2, level 3, and level 4) of cognitive and boredom had to be created. In order to develop these groups, quarterly percentiles were used. This process places individuals into approximately equally sized groups according to the criterion of whether their responses to a given set of measures for cognitive load and boredom (which in this study were scaled into an index) are in the bottom 25^{th} percentile, 25^{th} - 50^{th} percentile, 50^{th} - 75^{th} percentile, or above the 75^{th} percentile. In the end, the conditions of level 1, level 2, level 3, and level 4 reflect the bottom 25^{th} percentile, 25^{th} - 50^{th} percentile, 50^{th} - 75^{th} percentile, and above the 75^{th} percentile for cognitive load and boredom respectively.

Scatterplots: Ten bivariate plots were drawn. The cognitive load-collective knowledge, cognitive load-core knowledge, cognitive load-incremental knowledge, cognitive load-attitude, cognitive load-behavioral intention, boredom-collective knowledge, boredom-core knowledge, boredom-incremental knowledge, boredom-attitude, and boredom-behavioral intention plots failed to show ogive patterns.

Cognitive Load-Collective Knowledge ANOVA: The ANOVA trend analysis revealed no curvilinear pattern, and the video confounds did not need to be controlled. The ANOVA suggested that significant differences existed, such that more cognitive load resulted in collectively learning less about prostate cancer (level 1 M=52.13, SD=2.92, level 2 M=51.69, SD=2.60, level 3 M=48.61, SD=4.59, and level 4 M=47.02, SD=5.12), $F(3,195)=19.80$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed a significant difference between the level 2-level 3 pair with more cognitive load resulting in less prostate cancer knowledge ($t=3.98$, $df=195$, $p<.01$). Moreover, Tukey's multiple range test indicated significant differences between three other groups: level 1-level 3 ($p<.01$), level 1-level 4 ($p<.01$), and level 2-level 4 ($p<.01$). Similarly, these results showed that greater levels of cognitive load elicited less collective learning about prostate cancer. Hypothesis three is not supported by these data.

Cognitive Load-Core Knowledge ANOVA: The ANOVA trend analysis revealed no curvilinear pattern in the data, and the video confounds did not need to be controlled. The ANOVA results revealed that differences between core

knowledge with lower core learning about prostate cancer resulting from increased cognitive load [(level1 M=33.79, SD=1.76, level 2 M=33.24, SD=1.53, level 3 M=31.15, SD=3.21, and level 4 M=30.41, SD=3.24) $F(3,195)=20.64$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed a significant difference between the level 2-level 3 pair such that individuals reported less correct core knowledge with greater cognitive load ($t=4.17$, $df=195$, $p<.01$). Additionally, Tukey's multiple range test indicated significant differences between three other groups: level 1-level 3 ($p<.01$), level 1-level 4 ($p<.01$), and level 2-level 4 ($p<.01$). Tukey's results showed that participants who experienced greater cognitive load learned less core prostate cancer information.

Cognitive Load-Incremental Knowledge ANOVA: The ANOVA trend analysis revealed no quadratic pattern. When the video confounds were controlled, ANCOVA suggested incremental knowledge differed as a function of cognitive load as greater levels of load produced less incremental knowledge about cancer [(adjusted level 1 M=18.36, SE=.26, adjusted level 2 M=18.40, SE=.25, adjusted level 3 M=17.31, SE=.29, and adjusted level 4 M=16.85, SE=.28), $F(3,189)=7.57$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed a significant difference between the level 2-level 3 pair such that individuals reported less correct incremental knowledge with more cognitive load ($p<.01$). Additionally, pairwise post hoc comparisons indicated significant

differences between three other groups: level 1-level 3 ($p<.01$), level 1-level 4 ($p<.01$), and level 2-level 4 ($p<.01$). Results showed that participants who experienced greater cognitive load learned less incremental prostate cancer information.

Cognitive Load-Attitude ANOVA: The ANOVA trend analysis showed a marginally questionable quadratic effect ($F=4.03$, $p=.046$). When controlling for the video confounds, the ANCOVA suggested significant differences on participants' attitude [(adjusted level 1 $M=5.41$, $SE=.10$, adjusted level 2 $M=5.68$, $SE=.10$, adjusted level 3 $M=5.35$, $SE=.11$, and adjusted level 4=5.23, $SE=.10$), $F(3,188)=3.47$, $p<.05$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed a significant difference between the level 2-level 3 pair such that individuals with more load reported less favorable attitude ($p<.05$). Other pairwise comparisons revealed a significant difference between the level 3 and level 4 conditions ($p<.01$) such that participants who experienced greater cognitive load had less favorable attitude. Generally speaking, greater cognitive load appeared to inhibit the development of favorable attitudes. Hypothesis three was not supported.

Cognitive Load-Behavioral Intention ANOVA: The ANOVA trend results expressed no quadratic effect. When controlling for the video confounds, the ANCOVA revealed significant differences on behavioral intention [(adjusted level 1 $M=4.05$, $SE=.17$, adjusted level 2 $M=4.73$, $SE=.16$, adjusted level 3 $M=4.52$, $SE=.19$, and adjusted level 4=5.25, $SE=.18$), $F(3,189)=7.45$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed a significant difference between the level 1 and level 2 groups ($p<.01$) where greater load resulted in stronger intention. Additionally, post hoc comparisons show significant differences between the following groups: level 1-level 4 ($p<.01$), level 2-level 4 ($p<.01$), and level 3-level 4 ($p<.05$). In all three pairs, more cognitive load resulted in stronger behavioral intentions. Hypothesis three was not supported.

Boredom-Collective Knowledge ANOVA: The ANOVA trend analysis revealed no curvilinear data, and the video confounds did not need to be controlled. The ANOVA results suggested significant differences on core knowledge [(level 1 $M=32.98$, $SD=2.66$, level 2 $M=32.88$, $SD=2.52$, level 3 $M=31.82$, $SD=2.55$, and level 4 $M=31.23$, $SD=3.16$), $F(3,194)=4.78$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed no significant differences. However, Tukey's multiple range tests pointed out significant differences between the level 1 and level 4 groups ($p<.01$) and the level 2 and level 4 conditions ($p<.05$). In both cases, more boredom resulted in learning less collective information about prostate cancer.

Boredom-Core Knowledge ANOVA: The ANOVA trend analysis pointed out no curvilinear relationship. When the video confounds were controlled, ANCOVA suggested significant differences on core knowledge [(adjusted level 1 $M=32.56$, $SE=.36$, adjusted level 2 $M=32.96$, $SE=.36$, adjusted level 3 $M=32.00$, $SE=.39$, and adjusted level 4 $M=31.50$, $SE=.39$), $F(3,187)=2.59$, $p=.05$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed no significant differences. However, post hoc tests pointed out a significant difference between the level 2 and level 4 conditions ($p<.01$). Greater boredom resulted in learning less core information about prostate cancer.

Boredom-Incremental Knowledge ANOVA: No ogive relationship was supported by the ANOVA trend analysis, and the video confounds did not need to be controlled. The ANOVA results pointed out a significant main effect for incremental knowledge between the four levels of boredom with more boredom eliciting less incremental knowledge about cancer [(level 1 $M=18.20$, $SD=1.84$, level 2 $M=18.10$, $SD=1.08$, level 3 $M=17.89$, $SD=1.66$, and level 4 $M=16.91$, $SD=2.52$), $F(3,195)=5.01$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed that the level 3-level 4 comparison was significantly different ($t=2.51$, $df=195$, $p<.01$) with substantial less incremental knowledge learned with more boredom. In addition, Tukey's multiple range tests pointed out two other significant differences between the level 1 and level 4 groups ($p<.01$) and the level 2 and level 4 conditions ($p<.05$). In each case, stronger levels of boredom resulted in learning less incremental information about prostate cancer.

Boredom-Attitude ANOVA: The ANOVA trend analysis revealed no quadratic relationship. When controlling for the video confounds, ANCOVA suggested significant differences on attitude across the different boredom levels. More boredom appeared to result in less favorable attitudes even though positive attitudes overall were evident regardless of level of boredom [(adjusted level 1

M=5.53, SE=.10, adjusted level 2 M=5.18, SE=.10, adjusted level 3 M=5.72, SD=.10, and adjusted level 4=5.26, SE=.10), $F(3,187)=6.22$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed that all three pairs were significant. In the level 1-level 2 group ($p<.01$), greater boredom resulted in a decrease in positive attitudes. For the level 2-level 3 groups ($p<.01$), greater levels of boredom produced stronger favorable attitudes. However, the final comparison showed that more boredom elicited less favorable attitudes ($p<.01$). Additional post hoc comparisons did not point out any other difference. The data do not support hypothesis three.

Boredom-Behavioral Intention ANOVA: The ANOVA trend analysis showed no curvilinear effects. When video confounds were controlled, ANCOVA found a significant difference on the adjusted behavioral intention mean scores [(level 1 M=4.25, SE=.17, level 2 M=4.38, SE=.17, level 3 M=5.05, SE=.18, and level 4=4.91, SE=.18), $F(3,188)=4.21$, $p<.01$].

Planned contrasts (i.e., between level 1-2, level 2-3, and level 3-4) revealed a difference between the level 2 and level 3 conditions ($p<.01$) such that individuals who were more bored had stronger intentions. Additionally, other comparisons pointed out significant differences between the level 1-level 3 pair ($p<.01$), level 1-level 4 groups ($p<.05$), and level 2-level 4 conditions ($p<.05$). In each case, greater boredom resulted in stronger behavioral intentions. These data do not support hypothesis three.

Research Question One

This research question asked about the relative influence of the intervening variables on the collective knowledge, attitudes, and behavioral intentions outcomes. In other words, which variable, cognitive load or boredom, offered better explanatory, predictive power? In order to address this issue, three multiple regression models were tested – one for each of the outcomes which were regressed onto cognitive load and boredom. Keep in mind that the regression analyses were not broken down by treatment level, but rather all responses on these variables were combined to create composite scores, which were used to answer the research question. General speaking, the regression analysis showed that cognitive load, not boredom, had greater weight in determining knowledge, attitudes, and behavioral intentions outcomes (see Table 13).

Model One: This model regressed collective knowledge on cognitive load and boredom, and it explained 24% of the variance associated with knowledge. A comparison of standardized beta weights for cognitive load and boredom revealed that cognitive load had more relative impact (B=-.46, $p<.01$) on the outcome than boredom (B=-.05, ns). Since boredom had a non-significant effect on prostate cancer learning, cognitive load better predicted knowledge, but in a negative direction. As individuals experienced greater load, they knew less correct prostate cancer information.

Model Two: This model tested the effects of the two intervening variables on attitudes. The analysis suggested that cognitive load was significantly and

negatively (B=-.27, p<.01) more predictive of attitudes than boredom (B=.00, ns). Collectively, seven percent of the attitudinal variance was accounted. Similar to collective knowledge, boredom has no significant impact on attitudes about prostate cancer. As participants reported greater cognitive load, they also developed less favorable attitudes about providing/seeking social support and/or going to the doctor.

Model Three: Behavioral intention was the dependent variable in the third model. When comparing cognitive load (B=.30, p<.01) and boredom (B=-.09, ns), the results show that cognitive load explained a greater proportion of the variance on behavioral intentions than boredom. Overall, 7% of the variability was explained. Unlike collective knowledge and attitude, the greater the cognitive load, the stronger the behavioral intentions.

Research Question Two

This research question addressed the interplay between education, entertainment, cognitive load, boredom, collective knowledge, attitudes, and behavioral intentions by examining the Pearson correlation between each pair of variables. Table 14 summarizes the full set of correlations in a matrix.

Of the 28 correlations, 10 associations were not significant while the remaining 18 were significant. The results provided the answers to research question two, which asked about the types of relationships between education, entertainment, and the outcomes.

RQ2a (manipulated education & perceived entertainment): Manipulated education and perceived entertainment were significantly related in an inverse

relationship (r=-.17, p<.05), thereby suggesting as the manipulated educational content increased, the level of perceived entertainment decreased.

RQ2b (perceived education & perceived entertainment): Perceived education and entertainment value were significantly and positively related to each other (r=.37, p<.01). As viewers' perceptions of how entertaining the video they watched increased, so did their perceptions about how educational the storyline was.

RQ2c (manipulated education & collective knowledge, attitudes, and behavioral intention): The results uncovered that manipulated education was not significantly related to knowledge, attitude, or behavioral intention outcomes (r=-.13, ns, -.11, ns, and .14 ns, respectively).

RQ2d (perceived education & collective knowledge, attitude, and behavioral intention): Perceived education was positively associated with knowledge (r=.21, p<.01), attitudes (r=.17, p<.05), and behavioral intentions (r=.27, p<.01). As individuals found the EE storyline to be more educational, they also knew more about prostate cancer, held stronger favorable attitudes, and intended to seek/provide social support or go to the doctor for more information.

RQ2e (perceived entertainment & collective knowledge, attitude, and behavioral intention): Perceived entertainment was positively and significantly correlated with two of the outcomes such that individuals knew more collective prostate cancer information (r=.15, p<.05) and intended to provide/seek social support or go to the doctor (r=.31, p<.01) as the storyline was perceived to be more entertaining.

Chapter 7

Discussion and Conclusion

Overview

This study explored the role of educational content in entertainment-education programs. Of particular interest was how perceptions of educational and/or entertaining content influenced cognitive load, boredom, and ultimately knowledge, attitudes, and intentions. A number of general findings were unearthed.

First, the amount of educational content in an EE program was not significantly related to knowledge, attitude, or behavioral intention. Second, however, it was positively associated with cognitive load and boredom. In each case, increasing the amount of prostate cancer education resulted in more cognitive load and boredom. Third, both cognitive load and boredom were inversely related to collective knowledge and attitudes, but load was positively associated with behavioral intention. These findings collectively show that education does not affect outcomes directly. Instead, audiences watch an entertaining drama designed with health education messages, which directly influence viewers' cognitive load and/or boredom. These factors then appear to either positively or negatively influence knowledge, attitudes, and intentions.

In contrast, perceived educational content was directly related to knowledge, attitudes, and intentions, had no relationship with information overload, and had an inverse association with boredom. Perceived entertainment was positively related to collective knowledge and behavioral

intentions but had no relationship with attitudes. Finally, though entertainment and cognitive load were not related, as individuals perceived greater entertainment from the program, they were less bored. These results collectively seem to contend that perceptions about an EE television program directly impact many outcomes by influencing a viewer's cognitive load and/or boredom.

Put together, these findings suggest an indirect relationship between the objective amount of education in an EE program and knowledge, attitudes, and behavioral intentions. This begins to point out that EE's effectiveness may not rest in objective educational content, but instead EE's success may be more directly related to educational and/or entertainment perceptions and a viewer's cognitive load and/or boredom. For example, exposure to an EE program embedded with health education messages may directly effect an audience's perceptions about how entertaining and educational the show is. These perceptions in turn may directly alter how overloaded a person is and/or how bored a viewer is. Ultimately, cognitive load and/or boredom may directly influence changes in knowledge, attitudes, and intentions. Thus, education has an indirect impact on outcomes.

Detailed explanations of each of the findings follow.

Goal one: Hypothesis One

Hypothesis one predicted an ogive relationship between amount of education and collective knowledge, attitude, and behavioral intention. With all three outcomes, the data did not support the hypothesis.

Knowledge: Regardless of how much educational information individuals received, viewers in all groups were highly knowledgeable, but no differences were found. The percent correct for all groups was over 85% even with only one viewing of the EE program (i.e., 88%=level 1, 86%=level 2, 87%=level 3, and 84%=level 4). Although education and collective knowledge were not related, perceptions may have promoted learning. The strong correlation between collective knowledge and both perceived entertainment and perceived education may suggest that audiences paid attention to and learned from the highly dramatic, relational, and emotional storyline even when they knew it contained a wealth of prostate cancer information. Perceptions, not education, may have a more direct impact on knowledge.

The high collective knowledge scores are interesting because this measure was comprised of core and incremental knowledge. All participants theoretically should have been able to learn most of the core information because everyone was exposed to the same baseline story in each condition. On the other hand, participants, in principle, should have known incremental information, which was specific to only their condition. For example, education level 1 viewers should not have been able to know the incremental content found in the educational level 2, 3, or 4 conditions because they were not exposed to this additional, educational material. The high collective knowledge results suggest that individuals knew a fair amount of the core and incremental knowledge.

Specifically, core prostate cancer learning was similar for all viewers, which was not surprising. On average, all of the groups (i.e., 91%=level 1, 88%=level 2, 90%=level 3, and 89%=level 4) correctly had learned 89% of the core knowledge. The high percent may be attributable to the immediate posttest, which may reduce the possibility of forgetting core information. Additionally, the highly entertaining, dramatic storyline could have heightened attention and awareness (i.e., perceptions) to the prostate cancer issues, thereby increasing core knowledge.

Incremental knowledge also did not differ across conditions, which was surprising. Although average incremental learning was lower than for core knowledge, viewers still knew a fair amount of incremental information (83%=level 1, 82%=level 2, 81%=level 3, and 78%=level 4) even when they were not exposed to all of the incremental knowledge. For example, viewers in the education level 1 group should not have learned any incremental content, but as much incremental information as the other groups.

A few reasons can be offered to explain the incremental knowledge findings. Since no pretest was administered, baseline knowledge was not assessed. It is possible that participants already knew a great deal about prostate cancer before seeing the EE videos. Additionally, participants may already contain knowledge schemas about other cancers in general. Although all cancers are not identical with regard to symptoms, curative options, cures, and recovery, some similarities do exist. Extrapolating from knowledge or experience

with other cancers may have aided viewers to form educated, correct guesses about incremental information.

Attitude: Positive attitudes emerged in all groups, but no difference was found between the educational conditions. Perceptions, rather than objective education, may better explain why attitudes were strongly favorable. A positive relationship was found between perceived education and attitudes. While watching the entertaining storyline, participants developed more favorable attitudes as the EE show was perceived to be more educational. In this case, high knowledge, as a product of perceived education, may have aided to create positive attitudes.

Intentions: Intentions did not differ across the four educational conditions, but individuals overall held favorable intentions. Heightened attention possibly due to individuals perceiving the EE show to be dramatic, exciting, and/or emotional may explain why viewers were more willing to perform prostate cancer behaviors. Because viewers perceived the storyline as entertaining and educational, they may have developed strong intentions.

Conclusion: Based on this information, what is the optimal amount of educational content that should be inserted into an EE television program? This research suggests that any level of education can elicit positive, favorable outcomes. Contrary to popular belief that entertainment shows designed with greater levels of educational information typically do not result in positive outcomes, data here show the opposite. Audiences that watched the EE video embedded with 90% educational information (i.e., level 4) learned about prostate

cancer, developed positive attitudes, and held favorable intentions just as effectively as those who were exposed to far less educational material. However, the key may be how EE shows influence perceptions which affect the outcomes. As individuals find the EE program to be more entertaining and educational, they learn more, develop positive attitudes, and intend to perform health behaviors. In this study, each of the dramatic storylines was perceived as highly entertaining regardless of the amount of prostate cancer education content embedded into them. Perceptions about educational content and entertainment value, rather than just objective education, may be more critical to developing significant, prosocial change.

Goal Two: Hypotheses Two and Three

Hypothesis two (i.e., ogive curve between education and intervening variables) and three (i.e., ogive relationship between intervening variables and outcomes) were not supported by the data.

Hypothesis Two

The data showed that more education resulted in greater cognitive load and boredom. More amounts of information produced significantly the greatest demand on cognitive resources and potentially resulted in the dullest viewing environment. However, viewers did not even experience overwhelming cognitive load or boredom in any of the four conditions. The heaviest load or boredom levels, which were found in the education level 4 viewers, did not even reach the mid-point of the load and boredom scales, suggesting that viewers were not overloaded or bored.

Cognitive Load: A few reasons can be offered to explain why more load was not experienced. Contrary to the educational psychology literature on adult learning and attention spans, individuals here may be illustrating that they have a higher threshold for information load. If an EE program is perceived to be highly entertaining, individuals may tolerate higher levels of education, thereby reducing their cognitive load. Another reason that viewers were not overloaded may be that they were not actively processing the prosocial information because they already knew about prostate cancer--and rather energy was spent on understanding just the entertaining characters, not the educational information. Finally, the audience may already have cognitive schemas in place with which to analyze and interpret cancer-related education. By relying on these schemas as potential heuristics even if they are not about prostate cancer specifically, central processing may not require extensive cognitive resources, thereby reducing information overload.

Boredom: Some explanations can be provided for low boredom as well. The uniqueness of watching an entertaining show for the first time may limit the extent to which the show is perceived as boring and dull. The excitement and thrill of viewing something for the first time may counteract any potentially boring, dull moments. Even though audiences may have realized that they were watching a program containing a sizable amount of prostate cancer information, the novelty, emotional arousal, and/or excitement may have inhibited or counteracted perceptions about boredom. Additionally, since the videos and storylines were perceived as entertaining and they captured attention,

entertainment lends itself to not being boring. Because NYPD Blue is a well produced, high quality program designed to be aired during primetime American television, the show inherently has high entertainment value, possibly limiting boredom. These are some reasons why viewers overall did not find the EE video to be very boring.

Hypothesis Three

The data between the intervening variables (i.e., cognitive load and boredom) and the outcomes (collective knowledge, attitude, and intention) did not support the predicted ogive curve. Some interesting insights were uncovered.

Cognitive Load and Knowledge: Collective knowledge was high (i.e., 90%=level 1, 89%=level 2, 84%=level 3, and 81%=level 4) across all groups even though learning decreased as cognitive load increased. The high collective knowledge scores are interesting because this measure was comprised of core and incremental knowledge.

Specifically, more load produced lower core knowledge scores. On average, all of the groups (i.e., 94%=level 1, 92%=level 2, 87%=level 3, and 84%=level 4) had correctly learned 89% of the core knowledge. High core knowledge learning may be attributable to the immediate posttest, which reduced the probability of forgetting information. Additionally, the highly entertaining, dramatic storyline could have heightened perceptual attention and awareness to the educational issues.

Increased load also resulted in less incremental knowledge across the four groups. Although incremental learning was lower than that of core knowledge, viewers still learned a fair amount (83%=level 1, 84%=level 2, 79%=level 3, and 77%=level 4). What is astonishing is how education level 1 viewers who were only exposed to core content knew more than the other groups. A few suggestions for this surprising finding may be suggested. It is possible that participants already knew a great deal about prostate cancer or had some experience with the disease before seeing the EE video. Also, cognitive schemas about cancer in general could have been used to extrapolate correct incremental knowledge (i.e., resulting in successful "guesses" of the correct answers).

Cognitive Load and Attitudes/Intention: Less favorable attitude was self-reported as cognitive load increased, but overall attitudes were positive across the conditions. Regardless of the level of information overload experienced, more cognitive load produced more favorable intention. Moderately favorable intentions were held in all groups.

Cognitive Load Conclusion: Collectively, cognitive load appears to be a psychological moderator due to its influence between education and outcomes. Because individuals are processing educational messages and/or entertainment content, the addition of more information potentially heightens the overload and depletes cognitive resources. This process may force attention to general messages (i.e. core knowledge) and potentially may limit the amount of energy devoted to comprehending the detailed, specific messages (i.e. incremental

knowledge). Overtime, individuals learn less, and incremental knowledge is lower than core knowledge as load increases with additional health education. Since favorable attitudes are often linked to knowledge gain-both of which require information processing, cognitive load may also inhibit attitudinal development. Unlike the negative relationship for collective knowledge and attitude, this research found a positive correlation between cognitive load and behavioral intention. It is possible that developing favorable intentions requires a greater degree of cognitive processing than that of knowledge or attitudes. As the brain begins to be overloaded, the viewer strategically has to process, analyze, and understand not only educational information but also entertainment content. For example, he/she also has to question and interpret why the storyline, relationships, and characters have or perform certain health behaviors, which actions are positive and rewarded (i.e., outcome expectations), what behaviors are doable (i.e., self-efficacy), and/or which practices are most effective (i.e. response efficacy). This magnitude of cognitive processing may increase load, and at the same time, it may reaffirm or strengthen intentions to perform healthy actions. Education appears to increase load, which in turn influences knowledge and attitudes negatively, but it effects intentions positively.

The theory of cognitive load does not suggest a concrete breaking time point for this study. Since more educational content can be effective at developing favorable outcomes while producing little cognitive load, should we be concerned about highly educational programs? This research suggests that we should not be concerned because very little load is experienced, and outcomes

are still positive and favorable overall. Programs can be designed with 29 or more educational minutes because EE television shows with a plethora of educational information do not appear to cognitively tire out audiences. They continue to learn, develop favorable attitudes, and hold positive intentions.

Boredom and Knowledge: More boredom produced less learning about collective prostate cancer knowledge, but percent correct across was high (i.e., 88%=level 1, 88%=level 2, 86%=level 3, and 83%=level 4). The high collective knowledge scores are interesting because this measure was comprised of core and incremental knowledge.

Core learning was different across the boredom conditions. On average, participants (i.e., 92%=level 1, 91%=level 2, 88%=level 3, and 87%=level 4) had correctly learned 90% of the core knowledge. The high percent may be attributable to the immediate posttest and heightened perceptual attention/awareness.

Increased boredom also resulted in less incremental knowledge. Although the incremental learning was lower than core knowledge, viewers still learned a fair share (83%=level 1, 83%=level 2, 81%=level 3, and 77%=level 4). The education level 1 viewers who were only exposed to the core messages knew more incremental knowledge. It is possible that they already knew a great deal about prostate cancer before seeing the EE video. Another explanation may be that they were using their generalized cancer cognitive schema to make educated guesses.

Boredom and Attitudes/Intentions: Similar to collective knowledge, increases in boredom produced less favorable attitudes, but attitude was positive across all conditions. Although participants held moderately favorable intentions regardless of how much boredom they experienced, the significant differences across the four groups suggests an interesting insight. When individuals are bored while watching an entertaining program, they may tune out the show. However, they may continue to think about the educational content afterwards, which may strengthen or reaffirm one's desire to help an older male figure.

Boredom Conclusion: Boredom appears to be a psychological moderater between education and knowledge, attitudes, and intentions, but boredom's effect is significantly smaller than that of cognitive load. Until now, we have assumed that EE programs incorporated with heavy educational content would be a turn off, or dull, for audiences. While the audience did report some boredom, it was not very strong even in the educational/boredom level 4 group. This research may begin to show that EE television dramas laden with substantial amounts of prosocial messages may not be perceived as a "repetitive experience of any kind, routine, dull work" (Zuckerman, 1979, p. 103). Theories of boredom do not appear to offer much explanatory power to the EE literature -- contrary to popular belief. Individuals may never find an EE program boring as long as it is perceived as highly entertaining, it is novel to them, it is relevant to them, or it is melodramatic in nature. Theoretical development about EE may not benefit by pursuing boredom. Objective education may increase boredom which in turn may influence knowledge and attitudes negatively, but prosocial change

may not be directly tied to objective education. Rather, perceptions about boredom may be more important.

Goal Three

Goal three was to show EE's effectiveness. Unlike quasi-experimental EE field studies documented in the literature, this study begins to provide some of the first controlled experimental data which suggests that manipulated educational-entertaining videos may elicit prosocial outcomes. Since no follow-up (i.e., two or four months later) was administered, an assessment about longitudinal change could not be made. However, regardless of the amount of health education, favorable knowledge, attitudes, and behavioral intentions were reported after exposure to the drama. Significant differences between treatment groups did not exist for certain outcomes, but we have greater confidence in EE's potential as a strategy for prosocial change.

Limitations

The limitations of this study can be categorized as: (a) a lack of identification and involvement with the EE program, (b) unrealistic viewing constraints, and (c) limited external validity.

First, the NYPD Blue show and specifically the prostate cancer storyline were intended to be targeted to middle-age, Caucasian males and females when they were originally aired. Because this study selected young, college undergraduates as its participants, they may not have been able to identify with the show's characters from a racial, attitudinal, and socio-demographic perspective. Additionally, respondents may not have identified with

characteristics of the content (i.e., the prostate cancer messages) personally because the disease typically afflicts older males. A lack of identification could have influenced how personally uninvolved the undergraduate students were with the characters and content. Findings may have been stronger if participants were more similar to the characters in the storyline because interactions between the viewer and the characters may have increased the likelihood of identification and involvement.

Second, the edited videos may have been unrealistic. When the original NYPD Blue show aired the nine prostate cancer episodes, it did so over a nine-week period. This more than two month phase provided audiences with ample time to think about and question the educational messages found in the dramatic EE narrative by potentially seeking prostate cancer information from health care providers and/or communicating with family and friends. In other words, the extended time frame afforded viewers the opportunity to contemplate knowledge, attitudes, and practice changes.

The experiment truncated the entire nine episodes into a 32- minute storyline, thereby exposing the participants to an unrealistic timeline. Although the educational issues found in the stimulus videos were realistic, the nature of its delivery may not have been. Respondents may not have had enough time to evaluate the prostate cancer storyline adequately.

One other limitation is decreased external validity. Due to the artificial lab setting of this experiment and its chosen study audience, the ability to generalize to other audiences, educational topics, and settings is greatly diminished. For

example, with respect to cognitive load and boredom, the experimental process may have created information overload or boredom-albeit it was low-which ordinarily would not have been experienced by audience members in real-life watching the show over the course of nine weekly episodes. The artificially induced cognitive load or boredom in this study may not represent a real-life process. However, the basis of this study offers some insights into how a certain type of person may process pro-social health information in a particular setting, thereby providing some recommendations for future studies and a research agenda on entertainment-education.

Recommendations and Future Studies

Based on the results from this study, some recommendations can be offered for scholars and practitioners to consider when studying and designing future studies and EE television programs.

First, EE designers should not be afraid to insert more educational content into highly entertaining programs. This research shows that even with stronger levels of education audiences can still learn a great deal, develop favorable attitudes, and maintain positive intentions. The assumption that highly educational television may result in detrimental cognitive overload or boredom needs to be reexamined. This study points out that highly educational-entertaining programs may, in reality, very little information load or boredom. Future researchers need to study what outcomes can be achieved if EE designers produce highly educational shows with only moderate or low entertainment value.

Second, EE designers should more clearly understand the balance between entertainment and education. Although a program may have a certain amount of objective educational content, audiences may not perceive the drama to be educational as intended. Designers should be more concerned with a perceptual, mixed EE balance. Scholars must experimentally learn when audiences begin to perceive an EE drama as entertainment versus education. Future investigations must focus on determining if EE television viewers perceive EE as entertainment first and then education or vice versa, or at the same time, in order to understand if varying levels of entertainment can be crossed with differing amounts of education. For example, if scholars can experimentally test and show that moderate levels of entertainment can be equally as effective as high entertainment (assuming the same amount of educational content) in producing prosocial changes in health, then entertainment-education designers may be able to invest less money, resources, and time to write, develop, produce, and direct elaborate storylines, characters, relationships, etc. Future EE interventions may benefit from this type of research.

Finally, EE scholars and practitioners need to consider the role of cognitive load, not boredom, when attempting to understand how EE motivates an audience and elicits changes in knowledge, attitude, and intentions. This research points out that cognitive load has a stronger impact on outcomes than boredom. Figure 6 proposes a conceptual pathway for theorists to consider as they continue to develop models that attempt to explain EE effects. This framework begins to illustrate a process between education, perceptions,

cognitive load, and outcomes, and it raises three questions for future research on EE and cognitive load.

First, how can programs be designed effectively with cognitive load in mind? Since cognitive load rests upon processing educational and non-educational information, future EE producers should carefully pay attention to the entertainment and educational programming characteristics and how they are perceived. For example, researchers should investigate the number, time frame, and complexity of when, how, and why characters, relationships, and storylines are introduced, maintained, and terminated in the EE show. By studying these entertainment attributes and how much cognitive load is created, EE producers can shape the entertainment content of the EE intervention while limiting the audience's cognitive load. Similarly, scholars should examine the number, type, and complexity of health education messages that are embedded into the EE show. By understanding the right balance of these educational characteristics, EE designers will know how many different prosocial messages can be optimally included without overloading a viewer.

Second, does entertainment or education create more cognitive load? Keeping all things equal, future studies must determine if cognitive load is more a function of entertainment characteristics or educational content. According to Figure 6, viewers may begin to perceive entertainment value and educational messages at the same time. If researchers can determine which EE component contributes to more cognitive load or which EE component results in information load first, then designers can begin to insert pro-social messages and dramatic,

entertainment sequences strategically into the storyline in order to reduce cognitive load. This line of research may be able to examine how long entertainment and educational sequences should be to decrease viewer load.

Finally, what EE program characteristics are harder to analyze for the audience, thereby contributing to greater cognitive load? Research in the future should be devoted to studying if viewers have more difficulty (and take more time) analyzing, understanding, and perceiving entertainment value or educational content, assuming equal conditions. The theory of cognitive load suggests that more complex or harder to process stimuli lead to more cognitive load. If EE scholars can determine that a significant difference does exist between entertainment versus educational processing, then EE designers can intentionally simplify that specific component and reduce a viewer's cognitive load.

Acquiring the answers to these questions will take time, but research in the future will allow EE scholars, designers, and evaluators to better understand entertainment-education television strategies.

Appendices

Appendix A

Pilot Study Survey

Texas A&M University is conducting a study to assess your health profile. By collecting this information, researchers specifically plan to design health education materials about prostate cancer. Please do not write any identifying information on this survey in order to protect your privacy. Since responses to this survey are confidential, please complete this survey truthfully. Please follow the instructions for each section. Thank you for your time and effort.

Part 1. Please tell us how much you know about prostate cancer by circling one of the three choices to each statement (i.e., correct, incorrect, or don't know).

- A common symptom of prostate cancer is difficulty urinating. Correct Incorrect Don't Know
- Prostate cancer is typically a life-ending condition. Correct Incorrect Don't Know
- Prostate cancer is difficult to detect. Correct Incorrect Don't Know
- Prostate cancer can only be detected by a MRI scan. Correct Incorrect Don't Know
- The MRI scan requires the patient to lay enclosed in a small, confined space. Correct Incorrect Don't Know
- MRI scans are more effective at screening for prostate cancer than CAT scans. Correct Incorrect Don't Know
- During prostate cancer surgery, the doctor typically checks the lymph nodes to see if the cancer has spread. Correct Incorrect Don't Know
- During prostate cancer surgery, the doctor typically checks the bladder to see if the cancer has spread. Correct Incorrect Don't Know

- During prostate cancer surgery, the doctor examines the aorta to see if the cancer has spread. Correct Incorrect Don't Know

- During prostate cancer surgery, an incision from the navel to the base of the penis is made. Correct Incorrect Don't Know

- A PSA score of 6 means that the patient no longer has prostate cancer. Correct Incorrect Don't Know

- Prostate cancer surgery can result in blood clots in the legs. Correct Incorrect Don't Know

- The use of elastic leg stockings may prevent blood clots in the legs after prostate cancer surgery. Correct Incorrect Don't Know

- Urinary control is a typical problem after prostate cancer surgery. Correct Incorrect Don't Know

- A lack of urinary control is a permanent condition after prostate cancer surgery. Correct Incorrect Don't Know

- A PSA score of .9 after surgery means that a patient is completely cancer free. Correct Incorrect Don't Know

- A PSA score of .9 after surgery means that a patient is a "slow clear". Correct Incorrect Don't Know

- A drop in PSA score from 6 to .9 after surgery is a good thing. Correct Incorrect Don't Know

- Higher PSA levels indicate a higher risk of prostate cancer. Correct Incorrect Don't Know

- Someone with prostate cancer may take up to 20 minutes to urinate. Correct Incorrect Don't Know

- Prostate cancer can only be treated by surgery. Correct Incorrect Don't Know

- Prostate cancer surgery removes the prostate gland. Correct Incorrect Don't Know
- During post-operative walking, the incision begins to stretch. Correct Incorrect Don't Know
- If the prostate cancer has spread to other places, the doctor will not perform the surgery. Correct Incorrect Don't Know
- Dizziness is a common symptom after prostate cancer surgery. Correct Incorrect Don't Know
- A PSA score of .9 after surgery could suggest that the cancer has spread. Correct Incorrect Don't Know
- A PSA score of .9 after surgery could suggest that all of cancer around the prostate was removed. Correct Incorrect Don't Know
- If the prostate gland is removed, a person's PSA score should be 0. Correct Incorrect Don't Know
- After prostate cancer surgery, a patient's PSA score is typically checked again 3 months later. Correct Incorrect Don't Know
- After prostate cancer surgery, a man may experience erectile dysfunction. Correct Incorrect Don't Know
- Men can perform sexually within a few months after prostate cancer surgery. Correct Incorrect Don't Know

Part 2. Think about older male figures (i.e., father, uncle, brother, husband, cousin, grandfather) in your life. Then respond to the following statements by circling one number (1-7) for each set of adjectives.

- Encouraging your older male figures to seek social support (i.e. talking, listening, getting comforted, getting advice/information about prostate cancer) from people (i.e., spouse/girlfriend, family member, friends, you, doctor) is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Unmacho	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Macho**
Embarrassing	1	2	3	4	5	6	7	Not Embarrassing

- Encouraging your older male figures to go to the doctor to get checked for prostate cancer is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Unmacho	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Macho**
Embarrassing	1	2	3	4	5	6	7	Not Embarrassing

- Providing social support (i.e. talking, listening, comforting, advising, giving) to your older male figures who may be at risk for prostate cancer or has prostate cancer is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*Easy*
Unmacho	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Macho**
Embarrassing	1	2	3	4	5	6	7	Not Embarrassing

- Going to the doctor to get information about prostate cancer is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Unmacho	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Macho**
Embarrassing	1	2	3	4	5	6	7	Not Embarrassing

- Dealing with prostate cancer alone is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Unmacho	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Macho**
Embarrassing	1	2	3	4	5	6	7	Not Embarrassing

Part 3. Think about older male figures (i.e., father, uncle, brother, husband, cousin, grandfather) in your life. Then respond to the following statements by indicating how much you strongly disagree (SD) or strongly agree (SA) to the following statements about prostate cancer. Please circle only one number (1-7) for each statement.

	Strongly Disagree						Strongly Agree
▪ I will tell my older male figures to talk/listen to others about prostate cancer.	1	2	3	4	5	6	7
▪ I plan to tell my older male figures to get information about prostate cancer from the doctor.	1	2	3	4	5	6	7
▪ I will encourage my older male figures to get a regular medical exam to screen for prostate cancer.	1	2	3	4	5	6	7
▪ I plan to motivate my older male figures to visit their doctors.	1	2	3	4	5	6	7
▪ I will talk to my older male figures about prostate cancer.	1	2	3	4	5	6	7
▪ I plan on supporting my older male figures.	1	2	3	4	5	6	7
▪ I am going to talk with my older male figures about prostate cancer because Andy, his wife, and friends did in the video.	1	2	3	4	5	6	7
▪ I intend to get information about prostate cancer from the doctor.	1	2	3	4	5	6	7
▪ I will speak with a doctor about prostate cancer.	1	2	3	4	5	6	7
▪ I will go to the doctor because Andy and his wife did in the video.	1	2	3	4	5	6	7

	Strongly Disagree						Strongly Agree
▪ I want to get information from a doctor because Andy and his wife did in the video.	1	2	3	4	5	6	7

Part 4. Respond to the following statements by indicating how much you strongly disagree (SD) or strongly agree (SA) to the following statements about the video's content. Please circle only one number (1-7) for each statement.

	Strongly Disagree						Strongly Agree
▪ I feel I got too much prostate cancer information at once.	1	2	3	4	5	6	7
▪ I can not think anymore about prostate cancer.	1	2	3	4	5	6	7
▪ My brain is overload with information about prostate cancer.	1	2	3	4	5	6	7
▪ I feel mentally drained after watching the video.	1	2	3	4	5	6	7
▪ I tuned the video out after a point because I could not process more prostate cancer information.	1	2	3	4	5	6	7
▪ I was bored while watching the video.	1	2	3	4	5	6	7
▪ I found difficulty keeping interest in the video.	1	2	3	4	5	6	7
▪ I would have preferred a shorter video.	1	2	3	4	5	6	7
▪ I got restless during the video.	1	2	3	4	5	6	7
▪ I prefer videos that are more exciting.	1	2	3	4	5	6	7
▪ I got tired from hearing about prostate cancer.	1	2	3	4	5	6	7

Part 5. Respond to the following statements by indicating how much you strongly disagree (SD) or strongly agree (SA) to the following statements about the characteristics of the video. Please circle only one number (1-7) for each statement.

	Strongly Disagree						Strongly Agree
▪ The video is a quality production.	1	2	3	4	5	6	7
▪ The video is easy to understand.	1	2	3	4	5	6	7
▪ The video is easy to watch.	1	2	3	4	5	6	7
▪ The video is clear.	1	2	3	4	5	6	7
▪ The video is a realistic portrayal.	1	2	3	4	5	6	7
▪ The story line is easy to follow.	1	2	3	4	5	6	7
▪ I understood the issues discussed in the video.	1	2	3	4	5	6	7
▪ It is easy to get the point of this video.	1	2	3	4	5	6	7
▪ The video is entertaining.	1	2	3	4	5	6	7
▪ The video is educational.	1	2	3	4	5	6	7
▪ The video is fun to watch.	1	2	3	4	5	6	7
▪ The video captures my attention.	1	2	3	4	5	6	7
▪ The video maintains my interest.	1	2	3	4	5	6	7
▪ The video arouses my emotions	1	2	3	4	5	6	7
▪ The video is boring to watch.	1	2	3	4	5	6	7

	Strongly Disagree						Strongly Agree
▪ The video provides a lot of good (quality) information about prostate cancer.	1	2	3	4	5	6	7
▪ This video shows me skills I may need to help older at-risk male figures.	1	2	3	4	5	6	7
▪ I learned a lot about prostate cancer from this video.	1	2	3	4	5	6	7

▪ What percentage (0% - 100%) of the video is educational to me? _____%

▪ What percentage (0% - 100%) of the video is entertaining to me? _____%

▪ How much video time (0 minutes – 32 minutes) was educationally informing about prostate cancer?_____ minutes

Part 6. Please complete the following questions about yourself. The following questions ask about basic demographic information. Please circle only one choice or write-in your response.

▪ What is your race?

Caucasian	African American
Asian/Pacific Islander	Native American
Hispanic/Latino	Other_____

▪ What is your gender?

Male	Female

▪ How old are you? _____ years

▪ What is your marital status?

Single	Divorced
Married	Widowed

▪ What is your undergraduate classification?

Freshman	Sophomore
Junior	Senior

▪ How often do you watch the television show "NYPD BLUE"?

Almost every week	About 2-3 times a month
Once a month	Less than once a month
Never	

- When thinking about older male figures in your life, who is the first person that comes to mind?
  Grandfather Father Uncle Older Brother Husband/Boyfriend

  Other_____

- How close are you emotionally to this older male figure?

  Not very close 1 2 3 4 5 6 7 Very Close

- Have you ever spoken with a male figure about prostate cancer? Yes No

- Have you gotten information about prostate cancer from a doctor? Yes No

- Has an older male figure in your life ever been screened for prostate cancer? Yes No Don't Know

- Has an older male figure in your life ever been diagnosed with prostate cancer? Yes No Don't Know

- Has an older male figure in your life ever been treated for prostate cancer? Yes No Don't Know

THANK YOU FOR YOUR TIME AND EFFORT!

Appendix B

Dissertation Study Survey

Texas A&M University is conducting a study to assess your health profile. By collecting this information, researchers specifically plan to design health education materials about prostate cancer. Please do not write any identifying information on this survey in order to protect your privacy. Since responses to this survey are confidential, please complete this survey truthfully. Please follow the instructions for each section. Thank you for your time and effort.

Part 1. Please tell us how much you know about prostate cancer by circling one of the three choices to each statement (i.e., correct, incorrect, or don't know).

▪ A common symptom of prostate cancer is difficulty urinating.	Correct	Incorrect	Don't Know
▪ Prostate cancer is typically a life-ending condition.	Correct	Incorrect	Don't Know
▪ Prostate cancer is difficult to detect.	Correct	Incorrect	Don't Know
▪ Prostate cancer can only be detected by a MRI scan.	Correct	Incorrect	Don't Know
▪ MRI scans are more effective at screening for prostate cancer than CAT scans.	Correct	Incorrect	Don't Know
▪ During prostate cancer surgery, the doctor typically checks the lymph nodes to see if the cancer has spread.	Correct	Incorrect	Don't Know
▪ During prostate cancer surgery, the doctor typically checks the bladder to see if the cancer has spread.	Correct	Incorrect	Don't Know
▪ During prostate cancer surgery, the doctor examines the aorta to see if the cancer has spread.	Correct	Incorrect	Don't Know
▪ During prostate cancer surgery, an incision from the navel to the base of the penis is made.	Correct	Incorrect	Don't Know

- Higher PSA levels indicate a higher risk of prostate cancer. Correct Incorrect Don't Know

- A PSA score of 6 means that the patient no longer has prostate cancer. Correct Incorrect Don't Know

- Prostate cancer surgery can result in blood clots in the legs. Correct Incorrect Don't Know

- The use of elastic leg stockings may prevent complications in the legs after prostate cancer surgery. Correct Incorrect Don't Know

- A lack of urinary control is a permanent condition after prostate cancer surgery. Correct Incorrect Don't Know

- A PSA score of .9 after surgery means that a patient is completely cancer free. Correct Incorrect Don't Know

- A PSA score of .9 after surgery means that a patient is a "slow clear". Correct Incorrect Don't Know

- A drop in PSA score from 6 to .9 after surgery is a good thing. Correct Incorrect Don't Know

- Someone with prostate cancer may take up to 20 minutes to urinate. Correct Incorrect Don't Know

- Prostate cancer can only be treated by surgery. Correct Incorrect Don't Know

- Prostate cancer surgery removes the prostate gland. Correct Incorrect Don't Know

- During post-operative walking, the incision begins to stretch. Correct Incorrect Don't Know

- If the prostate cancer has spread to other places, the doctor will not perform the surgery. Correct Incorrect Don't Know

- Dizziness is a common symptom after prostate cancer surgery. Correct Incorrect Don't Know

- A PSA score of .9 after surgery could suggest that the cancer has spread. Correct Incorrect Don't Know

- A PSA score of .9 after surgery could suggest that all of cancer around the prostate was removed. Correct Incorrect Don't Know

- If the prostate gland is removed, a person's PSA score should be 0. Correct Incorrect Don't Know

- After prostate cancer surgery, a patient's PSA score is typically checked again 3 months later. Correct Incorrect Don't Know

- After prostate cancer surgery, a man may experience erectile dysfunction. Correct Incorrect Don't Know

- Men can perform sexually within a few days after prostate cancer surgery. Correct Incorrect Don't Know

Part 2. Think about older male figures (i.e., father, uncle, brother, husband, cousin, grandfather) in your life. Then respond to the following statements by circling one number (1-7) for each set of adjectives.

- Encouraging your older male figures to seek social support (i.e. talking, listening, getting comforted, getting advice/information about prostate cancer) from people (i.e., spouse/girlfriend, family member, friends, you, doctor) is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Embarrassing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Not Embarrassing**

- Encouraging your older male figures to go to the doctor to get checked for prostate cancer is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Embarrassing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Not Embarrassing**

- Providing social support (i.e. talking, listening, comforting, advising, giving) to your older male figures who may be at risk for prostate cancer or has prostate cancer is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Embarrassing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Not Embarrassing**

- Going to the doctor to get information about prostate cancer is:

Bad	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Embarrassing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Not Embarrassing**

Dealing with prostate cancer alone is:								
Bad	1	2	3	4	5	6	7	**Good**
Undesirable	1	2	3	4	5	6	7	Desirable
Negative	1	2	3	4	5	6	7	**Positive**
Hard	1	2	3	4	5	6	7	Easy
Embarrassing	1	2	3	4	5	6	7	**Not Embarrassing**

Part 3. Think about older male figures (i.e., father, uncle, brother, husband, cousin, grandfather) in your life. Then respond to the following statements by indicating how much you strongly disagree (SD) or strongly agree (SA) to the following statements about prostate cancer. Please circle only one number (1-7) for each statement.

	Strongly Disagree						**Strongly Agree**
I will tell my older male figures to talk/listen to others about prostate cancer.	1	2	3	4	5	6	7
I plan to tell my older male figures to get information about prostate cancer from the doctor.	1	2	3	4	5	6	7
I will encourage my older male figures to get a regular medical exam to screen for prostate cancer.	1	2	3	4	5	6	7
I plan to motivate my older male figures to visit their doctors.	1	2	3	4	5	6	7
I will talk to my older male figures about prostate cancer.	1	2	3	4	5	6	7
I plan on supporting my older male figures.	1	2	3	4	5	6	7

	Strongly Disagree						Strongly Agree
▪ I am going to talk with my older male figures about prostate cancer because Andy, his wife, and friends did in the video.	1	2	3	4	5	6	7
▪ I intend to get information about prostate cancer from the doctor.	1	2	3	4	5	6	7
▪ I will speak with a doctor about prostate cancer.	1	2	3	4	5	6	7
▪ I will go to the doctor because Andy and his wife did in the video.	1	2	3	4	5	6	7
▪ I want to get information from a doctor because Andy and his wife did in the video.	1	2	3	4	5	6	7
▪ I will tell my older male figures to listen to others about prostate cancer.	1	2	3	4	5	6	7

Part 4. Respond to the following statements by indicating how much you strongly disagree (SD) or strongly agree (SA) to the following statements about the video's content. Please circle only one number (1-7) for each statement.

	Strongly Disagree						Strongly Agree
▪ I feel I got too much prostate cancer information at once.	1	2	3	4	5	6	7
▪ I can not think anymore about prostate cancer.	1	2	3	4	5	6	7
▪ My brain is overload with information about prostate cancer.	1	2	3	4	5	6	7
▪ I tuned the video out after a point because I could not process more prostate cancer information.	1	2	3	4	5	6	7

	Strongly Disagree						Strongly Agree
▪ I was bored while watching the video.	1	2	3	4	5	6	7
▪ I found difficulty keeping interest in the video.	1	2	3	4	5	6	7
▪ I would have preferred a shorter video.	1	2	3	4	5	6	7
▪ I got restless during the video.	1	2	3	4	5	6	7
▪ I got bored hearing about prostate cancer.	1	2	3	4	5	6	7

Part 5. Respond to the following statements by indicating how much you strongly disagree (SD) or strongly agree (SA) to the following statements about the characteristics of the video. Please circle only one number (1-7) for each statement.

	Strongly Disagree						Strongly Agree
▪ The video is a quality production.	1	2	3	4	5	6	7
▪ The video is easy to understand.	1	2	3	4	5	6	7
▪ The video is easy to watch.	1	2	3	4	5	6	7
▪ The video is clear.	1	2	3	4	5	6	7
▪ The video is a realistic portrayal.	1	2	3	4	5	6	7
▪ The story line is easy to follow.	1	2	3	4	5	6	7
▪ I understood the issues discussed in the video.	1	2	3	4	5	6	7
▪ It is easy to get the point of this video.	1	2	3	4	5	6	7
▪ The video is entertaining.	1	2	3	4	5	6	7
▪ The video is educational.	1	2	3	4	5	6	7

- The video captures my attention. 1 2 3 4 5 6 7

- I learned a lot about prostate cancer from this video. 1 2 3 4 5 6 7

- What percentage (0% - 100%) of the video is educational to me? _____%

- What percentage (0% - 100%) of the video is entertaining to me? _____%

- How much video time (0 minutes – 32 minutes) was educationally informing about prostate cancer?_____ minutes

Part 6. Please complete the following questions about yourself. The following questions ask about basic demographic information. Please circle only one choice or write-in your response.

- What is your race?
  Caucasian African American
  Asian/Pacific Islander Native American
  Hispanic/Latino Other_____

- What is your gender?
  Male Female

- How old are you? _____ years

- What is your marital status?
  Single Divorced
  Married Widowed

- What is your undergraduate classification?
  Freshman Sophomore
  Junior Senior

- How often do you watch the television show "NYPD BLUE"?
  Almost every week About 2-3 times a month
  Once a month Less than once a month
  Never

- When thinking about older male figures in your life, who is the first person that comes to mind?
  Grandfather Father Uncle Older Brother Husband/Boyfriend

  Other_____

- How close are you emotionally to this older male figure?

  Not very close 1 2 3 4 5 6 7 Very Close

- Have you ever spoken with a male figure about prostate cancer? Yes No

- Have you gotten information about prostate cancer from a doctor? Yes No

- Has an older male figure in your life ever been screened for prostate cancer? Yes No Don't Know

- Has an older male figure in your life ever been diagnosed with prostate cancer? Yes No Don't Know

- Has an older male figure in your life ever been treated for prostate cancer? Yes No Don't Know

THANK YOU FOR YOUR TIME AND EFFORT!

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FOOTNOTES

1. An ogive is a curve which has both a linear and non-linear component, thereby resulting in a small, r-shaped curve. The linear aspect of the ogive expresses a rapid rate of change between the two variables while the non-linear component is constrained by a law of diminished return.
2. Since there are three outcomes, three independent figures should be drawn-one for each outcome. However, the shape of each curve is hypothetically identical so only one graph has been drawn. Also, the education conditions of level 1, 2, 3, and 4 are represented by 1, 2, 3, and 4.
3. Since there are two intervening variables, two independent figures should be drawn-one for each intervening variable. However, the shape of each curve is hypothetically identical so only one graph has been drawn. Also, the education conditions of level 1, 2, 3, and 4 are represented by 1, 2, 3, and 4.
4. Since there are two intervening variables and three outcomes, six independent figures should be drawn-one for each combination of the intervening variable and the outcome. However, the shape of each curve is hypothetically identical so only one graph has been drawn. Also, the intervening variable conditions of level 1, 2, 3, and 4 are represented by 1, 2, 3, and 4.

Tables

Table 1

Examples of the messages contained in each of the educational units embedded in NYPD Blue's prostate cancer storyline

Unit	Educational Message Examples
1	• difficulty urinating • Andy's coworker asking about going to the doctor (i.e., "did you see a doctor?")
2	• Andy's wife shows relief non-verbally (i.e., "touching", "holding", "hugging") • Andy's wife expresses relief verbally (i.e., "thanks for going to the doctor")
3	• Andy's doctor shows anger non-verbally (i.e., "vocalics, "facial expressions") • Andy's doctor expresses angry verbally (i.e., "called wife", "professional obligation", "feel pain", "not a death sentence") • Doctor talks about possibilities
4	• Andy and wife talk about tests (i.e., "scanning tests") • Andy's wife show concern non-verbally (i.e., "hugging") • Andy's wife expresses concern verbally (i.e., "think of life and family", "don't be afraid") • Andy and wife talk about cure (i.e., "take the tumor out")
5	• Andy's doctor talks about options (i.e., "different procedures exists") • Andy's coworker expresses concern verbally (i.e., "Andy, ask the doctor") • Andy the coworker talk about curative options (i.e., "he has to cut into me")
6	• Andy and wife talk about test (i.e., "CAT versus MRI")
7	• Andy's wife shows comfort non-verbally (i.e., "holding hands, touching, vocalics") • Andy and doctor talk about cure (i.e., "procedures during surgery") • Andy and doctor talk about surgery (i.e., "incision made", "medication available", "there is pain", "check PSA")
8	• Andy and nurses talking in post-op (i.e., "walking is painful", "blood clots in legs", "pain medication in reserve") • Andy's wife shows comfort non-verbally (i.e., "holding hands", "vocalics", "facial "expressions", "proximity", "help walking after surgery") • Andy's wife expresses comfort verbally (i.e., "surgery is ok")
9	• Andy's coworker helps with bladder problem (i.e., "incontinence", "giving pants") • Andy calls wife for new pants (i.e., "talking about problem")
10	• Andy and doctor talk about recovery (i.e., "PSA: .9 does not equal 0", "slow clear", "cancer could be spreading")
11	• Andy wants to talk to wife (i.e., "needs help with some news", "about his fears", "Andy's positive views", "alternative is slow clear")
12	• Andy and doctor talk about recovery (i.e., "PSA is ok", "urinary control", "sex with a pill")
13	• Andy's wife express comfort verbally about having sex again (i.e., "she has read about it", "encouraging him to get the prescription") • Andy talks to wife about sex (i.e., "telling her about prescription", "doctors say can have sex again")
14	• Andy and wife talk after sex (i.e., "let's do it again-second time")

Table 2

Each experimental condition's video's number of prostate cancer educational units, timeline, and the specific educational information embedded in NYPD Blue's prostate cancer storyline

Educational Condition	Units	Timeline	Prostate Cancer Educational Information
Education Level One	**Unit 1 (Filler)** **Unit 3 (Filler)** **Unit 6 (Filler)** **Unit 7 (Filler)** **Unit 9 (Filler)** **Unit 11(Filler)**	**0:00-2:56 (2:56-6:11)** **6:11-8:17 (8:17-11:32)** **11:32-13:23 (13:23-16:38)** **16:38-19:09 (19:09-22:24)** **22:24-25:11 (25:11-28:26)** **28:26-31:57**	**Difficulty Urinating** **Life-ending Condition** **Difficulty of Detection** **MRI versus CAT** **Surgery: Spread of Cancer** **Surgery: Incision** **Surgery: Blood Clots** **PSA Score: Number & Level** **Urinary Control** **Slow Clear**
Education Level Two	**Unit 1 (Filler)** Unit 2 (Filler) **Unit 3 (Filler)** **Unit 6 (Filler)** **Unit 7 (Filler)** Unit 8 (Filler) **Unit 9 (Filler)** **Unit 11 (Filler)** Unit 12 (Filler)	**0:00-2:56 (2:56-4:02)** 4:02-5:14 (5:14-6:20) **6:20-8:26 (8:26-9:32)** **9:32-11:23 (11:23-12:29)** **12:29-15:00 (15:00-16:06)** 16:06-20:30 (20:30-21:36) **21:36-24:23 (24:23-25:29)** **25:29-29:00 (29:00-30:06)** 30:06-31:49	**Difficulty Urinating** **Life-ending Condition** **Difficulty of Detection** **MRI versus CAT** **Surgery: Spread of Cancer** **Surgery: Incision** **Surgery: Blood Clots** **PSA Score: Number & Level** **Urinary Control** **Slow Clear** Surgery: Gland Removal Surgery: Incision Stretch Surgery: Dizziness Surgery: Score & Spreading Erectile Dysfunction
Education Level Three	**Unit 1 (Filler)** **Unit 2 (Filler)** **Unit 3 (Filler)** Unit 4 (Filler) Unit 5 (Filler) **Unit 6 (Filler)** **Unit 7 (Filler)** **Unit 8 (Filler)** **Unit 9 (Filler)** Unit 10 (Filler) **Unit 11 (Filler)** **Unit 12 (Filler)**	**0:00-2:56 (2:56-3:12)** **3:12-4:24 (4:24-4:40)** **4:40-6:46 (6:46-7:02)** 7:02-9:23 (9:23-9:39) 9:39-11:16 (11:16-11:32) **11:32-13:23 (13:23-13:39)** **13:39-16:10 (16:10-16:26)** **16:26-20:50 (20:50-21:06)** **21:06-23:53 (23:53-24:09)** 24:09-26:08 (26:08-26:24) **26:24-29:55 (29:55-30:11)** **30:11-31:54**	**Difficulty Urinating** **Life-ending Condition** **Difficulty of Detection** **MRI versus CAT** **Surgery: Spread of Cancer** **Surgery: Incision** **Surgery: Blood Clots** **PSA: Number & Level** **Urinary Control** **Slow Clear** **Surgery: Gland Removal** **Surgery: Incision Stretch** **Surgery: Dizziness** **Surgery: Score & Spreading** **Erectile Dysfunction** Other Treatment Options PSA: Score & Gland PSA: Timeframe

Educational Condition	Units	Timeline	Prostate Cancer Educational Information
Education Level Four	**Unit 1**	**0:00-2:56**	**Difficulty Urinating**
	Unit 2	**2:56-4:08**	**Life-ending Condition**
	Unit 3	**5:08-6:14**	**Difficulty of Detection**
	Unit 4	**6:14-8:35**	**MRI versus CAT**
	Unit 5	**8:35-10:12**	**Surgery: Spread of Cancer**
	Unit 6	**10:12-12:03**	**Surgery: Incision**
	Unit 7	**12:03-14:34**	**Surgery: Blood Clots**
	Unit 8	**14:34-18:57**	**PSA: Number & Level**
	Unit 9	**18:57-21:44**	**Urinary Control**
	Unit 10	**21:44-23:43**	**Slow Clear**
	Unit 11	**23:43-27:14**	
	Unit 12	**27:14-28:57**	**Surgery: Gland Removal**
	Unit 13	28:57-31:00	**Surgery: Incision Stretch**
	Unit 14	31:00-31:55	**Surgery: Dizziness**
			Surgery: Score & Spreading
			Erectile Dysfunction
			Other Treatment Options
			PSA: Score & Gland
			PSA: Timeframe
			Sexual Performance

The unbolded items in each column for a given educational condition represent the "units", "timeline", and "prostate cancer educational information" that are incrementally added to each educational condition when compared to a preceding educational condition. Additionally, the items in the "prostate cancer educational information" column are not listed according to which educational unit they were extracted from, but rather they are listed chronologically based on where in the NYPD BLUE prostate cancer storyline they are included.

Table 3

The number of prostate cancer educational content minutes versus the number of non-prostate cancer educational content minutes in each experimental condition's video

Condition	Educational Content	Non-Educational Content	Total
Education Level One	15.62 (48.8%)	16.33 (51.2%)	31.95 (100%)
Education Level Two	23.02 (72.3%)	8.80 (27.7%)	31.82 (100%)
Education Level Three	28.97 (90.8%)	2.93 (9.2%)	31.90 (100%)
Education Level Four	31.92 (100%)	0.00 (0%)	31.92 (100%)

Table 4

Characteristics of the pilot study and dissertation participants

Characteristics	Pilot Study (n=80)	Dissertation Study (n=200)
Race		
Caucasian	83%	81%
Asian/Pacific Islander	3%	0%
Hispanic/Latino	8%	9%
African American	6%	3%
Native American	0%	0%
Other	0%	7%
Gender		
Male	22%	21%
Female	78%	79%
Age (years)		
Range	18-24	18-24
Mean	20.3	20.4
Marital Status		
Single	98%	97%
Married	0%	1%
Divorced	1%	0%
Widowed	1%	2%
Education		
Freshman	1%	1%
Sophomore	43%	42%
Junior	39%	38%
Senior	17%	19%
NYPD Blue Viewing		
Almost every week	4%	4%
About 2-3 times a month	1%	1%
Once a month	0%	1%
Less than once a month	18%	16%
Never	77%	78%

Table 5

Reliability coefficients for the pilot study and dissertation scales

Variable	Pilot Study	Dissertation Study
Knowledge		
Cronbach's Alpha	.71	.78
Number of Items	31	29
Attitude		
Cronbach's Alpha	.87	.85
Number of Items	30	25
Behavioral Intention		
Cronbach's Alpha	.92	.93
Number of Items	11	12
Cognitive Load		
Cronbach's Alpha	.85	.91
Number of Items	5	4
Boredom		
Cronbach's Alpha	.84	.93
Number of Items	6	5

Table 6

Descriptives for the intervening and outcome variables

Variable	Mean	Standard Deviation	Minimum Score	Maximum Score	Scale Range
Collective Knowledge	50.02	4.39	38.00	56.00	29 to 58
Core Knowledge	32.25	2.85	25.00	36.00	18 to 36
Incremental Knowledge	17.78	1.93	13.00	21.00	11 to 22
Attitude	5.43	.73	3.92	7.00	1 to 7
Behavioral Intention	4.62	1.29	1.92	7.00	1 to 7
Cognitive Load	2.50	1.58	1.00	7.00	1 to 7
Boredom	2.57	1.67	1.00	7.00	1 to 7

For collective knowledge, core knowledge, and incremental knowledge, higher mean scores reflect more knowledge. For attitude, behavioral intention, cognitive load, and boredom, higher mean scores reflect more positive attitude, more favorable intention, more cognitive load, and more boredom.

Table 7

One-way analysis of variance of education on the outcomes

Educational Condition	Collective Knowledge	Core Knowledge	Incremental Knowledge	Attitude	Intention
Level One					
Sample Size	50	50	50	49	50
Mean	51.06	32.76	18.30	5.57	4.57
Standard Deviation	3.20	2.31	1.39	.70	.98
Level Two					
Sample Size	50	50	50	50	50
Mean	49.60	31.76	17.84	5.41	4.25
Standard Deviation	3.90	2.77	1.71	.70	1.25
Level Three					
Sample Size	50	50	50	50	50
Mean	50.38	32.40	17.98	5.36	4.52
Standard Deviation	5.04	3.21	2.08	.64	1.19
Level Four					
Sample Size	49	49	50	50	50
Mean	49.00	32.06	17.00	5.37	5.14
Standard Deviation	5.01	3.02	2.22	.87	1.53
F value	2.12	1.15	4.35	.87	4.40
df	(3,195)	(3,195)	(3,196)	(3,195)	(3,196)
p value	ns	ns	p<.01	ns	p<.01
eta squared	-	-	.06	-	.06

Table 8

Analysis of covariance of education on the outcomes

Educational Condition	Collective Knowledge	Core Knowledge	Incremental Knowledge	Attitude	Intention
Level One					
Mean	50.86	32.68	18.17	5.46	4.46
Standard Error	.60	.39	.27	.10	.18
Level Two					
Mean	50.23	32.23	18.00	5.53	4.47
Standard Error	.62	.39	.27	.10	.18
Level Three					
Mean	49.73	31.98	17.76	5.39	4.59
Standard Error	.61	.39	.27	.10	.18
Level Four					
Mean	49.23	32.09	17.19	5.33	4.96
Standard Error	.62	.39	.27	.10	.18
F value	1.22	.61	2.31	.61	1.59
df	(3,188)	(3,188)	(3,189)	(3,188)	(3,189)
p value	ns	ns	ns	ns	ns
eta squared	-	-	-	-	-

Table 9

One-way analysis of variance of education on the intervening variables

Educational Condition	Cognitive Load	Boredom
Level One		
Sample Size	50	50
Mean	1.87	1.92
Standard Deviation	.98	1.20
Level Two		
Sample Size	50	50
Mean	2.14	2.36
Standard Deviation	.98	1.48
Level Three		
Sample Size	50	49
Mean	2.44	2.49
Standard Deviation	1.34	1.61
Level Four		
Sample Size	50	50
Mean	3.56	3.51
Standard Deviation	2.17	1.91
F value	13.09	9.12
df	(3,196)	(3,195)
p value	p<.01	p<.01
eta squared	.17	.12

Table 10

Analysis of covariance of education on the intervening variables

Educational Condition	Cognitive Load	Boredom
Level One		
Mean	2.03	2.23
Standard Error	.21	.21
Level Two		
Mean	2.13	2.23
Standard Error	.21	.21
Level Three		
Mean	2.36	2.25
Standard Error	.21	.21
Level Four		
Mean	3.47	3.57
Standard Error	.21	.21
F value	9.17	9.63
df	(3,189)	(3,188)
p value	p<.01	p<.01
eta squared	.13	.13

Table 11
One-way analysis of variance of the intervening variables on the outcomes

Condition	Collective Knowledge	Core Knowledge	Incremental Knowledge	Attitude	Intention
Cognitive Load					
Level One					
Sample Size	52	52	53	52	53
Mean	52.13	33.79	18.38	5.53	4.34
Standard Deviation	2.92	1.76	1.53	.69	1.28
Level Two					
Sample Size	55	55	55	55	55
Mean	51.69	33.24	18.45	5.57	4.62
Standard Deviation	2.60	1.53	1.51	.58	1.37
Level Three					
Sample Size	46	46	46	46	46
Mean	48.61	31.15	17.46	5.47	4.62
Standard Deviation	4.59	3.21	1.77	.76	.97
Level Four					
Sample Size	46	46	46	46	46
Mean	47.02	30.41	16.61	5.11	4.95
Standard Deviation	5.12	3.24	2.30	.83	1.43
F value	19.80	20.64	11.67	4.28	1.83
df	(3,195)	(3,195)	(3,196)	(3,195)	(3,196)
p value	p<.01	p<.01	p<.01	p<.01	ns
eta squared	.23	.24	.15	.06	-
Boredom					
Level One					
Sample Size	59	59	60	59	60
Mean	51.15	32.98	18.20	5.65	4.54
Standard Deviation	4.17	2.66	1.84	.72	1.39
Level Two					
Sample Size	48	48	48	48	48
Mean	50.98	32.88	18.10	5.25	4.52
Standard Deviation	3.10	2.52	1.08	.59	1.03
Level Three					
Sample Size	44	44	44	44	44
Mean	49.70	31.82	17.89	5.60	4.76
Standard Deviation	3.67	2.55	1.66	.76	.90
Level Four					
Sample Size	47	47	47	47	47
Mean	48.15	31.23	16.91	5.14	4.66
Standard Deviation	5.41	3.16	2.52	.72	1.66
F value	5.51	4.78	5.01	6.55	.34
df	(3,194)	(3,194)	(3,195)	(3,194)	(3,195)
p value	p<.01	p<.01	p<.01	p<.01	ns
eta squared	.08	.07	.07	.09	-

Table 12
Analysis of covariance of the intervening variables on the outcomes

Condition	Collective Knowledge	Core Knowledge	Incremental Knowledge	Attitude	Intention
Cognitive Load					
Level One					
Mean	52.00	33.68	18.36	5.41	4.05
Standard Error	.57	.36	.26	.10	.17
Level Two					
Mean	51.28	32.87	18.40	5.68	4.73
Standard Error	.54	.34	.25	.10	.16
Level Three					
Mean	48.85	31.54	17.31	5.35	4.52
Standard Error	.62	.39	.29	.11	.19
Level Four					
Mean	47.44	30.59	16.85	5.23	5.25
Standard Error	.60	.38	.28	.10	.18
F value	11.96	12.37	7.57	3.47	7.45
df	(3,188)	(3,188)	(3,189)	(3,188)	(3,189)
p value	p<.01	p<.01	p<.01	p<.05	p<.01
eta squared	.16	.17	.11	.05	.11
Boredom					
Level One					
Mean	50.59	32.56	18.06	5.53	4.25
Standard Error	.56	.36	.25	.10	.17
Level Two					
Mean	51.11	32.96	18.15	5.18	4.38
Standard Error	.57	.36	.25	.10	.17
Level Three					
Mean	49.87	32.00	17.88	5.72	5.05
Standard Error	.61	.39	.27	.10	.18
Level Four					
Mean	48.56	31.50	17.05	5.26	4.91
Standard Error	.61	.39	.27	.10	.18
F value	3.27	2.59	3.31	6.22	4.21
df	(3,187)	(3,187)	(3,188)	(3,187)	(3,188)
p value	p<.05	p=.05	p<.05	p<.01	p<.01
eta squared	.05	.04	.05	.09	.06

Table 13

Regressing knowledge, attitude, and behavioral intention on cognitive load and boredom

Explanatory Variable	Knowledge	Attitude	Behavioral Intention
Cognitive Load			
B	-1.26	-.13	.25
SE of B	.22	.04	.07
B	-.46**	-.27**	.30**
Boredom			
B	-.12	-.00008	-.07
SE of B	.20	.04	.07
B	-.05	-.00	-.09
Model Fit			
R	.49	.27	.26
R^2	.24	.07	.07

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

Table 14

Zero-order correlations between variables in the dissertation study

	Collective Knowledge	Attitude	Intention	Cognitive Load	Boredom	Perceived Entertainment	Perceived Education	Manipulated Education
Collective Knowledge	-							
Attitude	.01	-						
Intention	-.12	.19**	-					
Cognitive Load	-.48**	-.27**	.25**	-				
Boredom	-.33**	-.17*	.10	.61**	-			
Perceived Entertainment	.15*	.12	.31**	-.08	-.53**	-		
Perceived Education	.21**	.17*	.27**	-.05	-.16*	.37**	-	
Manipulated Education	-.13	-.11	.14	.35**	.31**	-.17*	.07	-

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

Figure Captions

Figure Captions

Figures

Figure 1

The perceived entertainment-education matrix

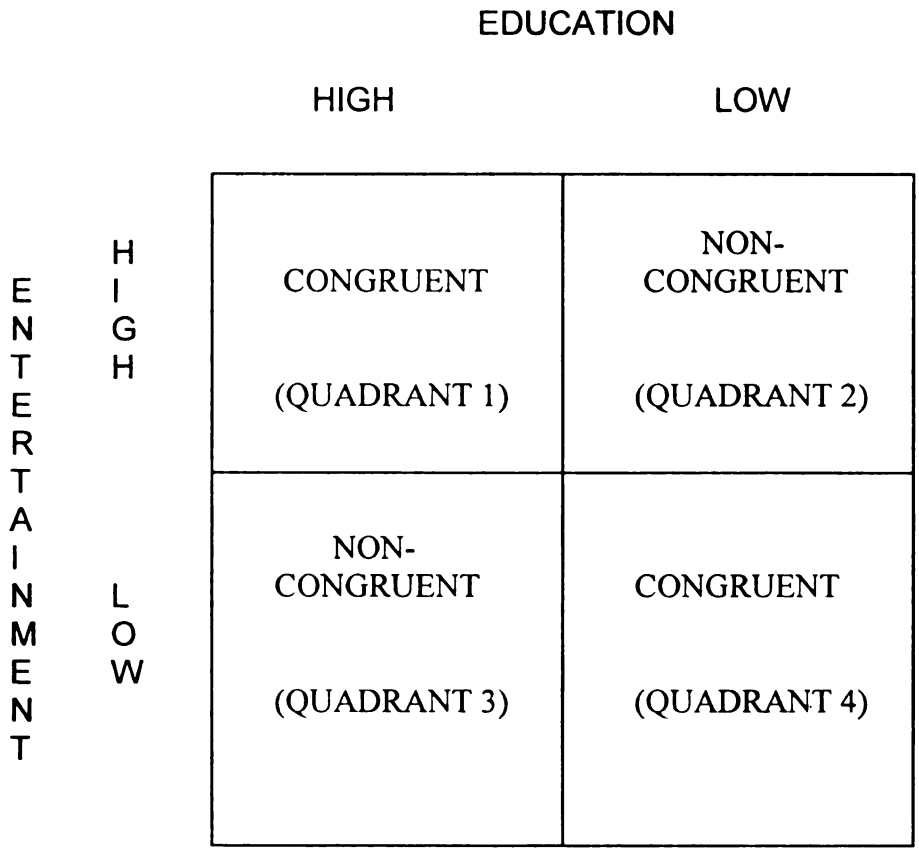

Figure 2

The relational paths between entertainment, education, and outcomes

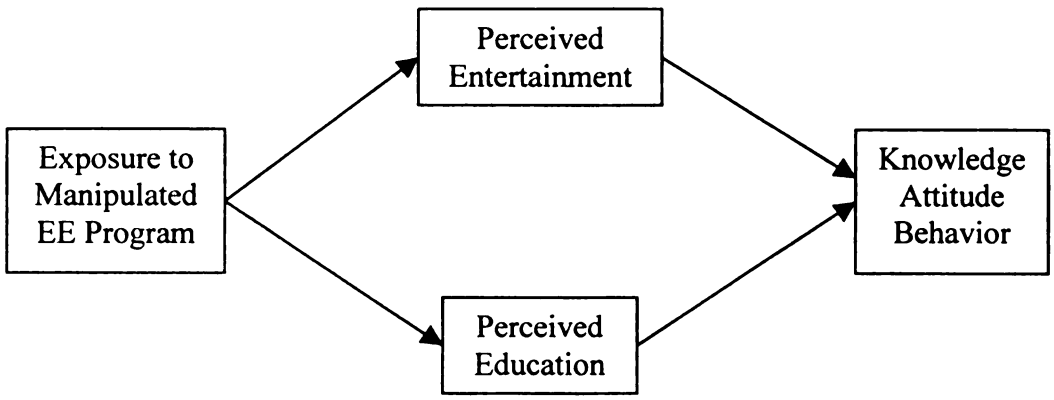

Figure 3

The hypothesized relationship between education and the outcomes[2]

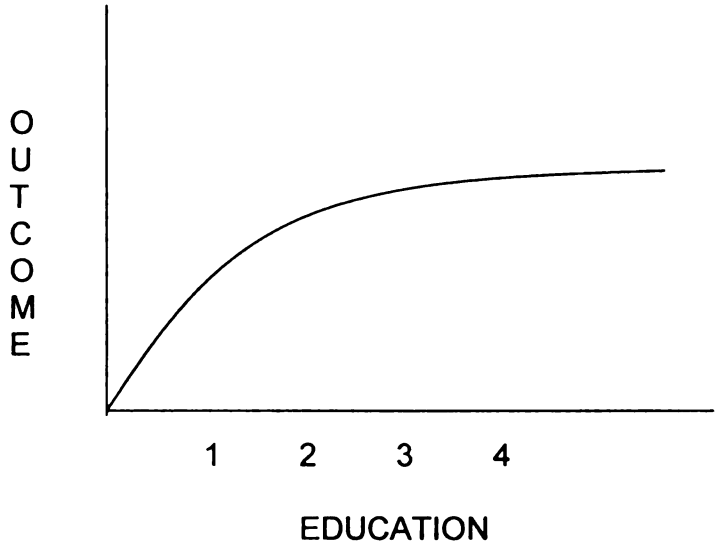

Figure 4

The hypothesized relationship between education and the intervening variables[3]

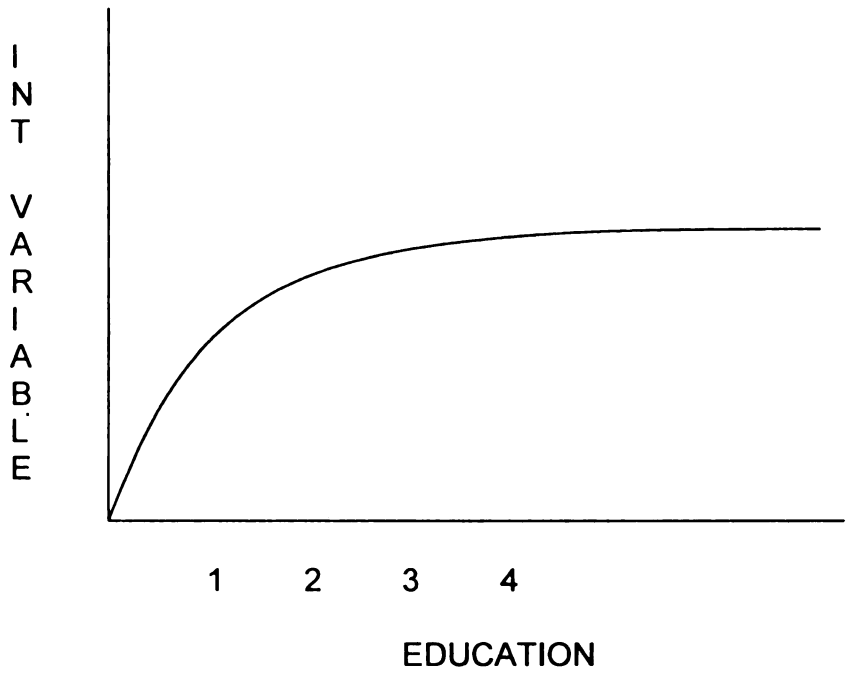

Figure 5

The hypothesized relationship between the intervening variables and the outcomes[4]

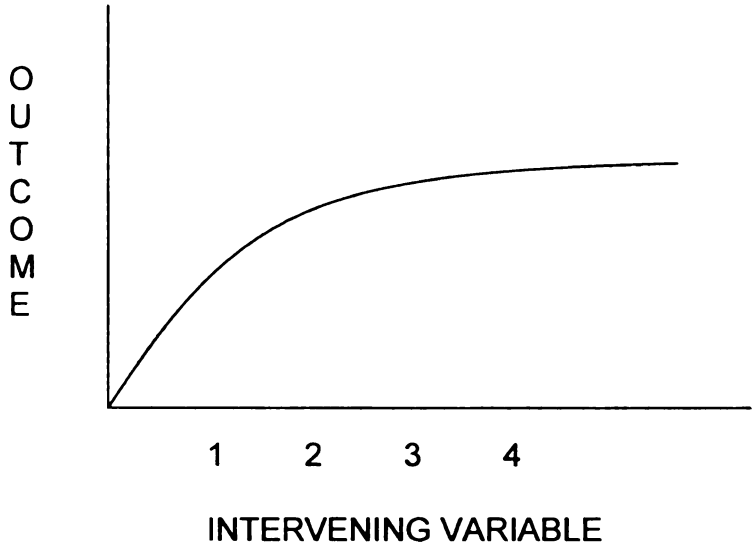

Figure 6.

A proposed conceptual pathway between entertainment, education, and outcomes