Relationships among Media Use, Psychological States, and Health Behavior Intentions

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This dissertation titled
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ABSTRACT

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An online survey (N=1, 251) of students enrolled at institutions of higher education in Southeast Ohio examined whether internal psychological states, such as attitudes, subjective norms, perceived behavioral control, and perceived risk mediated the relationship between individual media environments and the likelihood of engaging in health-adverse behaviors such as cigarette use and unprotected sun exposure. Linear and ordinal regression procedures were utilized to assess direct and indirect relationships among the variables. Although none of the media use variables were directly related to smoking intentions, both general and health media use were significant predictors of tanning intentions. However, Internet use was the only media channel unrelated to tanning intentions. All psychological states, except perceived susceptibility, were positively related to intentions to refrain from smoking as well as intentions to avoid unprotected sun exposure, as hypothesized. Contrary to prediction, respondents who were the highest consumers of media also had the least favorable attitudes toward engaging in health behaviors and efficacy to do so, they believed that their peer group supported smoking and unprotected sun exposure, and they also perceived smoking and unprotected tanning to be relatively benign behaviors. The exception to these findings was for Internet use, which increased individuals’ health attitudes related to smoking as well as perceived susceptibility to, and severity of, skin cancer. Indirect effects revealed that general news
use was associated with a greater perception of one’s peers and important others engaging in sun protective behaviors, which in turn increased one’s own intentions to engage in sun protection behaviors. A single case of suppression was also evident and showed that individuals’ decreased perceptions of the severity of cancer enhanced the relationship between general newspaper use and sun protection intentions. An understanding of the nuances of *how* and *why* media impact decision making must be a primary goal of health communication researchers. Although the processes by which media influence individuals’ behaviors remains somewhat ambiguous, it is our hope that this study will catalyze additional research that aims to elucidate these relationships.

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As I crested the reservation rim, rye grasses tall and strong from mid-summer rains, basalt rock columns and fields of wheat stubble signaling my approach to home, I wrote this page, thinking of the amazing individuals who made completion of this dissertation possible.

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CHAPTER 1: OVERVIEW

Cancer is currently the second leading cause of death in the United States (Centers for Disease Control and Prevention, 2009), with lung cancer being the most deadly. In the United States, lung cancer accounts for approximately 160,000 deaths per year, more than breast, colon, and prostate cancers combined (American Cancer Society, 2009), while skin cancer is the most commonly diagnosed cancer among Americans (Centers for Disease Control and Prevention, 2008). Health behaviors may play an important role in decreasing cancer morbidity and mortality, as well as cancer incidence, given the preventable nature of most cancers, including lung and skin cancer (Amin, Kucuk, Khuri, & Shin, 2009; Anand et al., 2008). Increasing awareness and knowledge via information dissemination has long been a central tactic in facilitating positive health behaviors.

Although health behavior changes may be achieved at any stage in life, health routines and habits are often shaped during young adulthood, when individuals are forming potentially lifelong behavioral patterns (Gray, 1993; Martin, Clifford, & Clapper, 1992; Schorling, Gutgesell, Klas, Smith, & Keller, 1994). Individuals’ decision-making is particularly vulnerable as they move from adolescence to young adulthood. Many individuals in the United States transition to college when leaving home for the first time. This “flight from the nest” brings with it considerable autonomy and marks a time when these young adults have, often for the first time, considerable control (and freedom) over many behaviors that have serious health consequences: exercise, sleep, dietary choices, alcohol consumption, cigarette smoking, drug use, and sex (Centers for Disease Control,
1997; Martin, Clifford, & Clapper, 1992; Nelson, Gortmaker, Subramanian, Cheung, & Wechsler, 2007; Schorling, Gutgesell, Las, Smith, & Keller, 1994). Furthermore, many young adults, due to their youthful age, infrequently ruminate over thoughts of mortality, disease, and disability that may be a distal consequence of risky health decisions (Weinstein, 1983; Wendt, 2005); thus, they may be more likely to engage in risky behaviors than their older counterparts. This time of life, marked by experimentation, can catalyze habits that last a lifetime (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). Examining the health behavior patterns of college-age populations is paramount to understanding the factors that contribute to health-decision making during this seminal period in life (Emmons, Wechsler, Dowdall, & Abraham, 1998; Torabi, Yang, & Li, 2002; Von Ah et al., 2004; Zucker et al., 2001).

Most individuals in the United States do not suffer from lack of general media exposure and media use (Morgan, Shanahan, & Signorielli, 2009; Pew Research Center, 2010), and past research has shown that individuals cite news media as important sources of health information (Dutta-Bergman, 2004c; Freimuth, Greenberg, DeWitt, & Romano, 1984; Wallack, 1990). In addition, media are an important tool in the public health field’s efforts to promote health and wellness in the general population (Abroms & Maibach, 2008). This is due, in part, to the fact that media dissemination is often the most cost-effective way to reach individuals and because people are actually attentive to health information in the general news (Rice & Atkin, 2009; Walsh-Childers & Brown, 2009). Indeed, media have been shown to influence health-related behaviors (Walsh-Childers & Brown, 2009). Prior research has established an association between message exposure
and intention to change a deleterious behavior, or, in some cases, non-engagement in a behavior (see Witte & Allen, 2000 for a review). However, this research has largely focused on the effectiveness of specific qualities of media messages (e.g., fear appeals, entertainment education, humor appeals, heuristic approaches, etc.), rather than broad health information found in the normal daily news. Thus, despite our rudimentary understanding of the influences mass media have on health behaviors, little is known about the processes by which media affect behavioral decision-making.

Shrum (2009) acknowledged that past media effects research has had a difficult time explaining why and how media affect individual thoughts, feelings, or actions, pointing out that one major criticism of media effects research has been that it primarily focuses on the relationship between “input variables (e.g., media information and its characteristics) and output variables (e.g. attitudes, beliefs, and behavior), with little consideration of the cognitive processes that might mediate these relations” (p. 50). Shrum argued for a new emphasis on investigating mediators of media effects and, in particular, to develop cognitive process models that both build new relationships and add new dimension to old relationships. Examining indirect media effects may illuminate how individual media environments influence health behaviors as well as add insight into the cognitive processes that may be present during engagement in beneficial or harmful health-related behaviors. This has broad implications for the current efforts in communication and public health to mitigate cancer disparities.

The purpose of the current study was to address this gap in the literature by examining the mediating role of internal psychological states on the relationship between
media use and health behavior intentions. In the review that follows, the cancer burden in the United States—with particular attention paid to lung and skin cancer in young adult populations—is explicated. Relationships important to mediational models are then established. Specifically, the associations between media use, internal psychological states, and health behavior intentions are discussed, in light of previous findings.

To test the hypothesized mediational models, young adults enrolled at institutions of higher education participated in an online survey that investigated general news use, health news use, health beliefs, and intentions to engage in risky behaviors associated with lung and skin cancer. More specifically, the study explored whether internal psychological states such as attitudes, subjective norms, perceived behavioral control, and perceived risk mediated the relationship between individual media environments and the likelihood of engaging in health-adverse behaviors such as cigarette use and unprotected sun exposure. In other words, this study explored whether and how media affect college-age students who are confronted with media messages about risky health behaviors that may conflict with their upbringing, social pressures, self-image, and current behaviors.
CHAPTER 2: CANCER BURDEN

The World Health Organization estimates that cancer will be the leading cause of death worldwide in 2010 and by 2030 will account for up to 17 million deaths annually (Boyle & Levin, 2008). The cancer burden has also proven to be significant in the United States, where nearly 1.5 million people are diagnosed with cancer each year (American Cancer Society, 2009), and currently one in four deaths in the United States is due to cancer (Jemal et al., 2008). In the U.S., cancer remains the second leading cause of death behind cardiovascular disease, accounting for more than 500,000 annual deaths (American Cancer Society, 2009). According to the American Cancer Society (2008), 1 in 2 men and 1 in 3 women in the U.S. will develop cancer in their lifetime, while 1 in 4 men and 1 in 5 women will die from cancer. The burden of cancer is also a significant economic cost. In 2004, cancer treatment accounted for $72 billion (or nearly 5%) of medical expenditures in the U.S., and an additional 120 million dollar burden was attributed to cancer morbidity and premature mortality (National Cancer Institute, 2009a). Financial costs, however, may be secondary to the psychological and quality of life burden on cancer patients and their families (Hodges, Humphris, & Macfarlane, 2005; Lemieux, Maunsell, & Provencher, 2008).

Studies have shown that one third of cancers can be considered “clinically cured” with early detection and treatment, while others have estimated that one third to one half of cancers are preventable with lifestyle changes (Amin, Kucuk, Khuri, & Shin, 2009; Stein & Colditz, 2004; World Health Organization, 2009); medical prognoses for many types of cancer (e.g., breast, colorectal, prostate, cervical) improve when tumors are
detected at early growth stages (Etzioni et al., 2003). Thus, cancer screening/early detection programs have become a mainstay of the public health and preventive medicine fields, which have enlisted mass media to effectively deliver health messages to the public (Abroms & Maibach, 2008).

Lung Cancer Epidemiology

The formation of lung cancer is highly dependent on behaviors that often begin in early adulthood, such as smoking (Breslau & Peterson, 1996; Centers for Disease Control, 1994). The average young adult in college seldom thinks about his or her own mortality and, in particular, is more likely to engage in activities that may be detrimental to long-term health, yet beneficial for social and appearance purposes (e.g., Christophi, Savvides, Warren, Demokritou, & Connolly, 2009; Lamanna, 2004; Pettijohn, Pettijohn, & Geschke, 2009; Zucker et al., 2001). This optimistic bias often reduces people’s motivation to take precautionary or preventative measures (Dillard, McCaul, & Klein, 2006; Weinstein, 1987), and, in general, college students have an unrealistic optimism about their own susceptibility to mortality and disease (Weinstein, 1983).

More people die from lung cancer (1.3 million deaths/year) than any other type of cancer, and tobacco use is the single most important risk factor for cancer (World Health Organization, 2009). In the 1990s, research showed that 22% of college students smoked in the last 30 days (Emmons, Wechsler, Dowdall, & Abraham, 1998). Another study, in a survey of college students on campuses across the United States, found that 29% were current smokers (in the past 30 days), 38% reporting cigarette use in the past year, and as many as 53% used cigarettes in their lifetime, (Rigotti, Lee, & Wechsler, 2000). Others
have reported that 70% of college students had tried cigarettes, with 42% of them remaining current cigarette smokers (Everett, Husten, Kann, Warren, Sharp, & Crossett, 1999). Of those who became regular smokers, 82% had tried to quit, but only one in four succeeded.

Despite the alarmingly high rates of smoking among college students in the 1990s, statistics in 2006 indicated a drop in college smoking to about 19%, or roughly one in five college students (American Lung Association, 2008). While this is significantly less than the national high of nearly 31% of college students smoking cigarettes on campuses in the 1990s, these numbers are staggering and well above the national goal of 12% set for 2010 (“U.S. won't meet 2010 no-smoking goals,” 2008). What makes these figures particularly disconcerting is that 30% of all cancer deaths and 87% of lung cancer deaths can be attributed to smoking (American Cancer Society, 2010). Smoking, on average, reduces life expectancy by approximately 14 years, and most routine cigarette smokers begin in early adulthood (American Cancer Society, 2009), with earlier smoking onset being associated with greater addiction (Centers of Disease Control, 1994; Erlanger, 2010). As such, early intervention may be pivotal in preventing the adoption of smoking behaviors.

Skin Cancer Epidemiology

Skin cancer, although not known for its morbidity, is the most common form of cancer in the United States (Centers for Disease Control, 2008; National Cancer Institute, 2009b), with more than 1 million cases diagnosed in the United States every year (American Cancer Society, 2009). One in five Americans will develop skin cancer in
their lifetime (Robinson, 2005), yet it is easily treatable if detected early (American Cancer Society, 2009).

Melanoma, a type of skin cancer, is the most common form of cancer for young adults 25-29 years old and the second most common form of cancer, next to lymphoma, in adolescents and young adults 15-29 years old in the United States (“Cancer epidemiology in older adolescents & young adults,” 2007). Unprotected sun exposure and acute overexposure to UV radiation (i.e., sunburns) are responsible for development of melanoma skin cancer (Kricker, Armstrong, English, & Heenan, 1995; Whiteman, Whiteman, & Green, 2001). Furthermore, studies indicate that almost 60% of young adults in the United States 18-29 years old report sunburns on an annual basis (Saraiya, Hall, & Uhler, 2002) and that a large majority (75%) of college undergraduates sunbathe (Hillhouse, Adler, Drinnon, & Turrisi, 1996). Research further suggests that unprotected sun exposure among college students is motivated by the perceived attractiveness and desirability of tan skin (Heckman, Wilson, & Ingersoll, 2009; Vail-Smith & Felts, 1993). In addition to concern regarding melanoma cancers among younger populations, non-melanoma skin cancers, though less dangerous and more treatable than melanoma skin cancers, are rapidly rising in people younger than age 40 (Christenson et al., 2005).

In sum, behaviors that are highly associated with lung and skin cancer, such as smoking and sunbathing, are highly prevalent among college populations. The desire to experiment, coupled with an optimistic bias of one’s long-term good health, creates an environment where media may play a unique contributory role to these health-adverse behaviors.
CHAPTER 3: MEDIA EFFECTS ON HEALTH BEHAVIOR

Four decades ago, Wade and Schramm (1969) argued that as we form health beliefs, we build and fill in our “cognitive maps” with facts, findings, concepts, and understandings gathered from our interactions with media content. The information obtained during this process becomes the foundation for our health knowledge and subsequent behavior. Media effects scholars have found that media “do shape individuals’ health-related beliefs and behaviors” and are paramount in efforts to improve the health environment and individual health outcomes (Walsh-Childers & Brown, 2009, p. 469). Additionally, public health researchers advocate for the use of mass media tactics to improve the likelihood of achieving population-based health behavior change (Abroms & Maibach, 2008). The confluence of media use across the mass communication and public health fields ensures that media will remain a delivery mechanism for rigorous, purposeful, and strategic behavior change interventions.

Media and Cigarette Smoking

Within the context of lung cancer, few studies have examined the relationship between general media use and self-reported health behaviors. Findings remain somewhat ambiguous among those that have. For example, Klein and colleagues (1993) created a general “risky behavior” scale that was formed by averaging behaviors (having done the behavior or not) of ever smoking cigarettes, drinking alcohol, cheating on a test, having sexual intercourse, smoking marijuana, stealing, and driving a car without permission. Although not entirely specific to lung cancer behavior, this study demonstrated that adolescents who reported more time listening to the radio and watching
television shows, such as soap operas, movies, and cartoons, engaged in more risky behaviors than those who did not.

Carson, Rodriguez, and Audrain-McGovern (2005) found that adolescents who were exposed to fashion, entertainment, and gossip magazines were more likely to smoke than those who read sports and fitness magazines due to differences in how those magazines affected readers’ body image. Rutten and colleagues (2009) conducted a U.S. population-based survey and found that heavy daily smokers were more likely to report higher exposure to television viewing, while intermittent smokers reported less exposure to television. A weakness of the studies conducted by Klein et al. (1993), Carson et al. (2005), and Rutten et al. (2009) was the cross-sectional designs used. As a result, it is difficult to determine if media use influences decisions to engage in or refrain from cigarette smoking or if individuals who are greater consumers of media (e.g., television) are less likely to be health conscious and thus refrain from smoking. Findings from the study by Carson and colleagues suggest that the latter interpretation may be more tenable, given that individuals who consumed health media were less likely to smoke than individuals who consumed general media.

In addition to overall media exposure, the types of messages within the media channels to which one is exposed may influence smoking decisions. Weiss and colleagues (2006) found that exposure to pro-tobacco media, including product placement, advertising, and promotional material, increased adolescents’ susceptibility to smoking. Pierce and Gilpin (2001) found that successful smoking cessation for young and middle-aged smokers followed a pattern similar to the media coverage of new
developments in scientific knowledge about the harmful effects of smoking and public policy related to anti-smoking measures (i.e., when coverage was high, smoking cessation was high; when coverage waned, cessation waned). Wakefield and colleagues (2003) conducted a review of media use and smoking behavior and found that exposure to tobacco news either provided reinforcement (or incentive) for smoking or encouraged anti-smoking attitudes (or intentions to quit), depending on the type of tobacco news coverage.

The amount (i.e., volume) of media coverage may also have a proportional effect on smoking opinions and subsequent behavior. Smith and colleagues (2008) looked at five months of newspaper coverage, which preceded a survey that investigated perceived harm of smoking, perceived peer smoking, disapproval of smoking, smoking within the past 30 days, and daily cigarette consumption. The study found that each 10-article increase in daily newspaper articles on tobacco-related articles was associated with increased odds of perceiving great harm from smoking and disapproving of smoking. With an increase in tobacco coverage, there was also a decrease among youth smoking in the past 30 days.

In sum, general media use is associated with an increased use of cigarettes, although the direction of causation cannot be determined from the compendium of existing studies. However, specific types of media consumption (i.e., health media and anti-tobacco media) may decrease the likelihood that individuals will smoke cigarettes.
Media and Sun Tanning

As with studies that have examined media effects on cigarette smoking, those that have examined media effects on skin cancer behaviors have been inconsistent. Images of tanned people in the media are highly prevalent. Some research has suggested that media influence young females’ decisions about UV exposure and protection, such that media consumers are less likely to use sun protection than their non-user counterparts, because a greater value is placed on the tan appearance in media (Cafri, Thompson, & Jacobsen, 2006) and tanned images have been shown to create more favorable attitudes toward tanning (Mahler, Beckerley, & Vogel, 2010). Unlike cigarette smoking, media infrequently emphasize the deleterious effects of unprotected sun exposure and its relation to skin cancer (Stryker et al., 2005). Stryker and colleagues posited that the lack of media attention to skin cancer prevention and detection education in the news media may be a contributing factor to a lack of knowledge, resulting in dismal rates of sun protection practices in the U.S.

As with cigarette smoking, media that target cancer risks may influence individuals’ sun protective behaviors. For example, farmers who frequently listened to the radio and acknowledged hearing messages about the sun were more likely to promote sun protection behaviors for themselves and others (Jones, Parrott, & Lemieux, 2001).

To summarize, increased media use is associated with increased tanning behaviors (without the use of sun protection). Intentions to use, and the actual use of, sunscreen are greater when individuals are exposed to media that address the risks of skin cancer and the ways to prevent it.
CHAPTER 4: PSYCHOLOGICAL STATES THAT IMPACT HEALTH BEHAVIORS

Theory of Planned Behavior

Numerous psychological constructs have been shown to be associated with various health behaviors. Several health behavior theories have been applied to consolidate these constructs in theoretically meaningful ways. In particular, the Theory of Planned Behavior (TPB; Ajzen, 1991) has been widely used to explain people’s health decision-making processes. In general, the TPB posits that three constructs are predictive of individuals’ intentions to engage in future behaviors: *attitudes*, *subjective norms*, and *perceived behavioral control*.

Attitudes refer to an individual’s feelings toward a particular behavior of interest (Ajzen, 1991). These feelings may be favorable or unfavorable and can also be thought of as an evaluation or appraisal of the behavior. Subjective norms refer to the perceived social pressure to conform or not conform to a specific behavior (Ajzen, 1991), and perceived behavioral control refers to the perceived ease or difficulty of actually performing the behavior (Ajzen, 1991). Perceived behavioral control (PBC) generally reflects past experiences engaging in the specific, or similar, behavior, as well as the expected problems that may impede behavior at a later date. PBC is somewhat analogous to the construct of self-efficacy (Bandura, 1986).

There has been considerable support for the TPB in predicting individuals’ intentions to engage in a variety of health behaviors, including HIV/STD prevention behaviors, condom use, exercise behavior, drug use, mammography, clinician provision of preventive services, and oral hygiene behaviors (see Montano & Kasprzyk, 2002, for a
In general, more favorable attitudes toward the behavior, perceptions that others value the behavior, and greater perceived behavioral control specific to the behavior will lead to a stronger intention to perform that behavior. Yet, Ajzen (1991) notes that the relative importance of each construct varies across behaviors and situations.

Armitage and Conner (2001) conducted a meta-analysis of the associations between the three TPB constructs and various health behavior intentions. Overall, subjective norms was the weakest of the three predictors of behavioral intentions. The authors surmised, however, that poor measurement of the subjective norms construct was responsible for this finding. In many TPB studies, a single item measured subjective norms and, therefore, the measure potentially had very low reliability. Studies that utilized multiple-item measures of norms did show significantly stronger correlations with intentions than the other measures in the TPB. When assessing the additive effects of TPB constructs for predicting behavioral intentions, Armitage and Connor also noted that PBC, the most recent construct added to the model, was a unique predictor of behavioral intentions and accounted for 6% additional variance in behavioral intentions when added to models that already contained attitudes and subjective norms, demonstrating the efficacy of the PBC construct for predicting behavior as well as intention with or without the other constructs in the TPB. In sum, TPB constructs, as with other psychological constructs, are best assessed with multi-item measures, and all three constructs warrant attention.
Theory of Planned Behavior and Cigarette Smoking

Within the context of lung cancer preventive behaviors, strong support for the TPB exists. All three constructs—attitudes, subjective norms, and perceived behavioral control—have proven useful in predicting individuals’ intentions to quit or to refrain from engaging in smoking in the first place. For example, the likelihood of youth non-smokers reporting intentions to try smoking in the next 30 days or six months decreased with more positive attitudes about staying tobacco free (Smith, Bean, Mitchell, Speizer, & Fries, 2007). For youth who were daily smokers, positive emotional attitudes towards quitting smoking were found to predict intention to quit smoking (Rise, Kovac, Kraft, & Moan, 2008). Wiium, Breivik, and Wold (2006) also found that the association between attitudes and intentions to refrain from smoking was strong; however, they pointed out that attitudes were a stronger predictor of non-smokers’ intentions to continue refraining from smoking than for smokers’ intentions to quit. The authors posited that nicotine dependence may account for this difference because the addictive properties of nicotine supersede even negative attitudes about smoking.

In addition to attitudes about smoking, membership in particular social circles or peer groups may also influence intentions related to smoking abstinence. Studies have shown that individuals with peers who discourage cigarette use and friends who refrain from smoking endorse greater intentions to refrain from smoking themselves (Smith et al., 2007). Additionally, among smokers, having friends who are thinking of quitting, about to quit, or have quit smoking was associated with greater intentions to quit smoking (Rise et al, 2008). As noted previously, the association between attitudes and intentions to
smoke was stronger for non-smokers than smokers; this, however, does not hold true for
the relationship between subjective norms and intentions to refrain from initiating
smoking or quit smoking (Wiium et al., 2006). This implies that the attitudes of peers
may have more of an influence on intentions to engage in smoke-free behaviors than does
one’s own attitudes about the behavior.

Regarding perceived behavioral control (PBC) within the context of smoking,
studies have found that PBC is a less robust predictor of intentions to quit smoking than it
is for other health behaviors (Rise et al., 2008). Some researchers have postulated that
this is due to smokers’ lack of confidence in their actual control over quitting smoking,
perhaps due to physiological dependence on cigarettes (Rise et al., 2008). In addition,
Smith and colleagues (2007) noted that high PBC may not always be beneficial. In a
sample of non-smoking youth, these authors assessed PBC and intentions to abstain from
smoking and to quit if one were to begin smoking. Participants with high PBC to quit
smoking were more likely to report intentions to try smoking in the future. As such, PBC
may give youths a sense of behavioral mastery and over-confidence in their ability to quit
smoking once started. Although it has not been examined in the literature, it is plausible
that among both smoker and non-smoker youths, heightened PBC may be responsible for
individuals’ justification for continuing or initiating smoking, respectively (i.e., the “I can
quit at anytime if I want to” phenomenon).

In summary, attitudes about smoking and peers’ smoking behaviors and beliefs
about smoking influence youths’ decision to quit smoking or refrain from smoking
altogether. Perceived behavioral control may be a weaker predictor of being smoke-free
and, among some non-smoking individuals, may even lead to intentions to begin smoking.

_Theory of Planned Behavior and Sun Tanning_

In the context of skin cancer, the TPB has also received a modicum of support. When attitudes toward tanning outside and in salons were negative, individuals were less likely to partake in those behaviors (Hillhouse et al., 1996). However, subsequent studies have shown that endorsing the attractiveness of a tanned appearance may trump any health-related concerns about tanning. For example, tanning salon behavioral intentions have been shown to be more strongly related to desired image than attitudes toward the tanning behavior itself (Hillhouse, Turrisi, & Kastner, 2000).

Subjective norms, often measured by asking participants the extent to which important persons (i.e., family and friends) want them to use sunscreen and/or moderate their tanning salon activity, have also shown support in predicting tanning salon behavioral intentions (Hillhouse et al., 2000) and sun protection behaviors (White et al., 2008). However, some studies have shown that subjective norms are associated with intentions to use sunscreen but not refrain from tanning in salons. This may be due to measurement issues, as has been the case when measuring the construct of subjective norms in other health behavior domains (Armitage & Connor, 2001). Branstrom, Ullen, and Brandberg (2004) showed that when assessing individuals’ perceptions of group norms about sun protection, the phrasing of the questions influenced the relationship of subjective norms to behavioral intentions. Specifically, participants’ perceptions of peer group norms about sunbathing were associated with behavioral intentions to minimize
sun exposure (i.e., limit time in the sun and/or use sunscreen). However, perceptions of peer group norms about the use of sunscreen were not associated with intentions to minimize sun exposure. The authors hypothesized that sunbathing was the more normative behavior in the participant sample and was thus a more salient reference point when considering the peer group’s opinions about this activity.

Perceived behavioral control (PBC) is generally found to be related to intentions to engage in sun-protective behaviors but not necessarily in the behaviors themselves (White et al., 2008). However, as is the case with most TPB studies that have assessed specific behaviors, White and colleagues measured sun protection behaviors over the previous two weeks. While it is possible that current PBC would be predictive of past behaviors, the TPB states that PBC (along with attitudes and subjective norms) is predictive of future intentions, which are in turn predictive of future behaviors. Retrospective accounts thus fail to apply the theory in its intended form. As with subjective norms, PBC is often assessed with a single, potentially unreliable, question in many studies of sun tanning behavior.

Despite minor discrepancies in construct operationalizations, the preponderance of TPB studies have found that the three TPB constructs are associated with behavioral intentions across a variety of health behaviors, including smoking and tanning. On average, attitudes, subjective norms, and PBC together account for 39% of the variance in behavior intentions (Armitage & Conner, 2001). However, it is likely that other psychological (and certainly other non-psychological) factors contribute to behavioral intention outcomes.
Health Belief Model

The Health Belief Model (HBM, Rosenstock, 1974), another widely applied model of health behavior, discusses psychological constructs that predict health behaviors but that are not subsumed under the TPB. The HBM states that individuals are more likely to engage in a health behavior if they perceive the health threat as severe and perceive themselves as susceptible to the health threat. Specifically, the more severe individuals perceive a health threat to be and the more susceptible they feel to the health threat, the more likely they are to engage in behaviors that prevent the health threat.

There are four other constructs within this model (benefits, barriers, cues to action, and self-efficacy); however, these have less to do with internal psychological states (excluding self-efficacy, which overlaps with PBC in the TPB) and more to do with structural barriers and facilitators to engaging in a behavior. For example, barriers to engaging in a behavior may be lack of financial resources. A benefit may be having insurance that facilitates engagement in a medical screening activity. Cues to action may be recommendations by family members or physicians to engage in health promoting behavior. Because the current study is concerned primarily with internal psychological states and because of the redundancy between self-efficacy and PBC, the empirical findings of the relationship between these four HBM constructs and health behaviors will not be reviewed.

Perceived severity refers to one’s belief about the seriousness of contracting an illness or leaving it untreated, while perceived susceptibility refers to one’s subjective perception of the risk of contracting a health condition (Janz, Champion, & Strecher,
The combination of susceptibility and severity has been referred to as perceived threat and, often, high levels of perceived severity are required before perceived susceptibility becomes a significant predictor (Janz et al., 2002). Additionally, Janz and colleagues (2002) hypothesized that when both constructs are high, perceived susceptibility will be a stronger predictor of intention to engage in health-related behaviors than of the actual engagement in a behavior itself.

These two HBM constructs have been widely used to predict a multitude of health behaviors (Janz & Becker, 1984), especially those related to cancer screening and AIDS (Janz et al., 2002). However, currently no studies have examined perceived severity and perceived susceptibility within the particular domains of cigarette smoking and tanning or unprotected sun exposure.
CHAPTER 5: EFFECTS OF MEDIA ON PSYCHOLOGICAL STATES

Media have been shown to affect individuals’ internal opinions and psychological states across a range of topics. For example, media use has been associated with violent and aggressive arousal (Sparks, Sparks, & Sparks, 2009), a variety of sexual attitudes (Harris & Barlett, 2009), racial and ethnic stereotyping and beliefs (Mastro, 2009), and negative self-esteem and body image (Levine & Harrison, 2009). Additionally, media use has been associated with individuals’ attitudes about different social groups, such as college students’ attitudes of acceptance towards homosexuals (Calzo & Ward, 2009), attitudes toward African-American celebrities (Neuendorf, Atkin, Jeffres, Billman, & Loszak, 2009), and prejudice toward different races following heavy news exposure (Persson & Musher-Eizenman, 2005). Within the political sphere, media use has been shown to affect attitudes and opinions about candidates and campaign issues (Coleman & Banning, 2006; Drew & Weaver, 1991, 1998, 2006; Weaver & Drew, 1995, 2001) and political ideologies about one’s country or state (Antecol & Endersby, 1999). Media use has also had an impact on individuals’ appreciation for the environment (Ewert, Place, & Sibthorp, 2005), attitudes about stem cell research (Ho, Brossard, & Scheufele, 2008), and attitudes about gambling, which in turn influence both positive and negative gambling intentions (Lee, Lemanski, & Jun, 2008). In sum, media have been shown to be associated with attitudes, opinions, and other internal psychological processes across many topics.

Much research has been devoted to examining the relationship between tailored media campaigns that address cigarette smoking (e.g., Cowell, Farrelly, Chou, &
Vallone, 2009; Terry-McElrath et al., 2007; Wakefield et al., 2006; see also Walsh-Childers & Brown, 2009) and sun tanning-or sun-protective behaviors (Smith, Ferguson, McKenzie, Bauman, & Vita, 2002). However, there is a paucity of research examining the relationship between general media use and internal psychological states specifically associated with lung and skin cancer-protective behaviors. However, some studies have examined these relationships in other cancers. For example, Lemal and Van den Bulck (2009) found an association between breast cancer messages in the news and an increased fear of getting breast cancer. Honda and Kreps (2006) found that traditional media attention influenced beliefs and attitudes about the causes of colorectal cancer (e.g., dietary and genetic influences).

In addition to psychological states pertaining to cancer, attention has been paid to media use and psychological state relationships with other health behaviors, such as substance use, eating disorders, and body satisfaction. For example, greater television viewing and newspaper reading were associated with attitudes that supported spending more government money on drug addiction services for the public (Nielsen & Bonn, 2008). Becker and colleagues (2002) found that prolonged television exposure increased disordered eating attitudes about diet, weight loss, and aesthetic ideals among young women. Similarly, Tiggemann (2003) found that exposure to magazine and television was associated with body dissatisfaction among female undergraduate students. Taking the association between media use and body dissatisfaction a step further, Slevec and Tiggemann (2010) found that media exposure influenced attitudes toward cosmetic surgery for middle-aged women.
CHAPTER 6: RATIONALE FOR THE CURRENT STUDY

Past research has shown that various forms of media influence people’s decisions to engage in or refrain from deleterious health behaviors. One possible mechanism of this influence is media’s ability to change people’s opinions, attitudes, and beliefs about various behaviors. To say that the mere usage of media causes intentions neglects the internal decision making process, the weighing of pros and cons, that people go through when gaining information about a topic from media and eventually deciding to engage in or refrain from various health behaviors. Indeed, Shrum (2009) stated that “these interrelated questions about the why and how of media effects lie at the heart of scholarly debates and critiques of media effects research” and, in general, media effects research has “lacked any focus on explanatory mechanisms” or included “cognitive processes that might mediate these relations” (p. 50). As such, the current study aims to test mediational models of the relationship between media usage and health behavior intentions for sun exposure and cigarette tobacco use. Specifically, it is believed the relationship between media use and health behavior intentions to (1) refrain from smoking cigarettes and (2) utilize sun protective behaviors when exposed to natural sun will be mediated by internal psychological processes associated with the TPB and HBM.

Hypotheses

Based on the above literature review, the following four hypotheses and rationales are delineated below:

H1a: General media use (i.e., television, newspaper, magazine, and Internet) will be negatively related to intentions to refrain from cigarette smoking and to always use sun
protection when tanning. Specifically, those with greater general media use will have fewer intentions to refrain from deleterious health behaviors.

H1b: Health media use will be positively related to intentions to refrain from deleterious health behaviors.

Rationale for H1: General media use has been shown to be related to greater smoking and unprotected tanning intentions and behaviors. However, media that emphasize health, and potentially include covering the risks of lung and skin cancer (e.g., health-specific media, anti-smoking advertisements, etc.), as well as the behaviors that can prevent these cancers, reverse this relationship.

H2a: General media use will be negatively related to internal psychological states about lung and skin cancer-protective behaviors. Specifically, greater general media use will be associated with lower attitudes, subjective norms, and perceived behavioral control about refraining from smoking and using protection when in the sun, as well as lower perceived susceptibility to and severity of lung and skin cancer.

H2b: Health media use will be positively related to internal psychological states.

Rationale for H2: Topic-specific media use was positively associated with attitudes and opinions of the topic. Thus, health media use will increase psychological states associated with engaging in healthy behaviors (e.g., refraining from cigarette smoking and unprotected sun exposure). General media use—that lacks these health-specific messages, while possibly emphasizing the positive effects of deleterious health behaviors—will decrease psychological states associated with engaging in healthy behaviors.
**H3:** Internal psychological states will be positively related to intentions to engage in lung and skin cancer-protective behaviors.

*Rationale for H3:* Prior studies that examined TPB and HBM constructs found that higher attitudes, subjective norms, and perceived behavioral control for not smoking or engaging in unprotected sun exposure, along with greater perceived susceptibility to and severity of lung and skin cancer, increased the likelihood that individuals would refrain from smoking and engaging in unprotected tanning.

**H4:** Internal psychological states will partially mediate the relationship between media use and intentions to engage in lung and skin cancer-protective behaviors.

*Rationale for H4:* Although few studies within the media effects literature have tested such meditational models, two studies provide preliminary evidence for these relationships. Islam and Johnson (2007) sampled Egyptian adolescents and found that underlying positive beliefs about smoking mediated the relationship between Western media exposure and ever-smoking behavior. Martino and colleagues (2005) found that the relationship between exposure to televised sexual content and initiation of safe sex was shown to be mediated by adolescents’ self-efficacy (i.e., confidence that safe sexual behaviors could be enacted).
CHAPTER 7: METHOD

Participants

Participants were 1,251 enrolled college students 18 years of age or older recruited from community colleges, technical schools, and four-year institutions of higher education in Southeast Ohio. This list included 10 institutions: Belmont Technical College, Central Ohio Technical College (Coshocton), Hocking College, Jefferson Community College, Ohio University, Rio Grande Community College, Shawnee State University, Southern State Community College, Washington State Community College, Zane State College. In addition to Ohio University’s main campus, participants were also recruited from Ohio University branch campuses in Chillicothe, St. Clairsville, Lancaster, Ironton, and Zanesville.

Procedures

Participants completed a web-based survey. During the spring 2010 and summer 2010 terms, 420 professors at the above-named institutions were contacted via email and asked to forward the survey link to their students. Introductory courses were targeted because they have larger class enrollments than upper-level classes and are often a general breadth course requirement, regardless of one’s chosen major. A follow-up email was sent to the professors two weeks after initial contact was made to remind professors to encourage their students to partake in the survey. Students were offered a nominal compensation or course extra credit in exchange for completing the 20-minute survey. To ensure student anonymity, students were immediately redirected to a second “survey,” at the conclusion of the first, where they filled in their name and contact information to be
mailed a compensation check; students receiving extra credit provided their name and the class in which they were enrolled.

Questions in the current survey were informed by a pilot study (N = 508) conducted in this student population in March of 2010. Pilot data were utilized to refine survey length, create internally consistent measures, and determine the appropriate sample size needed for the data analyses of the current study. An *a priori* power analysis based on effect sizes obtained from the pilot study indicated that a sample of N = 1,200 was sufficient to detect significant findings with 80% power and alpha = .05.

Measures

*SurveyGizmo* was used for the online survey. This online software was chosen because it allows for random counterbalancing between and within multi-item measures, thus reducing response bias due to question order. Four categories of questions were asked of survey participants: (1) media use, (2) psychological states, (3) intentions and behaviors related to engagement in cigarette smoking and tanning, and (4) demographic characteristics. Empirically validated scales of media use, psychological states, and behavioral intentions were adapted to fit the specific behaviors of smoking and/or tanning for a college population.

*Media Use*

In the field of mass communication, media effects have been measured by exposure to media—the amount of time one is exposed to various media channels in a given time frame (e.g., an average week or day). Others have argued that mere exposure to media is secondary to the extent to which individuals *attend* to the media (see Chaffee
& Schleuder, 1986). In response to this argument, the field of mass communication research began to include measures of attention to various forms of media, in addition to exposure. Although many studies examine individual media channels, a common method of aggregating media use is to combine individuals’ attention scores across various media (e.g., the average attention across television, newspaper, magazines, and Internet within a given time period). More recently, however, Eveland and colleagues (2009) argued that single-item measures assessing exposure and/or attention have an unknown reliability and perhaps have been partially responsible for the wide range of conflicting findings across media effects studies. The authors further illustrated that collapsing across media channels to form aggregate exposure and/or attention measures does not produce the most psychometrically robust media use variable.

As an alternative, Eveland and colleagues (2009) proposed the construction of media use variables that combine media exposure and attention for specific media channels. Specifically, standardized measures of media exposure and attention for each medium are averaged (e.g., the average standardized values of television exposure and television attention). The authors found that media use measures accounted for more variance in latent factors and reduced multicollinearity in regression models when compared to the use of single exposure measures, single attention measures, and aggregate exposure or attention measures. Eveland and colleagues argued that this approach still allows for comparisons across channels or sources and measures “a more general concept of ‘use’ that reflects the correspondence between exposure to a source and devotion of cognitive effort to that source” (p. 241).
In the current study, both general media (see Eveland et al., 2009) and health-specific media (see Romantan et al., 2008) exposure and attention were assessed across four channels: television (broadcast and cable), newspaper (national and local), magazines (news and special interest), and Internet. Exposure and attention items for general news and for health news were first standardized then averaged within each medium (i.e., eight total media use measures—four general media use measures and four health media use measures). As suggested by Eveland and colleagues (2009), general and health news media use variables were computed by averaging standardized exposure (“In a typical week, how many days would you say that you spend any time watching, reading, or listening to sources of [health-related] news or information on ______?” scale 0-7 days) and standardized attention (“Now, how would you describe how closely you pay ATTENTION to general [health-related] news or general [medical] information on these media sources ______?” rated on a 5-point Likert scale where 1 = No attention and 5 = A lot of attention). Table 1 presents Cronbach’s alpha for the media use variables for the current study. See Appendix A for all media exposure and attention questions.
Table 1

*Cronbach’s Alpha for Media Use Variables (N = 1,251)*

<table>
<thead>
<tr>
<th></th>
<th>Standardized Item Alpha</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Use</td>
<td>.80</td>
<td>4</td>
</tr>
<tr>
<td>Newspaper Use</td>
<td>.75</td>
<td>4</td>
</tr>
<tr>
<td>Magazine Use</td>
<td>.78</td>
<td>4</td>
</tr>
<tr>
<td>Internet Use</td>
<td>.80</td>
<td>2</td>
</tr>
<tr>
<td>Health TV Use</td>
<td>.86</td>
<td>4</td>
</tr>
<tr>
<td>Health Newspaper Use</td>
<td>.82</td>
<td>4</td>
</tr>
<tr>
<td>Health Magazine Use</td>
<td>.84</td>
<td>4</td>
</tr>
<tr>
<td>Health Internet Use</td>
<td>.82</td>
<td>2</td>
</tr>
</tbody>
</table>

Psychological Constructs

The following psychological constructs were abstracted from the Theory of Planned Behavior (TPB) and the Health Belief Model (HBM) as they relate to the specific behaviors of interest for the current study (i.e., cigarette smoking and unprotected sun exposure): perceived *attitudes* towards the behavior, perceived *subjective norms* about the behavior, perceived *behavioral control* to abstain from the behavior, perceived *susceptibility* to lung and skin cancer (i.e., the likelihood that one will develop lung and/or skin cancer), and perceived *severity* of lung and skin cancer.

Most questions used to assess psychological constructs were adapted from scales used in previous research to fit the specific behaviors of interest within this college population.¹

¹ Attitudes toward smoking were partially developed using questions from Vitoria, Salgueiro, Silva, and De Vries (2009) and Meshack et al. (2004). Attitudes toward tanning in salons or outdoors were guided by Branstrom, Ullen, and Brandberg (2004). White and colleagues (2008) as well as Branstrom and colleagues (2004) were used as a basis for the social norms associated with sunbathing and tanning, while Vitoria and colleagues (2009) assessed social norms for smoking. Rise, Kovac, Kraft, and Moan (2008) informed the perceived behavioral control questions associated with smoking.
Adaptations included slight wording modifications and the addition of questions to improve salience for a college student population. In addition, the scales were further refined (e.g., question omissions) based on results from the pilot study. For smoking and tanning *attitudes*, principle components analyses indicated that two factors for each attitudinal health domain best captured the data. As a result, smoking attitudes were divided into health attitudes (five questions; e.g., “If I do not smoke cigarettes my hair and skin will be healthy”) and social attitudes (five questions; e.g., “Smoking can help people fit in”). Tanning attitudes were divided into aging attitudes (2 questions; e.g., “If I avoid unprotected sun exposure by staying out of the sun or wearing sunscreen, my skin will not age as much”) and social attitudes (4 questions; “Sunbathing is a good way to relax or study”). Please see Table 2 for results from exploratory factor analyses and internal consistency for the five psychological constructs.

All of the psychological construct scales had acceptable internal reliability of at least .70 and most were greater than .80. Individual questions were reverse coded, where appropriate, and scale items were averaged with higher scores indicating greater attitudes, subjective norms, and behavioral control for *not* smoking or engaging in unprotected tanning, as well higher perceived susceptibility to, and severity of, lung and skin cancer. See Appendix B for questions pertaining to internal psychological states.

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Questions about perceived susceptibility and perceived severity for skin cancer were from Rimal and Real (2003) and Witte, Cameron, McKeon, and Berkowitz (1996).
Table 2

*Exploratory Factor Analysis and Internal Reliability of Psychological Constructs (N = 1,251)*

<table>
<thead>
<tr>
<th>Construct</th>
<th>% Variance Accounted For</th>
<th>Internal Consistency</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Smoking attitudes a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>51.47%</td>
<td>.75</td>
<td>5</td>
</tr>
<tr>
<td>Social</td>
<td>57.80%</td>
<td>.82</td>
<td>5</td>
</tr>
<tr>
<td>1b. Sunbathing/tanning attitudes a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aging</td>
<td>78.91%</td>
<td>.73</td>
<td>2</td>
</tr>
<tr>
<td>Social</td>
<td>62.56%</td>
<td>.80</td>
<td>4</td>
</tr>
<tr>
<td>2a. Smoking Subjective Norms</td>
<td>75.95%</td>
<td>.89</td>
<td>4</td>
</tr>
<tr>
<td>2b. Sunbathing/tanning Subjective Norms</td>
<td>74.08%</td>
<td>.91</td>
<td>4</td>
</tr>
<tr>
<td>3a. Smoking Perceived Behavioral Control</td>
<td>83.66%</td>
<td>.93</td>
<td>4</td>
</tr>
<tr>
<td>3b. Sunbathing/tanning Perceived Behavioral Control</td>
<td>62.33%</td>
<td>.79</td>
<td>4</td>
</tr>
<tr>
<td>4a. Lung Cancer Susceptibility</td>
<td>72.54%</td>
<td>.91</td>
<td>5</td>
</tr>
<tr>
<td>4b. Skin Cancer Susceptibility</td>
<td>76.69%</td>
<td>.92</td>
<td>5</td>
</tr>
<tr>
<td>5a. Lung Cancer Severity</td>
<td>77.01%</td>
<td>.91</td>
<td>5</td>
</tr>
<tr>
<td>5b. Skin Cancer Severity</td>
<td>79.28%</td>
<td>.93</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: To determine percent of variance accounted for in exploratory factor analyses, items for a hypothesized construct were entered, and models were restricted to a single factor, unless otherwise noted.

a Exploratory factor analyses, restricting factors to those with eigenvalues > 1, yielded two factors. Questions that comprised distinct factors were then subjected to the procedures used to determine % of variance accounted for, as delineated above.

*Behavioral Intentions*

*Intentions to Refrain from Smoking*

Participants responded to six questions about past and current smoking behavior. Both past/current regular smokers as well as past/current social smokers (i.e., having or sharing cigarettes with friends in social situations but never regularly smoking) were identified within the line of questions. See Appendix C for the full list of smoking
questions. Individuals who endorsed lifetime smoking abstinence or who were past, but not current, smokers responded to a question that assessed their intention to refrain from smoking in the future. Response options included the following: “I plan to never smoke cigarettes,” “I plan to smoke cigarettes sometime during college,” “I plan to smoke cigarettes in the years after I graduate from college.” Individuals who endorsed being a current regular or social smoker responded to a question that assessed their intentions to quit. Response options included: “I do not plan to smoke cigarettes,” “I plan to quit smoking cigarettes sometime during college,” or “I do not plan to quit smoking cigarettes.” A total of 821 participants in the study sample (66%) were current nonsmokers. Of those nonsmokers, when asked their intentions to refrain from smoking in the future, 19 said that they planned to start smoking sometime in the near or distant future. Because the dependent variable assessed one’s intentions to refrain from or quit smoking, these 19 participants (1.5%) were excluded from the current sample, resulting in an analytic sample of N = 1,232 for analyses involving the smoking intention dependent variable.

Ordinal categories of past behavior/future intentions were created based on substantive and statistical grounds. The five ordinal categories were as follows: 1 = current social or regular smoker and intend to quit in the distant future or not at all; 2 = current social or regular smoker and intend to quit during or immediately after college; 3 = current social or regular smoker and intend to quit in the next 30 days; 4 = past social or regular smoker and intend to refrain from smoking; 5 = never smoked or just tried one and intend to refrain from smoking.
Empirical findings on the TPB lend support to internal psychological states such as attitudes, subjective norms, and perceived behavioral control predicting health behavior intentions such as smoking. To corroborate the substantive ordinal categories described above, the mean values on these internal psychological variables were examined across each category of the smoking intentions dependent variable to ensure increasing monotonicity, that is, that the mean value on these psychological state variables for individuals in a given smoking intentions category were greater than the mean value for individuals in any lower category (i.e., mean predictor$_{DVcat1} <$ mean predictor$_{DVcat2} <$ mean predictor$_{DVcat3} <$ mean predictor$_{DVcat4} <$ mean predictor$_{DVcat5}$). Data indicated that this was the case, lending further support for these ordinal categories. See Table 3 for mean values of TPB constructs within each ordered category of smoking intentions.
Table 3

Means and Standard Deviations for Attitudes, Subjective Norms, and Perceived Behavioral Control for not Smoking Cigarettes (N = 1,232)

<table>
<thead>
<tr>
<th>DV Ordinal Category</th>
<th>Health Attitudes</th>
<th>Social Attitudes</th>
<th>Subjective Norms</th>
<th>Perceived Behavioral Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Current smoker, intend to quit in distant future or not at all (n = 140)</td>
<td>3.67 (0.76)</td>
<td>3.04 (0.84)</td>
<td>2.02 (0.76)</td>
<td>2.40 (1.12)</td>
</tr>
<tr>
<td>2. Current smoker, intend to quit in near future (n = 162)</td>
<td>3.79 (0.81)</td>
<td>3.06 (0.87)</td>
<td>2.21 (0.91)</td>
<td>2.67 (1.11)</td>
</tr>
<tr>
<td>3. Current smoker, intend to quit in immediate future (n = 126)</td>
<td>3.93 (0.82)</td>
<td>3.27 (0.93)</td>
<td>2.53 (0.98)</td>
<td>3.59 (1.24)</td>
</tr>
<tr>
<td>4. Past smoker, intend to refrain (n = 220)</td>
<td>4.09 (0.78)</td>
<td>3.57 (0.92)</td>
<td>3.07 (1.16)</td>
<td>4.73 (0.56)</td>
</tr>
<tr>
<td>5. Non-smoker, intend to refrain (n = 584)</td>
<td>4.17 (0.75)</td>
<td>3.82 (0.94)</td>
<td>3.47 (1.16)</td>
<td>4.80 (0.56)</td>
</tr>
</tbody>
</table>

Intentions to Avoid Unprotected Sun Exposure

Participants responded to five questions with Likert-scale responses (1 = strongly disagree to 5 = strongly agree) about their intentions to avoid unprotected exposure to the sun (e.g., “I intend to stop spending time outside strictly with the purposes of getting tan” or “I intend to apply and reapply sunscreen of SPF 15 or higher when out in the sun”). Questions were based on recommended sun exposure guidelines set forth by the Skin Cancer Foundation (www.skincancer.org). See Appendix C for the five tanning intentions questions. Exploratory factor analyses indicated that these five questions
loaded on a single factor, explaining 62.86% of the variance in the latent construct of sun exposure intentions, and had an internal consistency of alpha = .85. Items were averaged to create a single summary measure of sun tanning intentions with higher scores indicating greater intentions to engage in sun-protective behaviors.

Statistical Analyses

Unless otherwise noted, all statistical analyses controlled for gender, age, and class rank and employed an $\alpha$-level of .05. The following statistical analyses were performed to test hypotheses 1-4. Ordinal regression was used to assess the relationship between media use and smoking intentions (H1a), as well as psychological constructs and smoking intentions (H3). Linear regression was used to test the relationship between media use and sun exposure intentions (H1b), as well as psychological constructs and sun exposure intentions (H3). Linear regression was also used to assess the relationship between media use and psychological states (H2a and H2b). To test the third-variable effect (i.e., mediation; H4), both hierarchical ordinal and linear regression procedures set forth by Baron and Kenny (1986) were used. Specifically, Baron and Kenny outline the following three requirements for third-variable effects to take place:

1. The independent variable (IV) is related to the dependent variable (DV).
2. The IV is related to the third variable.
3. The third variable is related to the DV in the presence of the IV, and the relationship between the IV and the DV changes in the presence of the third variable (i.e., is reduced in the special case of mediation).
Thus, for the current study, step 3 of the Baron and Kenny procedure was conducted when H1 (Baron and Kenny step 1) and H2 (Baron and Kenny step 2) were jointly supported. To proceed with step 3 of the Baron and Kenny Method, IVs and third variables that were significant at the $\alpha$-level of .10 were analyzed. We used a more liberal inclusion criterion because debate continues to surround the tenability of step 1. Specifically, some argue that an IV need not be “significantly” related to the DV for mediation to occur (e.g., Mackinnon, Fairchild, & Fritz, 2007; MacKinnon, Krull, & Lockwood, 2000). Given this continued debate, less stringent criteria for steps 1 and 2 of the Baron and Kenny method seemed appropriate.²

Sobel tests (Sobel, 1982) were employed to examine the changes in the relationship between media use and health intentions when a third variable was added to the model. These tests examine the change in the magnitude of beta coefficients for the model containing only the IV, relative to the model that contains both the IV and the third variable. To estimate the standard errors for the coefficient change, online calculators developed by Preacher and Leonardelli (http://people.ku.edu/~preacher/sobel/sobel.htm) were utilized.

² Results for the mediation analyses did not differ when a more stringent inclusion criterion of $\alpha = .05$ for steps 1 and 2 was used.
CHAPTER 8: RESULTS

Sample Characteristics

The majority of the participants were female (74.4%), underclassmen (62.3%), and from one of the six Ohio University campuses (67.1%). The average age of participants was 26 years; however, this distribution was highly positively skewed. Ages ranged from 18 to 64 with the 50th percentile falling at age 21 years and the 75th percentile falling at age 30 years. See Table 4 for complete participant demographics.
Table 4

Sample Characteristics ($N = 1,251$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>319</td>
<td>25.5</td>
</tr>
<tr>
<td>Female</td>
<td>932</td>
<td>74.5</td>
</tr>
<tr>
<td><strong>2. School Enrollment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belmont Technical College</td>
<td>17</td>
<td>1.4</td>
</tr>
<tr>
<td>Central Ohio Technical College</td>
<td>56</td>
<td>4.5</td>
</tr>
<tr>
<td>Hocking College</td>
<td>10</td>
<td>0.8</td>
</tr>
<tr>
<td>Jefferson Community College</td>
<td>34</td>
<td>2.7</td>
</tr>
<tr>
<td>Ohio University—Athens</td>
<td>564</td>
<td>45.1</td>
</tr>
<tr>
<td>Ohio University—Chillicothe</td>
<td>99</td>
<td>7.9</td>
</tr>
<tr>
<td>Ohio University—St. Clairsville</td>
<td>17</td>
<td>1.4</td>
</tr>
<tr>
<td>Ohio University—Lancaster</td>
<td>59</td>
<td>4.7</td>
</tr>
<tr>
<td>Ohio University—Ironton</td>
<td>70</td>
<td>5.6</td>
</tr>
<tr>
<td>Ohio University—Zanesville</td>
<td>30</td>
<td>2.4</td>
</tr>
<tr>
<td>Shawnee State University</td>
<td>29</td>
<td>2.3</td>
</tr>
<tr>
<td>Southern State Community College</td>
<td>123</td>
<td>9.8</td>
</tr>
<tr>
<td>Washington State Community College</td>
<td>19</td>
<td>1.5</td>
</tr>
<tr>
<td>Zane State College</td>
<td>124</td>
<td>9.9</td>
</tr>
<tr>
<td><strong>3. Year in School</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>366</td>
<td>29.3</td>
</tr>
<tr>
<td>Sophomore</td>
<td>415</td>
<td>33.2</td>
</tr>
<tr>
<td>Junior</td>
<td>231</td>
<td>18.5</td>
</tr>
<tr>
<td>Senior</td>
<td>205</td>
<td>16.4</td>
</tr>
<tr>
<td>Graduate</td>
<td>34</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>4. Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25.87</td>
<td>9.32</td>
</tr>
</tbody>
</table>

*a Denotes mean and standard deviation
Media Use and Behavioral Intentions

For general media, exposure and attention were greatest for Internet, followed by television, newspaper, and magazines. Similarly, for health media, exposure and attention were greatest for Internet and television. However, information in health magazines were used to a greater extent than information found in the health sections of newspapers. See Table 5 for complete descriptive statistics for media use and behavioral intentions variables. See Appendix D for correlations of media use variables.

Table 5

Descriptive Statistics for Media Use and Behavioral Intentions Variables
(N = 1,251, unless otherwise indicated)

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Media Exposure</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. TV</td>
<td>2.62</td>
<td>1.93</td>
</tr>
<tr>
<td>2. Newspaper</td>
<td>1.62</td>
<td>1.49</td>
</tr>
<tr>
<td>3. Magazine</td>
<td>1.21</td>
<td>1.31</td>
</tr>
<tr>
<td>4. Online</td>
<td>4.16</td>
<td>2.36</td>
</tr>
<tr>
<td><strong>General Media Attention</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. TV</td>
<td>2.85</td>
<td>1.08</td>
</tr>
<tr>
<td>6. Newspaper</td>
<td>2.47</td>
<td>1.04</td>
</tr>
<tr>
<td>7. Magazine</td>
<td>2.21</td>
<td>1.06</td>
</tr>
<tr>
<td>8. Online</td>
<td>3.56</td>
<td>1.21</td>
</tr>
<tr>
<td><strong>Health Media Exposure</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. TV</td>
<td>1.67</td>
<td>1.66</td>
</tr>
<tr>
<td>10. Newspaper</td>
<td>1.13</td>
<td>1.39</td>
</tr>
<tr>
<td>11. Magazine</td>
<td>1.16</td>
<td>1.40</td>
</tr>
<tr>
<td>12. Online</td>
<td>2.72</td>
<td>2.16</td>
</tr>
<tr>
<td><strong>Health Media Attention</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. TV</td>
<td>2.46</td>
<td>1.15</td>
</tr>
<tr>
<td>14. Newspaper</td>
<td>2.02</td>
<td>1.02</td>
</tr>
<tr>
<td>15. Magazine</td>
<td>2.06</td>
<td>1.08</td>
</tr>
<tr>
<td>16. Online</td>
<td>3.04</td>
<td>1.30</td>
</tr>
</tbody>
</table>
Table 5, continued  

**Behavioral Intentions**  

<table>
<thead>
<tr>
<th>17. Intentions to avoid unprotected sun exposure</th>
<th>2.57</th>
<th>1.01</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>18. Intentions to quit smoking (N = 1,232)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Current social/regular smoker: Intends to quit in distant future or not at all</td>
<td>140</td>
<td>11.4</td>
</tr>
<tr>
<td>2. Current social/regular smoker: Intends to quit in the near future</td>
<td>162</td>
<td>13.1</td>
</tr>
<tr>
<td>3. Current social/regular smoker: Intends to quit in immediate future</td>
<td>126</td>
<td>10.2</td>
</tr>
<tr>
<td>4. Past social/regular smoker: Intends to not smoke again</td>
<td>220</td>
<td>17.8</td>
</tr>
<tr>
<td>5. Never smoked or only tried one cigarette: Intends to not smoke</td>
<td>584</td>
<td>47.4</td>
</tr>
</tbody>
</table>

*a Scale: 0-7 for days of the week.*  

*b 5-point Likert scale (1 = No attention, 5 = A lot of attention)*

**Hypothesis 1: Media Use and Health Behavior Intentions**

Hypothesis 1 stated that general media use would be negatively related to behavioral intentions, while health media use would be positively related to behavioral intentions. For intentions to refrain from smoking, hypothesis 1 was partially supported. Health magazine and Internet use \( (OR = 1.13, p = .057 \) and \( OR = 1.10, p = .085, \) respectively) were marginally related to intentions to refrain from smoking in the hypothesized direction; respondents who reported greater health media use were more likely to belong to a higher smoking intentions category (i.e., they were more likely to refrain from smoking). General magazine use, however, was also marginally related to intentions to refrain from smoking in the positive direction, contrary to hypothesis \( OR = \)
1.12, \( p = .088 \)). All relationships were no longer significant after controlling for age, gender, and year in school (see Table 6).

For intentions to use protection when exposed to the sun, health television, health newspaper, and health magazine use were all significantly related to intentions to avoid unprotected sun exposure in the hypothesized direction (all \( p \)'s < .01; see Table 6). Specifically, individuals with greater health media use had higher intentions to avoid unprotected sun exposure. General newspaper and magazine use, contrary to hypotheses, were also positively related to intentions to avoid unprotected exposure to the sun (all \( p \)'s < .01; see Table 6). All relationships remained significant after controlling for participant demographic characteristics.

Table 6

Summary of Ordinal and Linear Regression Analyses for Predicting Health Intentions from Media Use

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intention to refrain from smoking (N = 1,232)</th>
<th>Intention to avoid unprotected sun exposure (N = 1,251)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted OR</td>
<td>Wald</td>
</tr>
<tr>
<td>General Media Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Television</td>
<td>0.96</td>
<td>0.25</td>
</tr>
<tr>
<td>Newspaper</td>
<td>0.93</td>
<td>1.02</td>
</tr>
<tr>
<td>Magazine</td>
<td>1.04</td>
<td>0.29</td>
</tr>
<tr>
<td>Online</td>
<td>0.95</td>
<td>0.72</td>
</tr>
<tr>
<td>Health Media Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Television</td>
<td>1.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Newspaper</td>
<td>1.05</td>
<td>0.51</td>
</tr>
</tbody>
</table>

\( ^a \) All models control for participant age, gender, and class rank.
Hypothesis 2: Media Use and Internal Psychological States

Research hypothesis 2 stated that general media use would be negatively related to psychological states, while health media use would be positively associated with these states. To test hypothesis 2, each of the 12 psychological state variables (six related to smoking and six related to sun exposure; see Tables 7 and 8) were individually regressed on the eight media use variables, controlling for age, gender, and class rank. For smoking-related psychological constructs, hypothesis 2 was partially supported. More frequent media use was associated with less favorable attitudes toward not smoking, lower subjective norms about smoking abstinence, less perceived behavioral control to refrain from or quit smoking, and lower severity of lung cancer, all in support of hypothesis 2a. In support of hypothesis 2b, health Internet use was positively associated with health attitudes, such that greater health Internet use was associated with more positive health attitudes about refraining from smoking. Contrary to hypothesis 2b, a number of negative and significant associations were found. Individuals with greater health TV use, health magazine use, and health newspaper use had less subjective norms, perceived severity of lung cancer, and both perceived behavioral control and perceived severity, respectively. See Table 7.
Table 7

Summary of Linear Regression Analyses Predicting Smoking Psychological States from Media Use* (N = 1,251)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Health Attitudes</th>
<th>Social Attitudes</th>
<th>Subjective Norms</th>
<th>Perceived Behavioral Control</th>
<th>Susceptibility</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
</tr>
<tr>
<td>General Media Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>-.033 (.029)</td>
<td>-.004 (.035)</td>
<td>-.130** (.044)</td>
<td>-.084† (.046)</td>
<td>.054 (.037)</td>
<td>.020 (.022)</td>
</tr>
<tr>
<td>Newspaper</td>
<td>-.078** (.030)</td>
<td>-.035 (.036)</td>
<td>-.077† (.045)</td>
<td>-.096* (.047)</td>
<td>.048 (.038)</td>
<td>-.095*** (.022)</td>
</tr>
<tr>
<td>Magazine</td>
<td>-.046 (.029)</td>
<td>-.029 (.035)</td>
<td>-.005 (.045)</td>
<td>-.011 (.047)</td>
<td>-.002 (.038)</td>
<td>-.087*** (.022)</td>
</tr>
<tr>
<td>Online</td>
<td>.014 (.025)</td>
<td>-.023 (.030)</td>
<td>-.069† (.037)</td>
<td>-.021 (.039)</td>
<td>.033 (.031)</td>
<td>.032† (.018)</td>
</tr>
<tr>
<td>Health Media Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>.011 (.027)</td>
<td>.037 (.032)</td>
<td>-.116** (.041)</td>
<td>-.071† (.042)</td>
<td>.062† (.034)</td>
<td>.004 (.020)</td>
</tr>
<tr>
<td>Newspaper</td>
<td>-.046 (.028)</td>
<td>-.018 (.033)</td>
<td>-.066 (.042)</td>
<td>-.111* (.044)</td>
<td>.053 (.035)</td>
<td>-.077*** (.021)</td>
</tr>
<tr>
<td>Magazine</td>
<td>-.001 (.028)</td>
<td>.024 (.033)</td>
<td>.031 (.042)</td>
<td>.014 (.044)</td>
<td>-.011 (.035)</td>
<td>-.060** (.021)</td>
</tr>
<tr>
<td>Online</td>
<td>.052* (.024)</td>
<td>.048 (.029)</td>
<td>-.026 (.037)</td>
<td>.074† (.038)</td>
<td>-.035 (.031)</td>
<td>.033† (.018)</td>
</tr>
</tbody>
</table>

Note: † p < .10, * p < .05, ** p < .01, *** p < .001.
a All models control for participant age, gender, and class rank.

For psychological variables associated with sun exposure, hypothesis 2 was partially supported. General TV use was negatively related to subjective norms, as hypothesized, such that greater TV use was associated with lower subjective norms about
refraining from unprotected sun exposure. In addition, general newspaper use was also negatively related to severity of skin cancer. Consistent with hypothesis 2b, positive relationships were observed between health Internet use and both perceived susceptibility to and perceived severity of skin cancer, such that the more individuals reported using health Internet sites, the more susceptible they felt to skin cancer and the more severe they perceived skin cancer to be. Contrary to hypothesis 2a, general newspaper use was significantly and *positively* related to subjective norms, while general Internet use was positively associated with perceived severity. Individuals who reported greater newspaper use had higher perceptions of others using protection while in the sun, while individuals who reported more general Internet use perceived skin cancer as being severe. See Table 8.
Table 8

Summary of Linear Regression Analyses Predicting Sun Exposure Psychological States from Media Use\(^a\) (\(N = 1,251\))

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age Attitudes</th>
<th>Social Attitudes</th>
<th>Subjective Norms</th>
<th>Perceived Behavioral Control</th>
<th>Susceptibility</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
<td>Beta (SE)</td>
</tr>
<tr>
<td>General Media Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>.000 (.035)</td>
<td>-.051 (.037)</td>
<td>-.078* (.034)</td>
<td>.007 (.037)</td>
<td>.051 (.036)</td>
<td>.045 (.027)</td>
</tr>
<tr>
<td>Newspaper</td>
<td>-.070† (.036)</td>
<td>.061 (.038)</td>
<td>.084* (.035)</td>
<td>.029 (.038)</td>
<td>-.029 (.037)</td>
<td>-.070** (.028)</td>
</tr>
<tr>
<td>Magazine</td>
<td>-.063† (.036)</td>
<td>-.046 (.038)</td>
<td>.011 (.034)</td>
<td>.031 (.038)</td>
<td>.013 (.037)</td>
<td>-.049 (.027)</td>
</tr>
<tr>
<td>Online</td>
<td>-.012 (.030)</td>
<td>.050 (.031)</td>
<td>.010 (.029)</td>
<td>.056 (.031)</td>
<td>.000 (.031)</td>
<td>.071** (.023)</td>
</tr>
<tr>
<td>Health Media Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>.034 (.033)</td>
<td>-.006 (.034)</td>
<td>-.034 (.031)</td>
<td>.019 (.034)</td>
<td>.055 (.034)</td>
<td>.047† (.025)</td>
</tr>
<tr>
<td>Newspaper</td>
<td>-.048 (.034)</td>
<td>.023 (.035)</td>
<td>.045 (.032)</td>
<td>.031 (.036)</td>
<td>.010 (.035)</td>
<td>-.022 (.026)</td>
</tr>
<tr>
<td>Magazine</td>
<td>-.019 (.034)</td>
<td>-.052 (.035)</td>
<td>-.008 (.032)</td>
<td>.002 (.036)</td>
<td>.061† (.035)</td>
<td>-.013 (.026)</td>
</tr>
<tr>
<td>Online</td>
<td>.026 (.030)</td>
<td>-.033 (.031)</td>
<td>-.032 (.028)</td>
<td>.027 (.031)</td>
<td>.062* (.031)</td>
<td>.052* (.023)</td>
</tr>
</tbody>
</table>

Note: † \(p < .10\), * \(p < .05\), ** \(p < .01\), *** \(p < .001\).

\(^a\) All models control for participant age, gender, and class rank.
Hypothesis 3: Internal Psychological States and Health Intentions

Hypothesis 3 stated that internal psychological states would be positively related to health behavior intentions. To test research hypothesis 3, each of the two health behavior intention variables were regressed on the six psychological states, after controlling for age, gender, and class rank. See Table 9. For smoking intentions, all psychological state variables, except for perceived severity of lung cancer, predicted smoking intentions. In addition, all significant relationships were in the hypothesized direction, except for perceived susceptibility to lung cancer. Specifically, greater perceived susceptibility to lung cancer was associated with fewer intentions to refrain from smoking.

All psychological states significantly predicted unprotected sun exposure intentions in the hypothesized direction, except perceived susceptibility of skin cancer. As with intentions to refrain from smoking, greater perceived susceptibility to skin cancer was associated with fewer intentions to avoid unprotected sun exposure.
Table 9

Summary of Regression Analyses Predicting Health-Behavior Intentions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intention to Refrain from Smoking (N = 1,232)</th>
<th>Intentions to Avoid Unprotected Sun Exposure (N = 1,251)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted OR</td>
<td>Wald</td>
</tr>
<tr>
<td>Health/Age Attitudes b</td>
<td>1.65</td>
<td>55.067</td>
</tr>
<tr>
<td>Social Attitudes</td>
<td>2.02</td>
<td>135.94</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td>2.34</td>
<td>261.076</td>
</tr>
<tr>
<td>Perceived Behavioral Control</td>
<td>3.920</td>
<td>545.582</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>0.323</td>
<td>320.75</td>
</tr>
<tr>
<td>Severity</td>
<td>1.092</td>
<td>.958</td>
</tr>
</tbody>
</table>

*a All models control for participant age, gender, and class rank.

*b The smoking dv was regressed on health attitudes; the sun exposure dv was regressed on age attitudes.

Hypothesis 4: Third Variable Effects

Tests of third-variable effects for the current study required that two prior conditions be met: (1) a media use variable must be significantly associated with a health behavior intention dependent variable and (2) the media use variable must be significantly associated with a “third variable,” in this case, one of the psychological state variables. Five media use variables met criterion 1 at an alpha = .10 level of significance: general newspaper use, general magazine use, health television use, health newspaper use, and health magazine use, all as predictors of unprotected sun exposure intentions. Six psychological state variables satisfied criterion 2 (i.e., were related to at least one of the five media use variables identified in criterion 1) at the alpha = .10 level of significance. General newspaper use predicted age attitudes and subjective norms about
tanning, as well as perceived severity of skin cancer. General magazine use predicted age 
atitudes about smoking. Health TV use and health magazine use predicted severity of 
skin cancer and susceptibility to skin cancer, respectively. Thus, a total of six third 
variable tests were conducted.

Sobel tests (Sobel, 1982) assessed the extent to which a psychological state third 
variable changed the magnitude of the relationship between the media use variable and 
the dependent measure of unprotected sun exposure intentions. See Table 10. In support 
of hypothesis 4, greater general newspaper use was associated with more intentions to use 
protection when in the sun (Beta = .13; Table 6); however, this relationship was due in 
part to individuals’ perceptions of others also favoring the use of protection when in the 
sun (ΔBeta = 0.015, p = .023), thus suggesting that subjective norms partially mediated 
the relationship between general newspaper use and unprotected sun exposure intentions. 
However, when considering individuals’ perceptions of the severity of skin cancer, the 
opposite effect occurred (ΔBeta = -0.011, p = .033). The relationship between general 
newspaper use and unprotected sun exposure intentions was actually enhanced, rather 
than attenuated as would be the case if mediation had taken place.
### Table 10

**Summary of Third Variable Analyses Predicting Intentions to Avoid Unprotected Sun Exposure (N = 1,251)**

<table>
<thead>
<tr>
<th>Media Use/Psychological State Variable</th>
<th>$\beta_1$</th>
<th>$\beta_2$</th>
<th>$\Delta\beta$</th>
<th>SE$_{\Delta\beta}$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Newspaper/Age Attitudes</td>
<td>0.131</td>
<td>0.142</td>
<td>-0.011</td>
<td>0.006</td>
<td>.067</td>
</tr>
<tr>
<td>General Newspaper/Subjective Norms</td>
<td>0.131</td>
<td>0.116</td>
<td>0.015</td>
<td>0.006</td>
<td>.023</td>
</tr>
<tr>
<td>General Newspaper/Severity</td>
<td>0.131</td>
<td>0.142</td>
<td>-0.011</td>
<td>0.005</td>
<td>.033</td>
</tr>
<tr>
<td>General Magazine/Age Attitudes</td>
<td>0.165</td>
<td>0.174</td>
<td>-0.009</td>
<td>0.006</td>
<td>.095</td>
</tr>
<tr>
<td>Health TV/Severity</td>
<td>0.100</td>
<td>0.093</td>
<td>0.007</td>
<td>0.004</td>
<td>.096</td>
</tr>
<tr>
<td>Health Magazine/Susceptibility</td>
<td>0.149</td>
<td>0.157</td>
<td>-0.008</td>
<td>0.005</td>
<td>.100</td>
</tr>
</tbody>
</table>

*The psychological state third variable in each model was significantly related to unprotected sun exposure intentions, in the presence of media use and demographic variables, at the $p < .01$ level.*

*b Denotes unstandardized beta coefficient for unprotected sun exposure intentions regressed on media use variables, after controlling for demographic variables.

c Denotes unstandardized beta coefficient for unprotected sun exposure intentions regressed on media use variables, after controlling for demographic variables and in the presence of the third variable (i.e., psychological state).

d Denotes change in Beta coefficients (i.e., $\beta_1 - \beta_2$).
CHAPTER 9: DISCUSSION

Few studies have examined the processes through which media influence individuals’ decisions to engage in or refrain from various behaviors. This study aimed to fill the gap in the empirical literature by employing an online survey method to assess the relationships between media use, internal health-related psychological states, and health behavior intentions in a sample of Southeast Ohio college students.

In the current study, none of the general media use variables nor health media use variables were significantly related to smoking intentions. Although magazine and Internet use for health and medical information marginally predicted intentions to refrain from smoking in the hypothesized direction, they were no longer related after controlling for demographic variables. The null finding is somewhat surprising given the coverage of statewide smoking bans in the media, particularly in local television and newspaper (American Nonsmokers’ Rights Foundation, 2010). However, Ohio passed its smoke-free legislation in 2006, and it is thus possible that coverage of smoking issues has waned in the years leading up to the current study. A media content analysis conducted immediately prior to and during the study would have shed greater light on the extent to which smoking issues make their way into the media consumed by study participants.

A second possibility is that most media do, in fact, contain information that portrays smoking in a negative light, and for non-smokers, these messages just reify or solidify their already existing commitment to refrain from smoking. On the contrary, smokers who use media may pay little attention to the information about smoking because they do not want to be reminded of its harmful effects. In other words, based on
selective exposure (Zillmann & Bryant, 1994), individuals see what they want to see and ignore what they do not want to see. Smokers’ ignoring of media messages about the harmful effects of smoking may reduce any dissonance caused by their behavior and the knowledge of the deleterious effects of the behavior (Lee, 1989; McMaster & Lee, 1991). In these instances, both smokers’ and non-smokers’ intentions to use cigarettes would be unaffected by media use, regardless of the messages contained in the media.

A third explanation for the null findings concerns the lack of precision used to measure media use in the current study. Indeed, prior studies that found a relationship between media use and smoking intentions/behaviors employed more nuanced media measurements such as use of fashion magazines (Carson, Rodriguez, & Audrain-McGovern, 2005) and comedy television shows (Klein et al., 1993). Although the goal of the current study was to examine the impact of more global, rather than specific, media use on behavioral intentions, it is possible that the measurement was too global and thus failed to identify the precise media channels that are the most robust predictors of behavioral intentions.

Although media use was unrelated to smoking intentions, this study found that general and health media use were both significant predictors of tanning intentions. Study hypothesis 1 predicted that general media use would be negatively related to tanning intentions, while health media use would be positively related. In partial support of this hypothesis, significant positive relationships were found between intentions to use protection when tanning and both general and health-specific newspaper and magazine
use, as well as health television use. No media use variables were negatively related to tanning intentions.

It is possible that both general and health media are health-promoting and contain information that would encourage individuals to use protection when tanning. In addition, people who like to be well-informed about their own lives, including their health and bodies, may be those who use media the most (e.g., Dutta-Bergman, 2005). These information seekers may acquire health knowledge through the media and other non-media sources (e.g., medical provider, family/friends), such that it is not only the use of media that increases their health-promoting behavior, but also the act of being a resourceful health-conscious information seeker (Dutta-Bergman, 2004a; Tian & Robinson, 2008).

Interestingly, Internet use (both for general purposes as well as for health and medical information) was the only media channel unrelated to tanning intentions. Perhaps for this college population, the use of the Internet is primarily relegated to social activities such as social networking, online video games, emailing, and chatting (Jones, Johnson-Yale, Millermaier, & Perez, 2009). The use of television, newspapers, and magazines, on the other hand, may be primarily associated with news consumption.

All psychological states, except perceived susceptibility, were positively related to intentions to refrain from smoking as well as intentions to avoid unprotected sun exposure, as hypothesized. That is, as one would expect from the Theory of Planned Behavior, individuals with higher attitudes, higher subjective norms, and higher perceived behavioral control had greater intentions to refrain from risky health behaviors
related to lung and skin cancer. However, contrary to what the Health Belief Model would predict, individuals who perceived themselves as being susceptible to lung and skin cancer were more likely to report intentions to engage in smoking and unprotected tanning, respectively.

One possible explanation for this unexpected finding is that individuals who currently engage in deleterious health behaviors such as smoking and unprotected tanning, and who intend to continue engaging in these behaviors, are fully aware that they place themselves at greater risk for lung and/or skin cancer by engaging in such harmful behaviors. Given the age composition of this sample (i.e., younger adults), it is possible that some respondents still feel the invincibility of youth (Weinstein, 1983). That is, they believe that their actions may eventually lead to negative health consequences, but such consequences are unlikely to manifest for many years. Other respondents may fall prey to an attitude of fatalistic determinism, which has been shown to be prevalent among community samples of this geographic region (Phillips, 2007; Shell & Tudiver, 2004). Such individuals externalize behavioral consequences, stating that whatever happens is out of their control and meant to be. Awareness and knowledge of the severity of consequences, in this context, would thus have little impact on changing health behaviors (Arthey & Clarke, 1995; Knight, Kirincich, Farmer, & Hood, 2002). Still others may resist changing negative behaviors because of a perception of the ubiquity and possible inevitability of eventually being diagnosed with some form of cancer during one’s life (Niederdeppe & Levy, 2007).
Contrary to prediction, respondents who were the highest consumers of media also had the least favorable attitudes toward engaging in health behaviors and efficacy to do so, they believed that their peer group supported smoking and unprotected sun exposure, and they also perceived smoking and unprotected tanning to be relatively benign behaviors. The exception to these findings was for Internet use, which increased individuals’ health attitudes related to smoking as well as perceived susceptibility to, and severity of, skin cancer. Unlike television, newspapers, and magazines, the Internet is a highly specialized source of information that people often depend on more for their information than other sources (Riffe, Lacy, & Varouhakis, 2008). When people use the Internet to obtain health and medical information, they conduct an online search to answer a particular question or clarify a problem. Conversely, other media may provide general information about specific topics, but they lack the ability of the Internet to provide in-depth information on a specific topic of immediate interest.

In the current study, it is possible that those who used the Internet the most, primarily for social activities but also for the purpose of acquiring specific information, differed in one or more salient ways from those who primarily utilized other, passive forms of media such as television, newspaper, and magazines (Oliver & Krakowiak, 2009). For example, passive media users may be less proactive about their health and, in general, more likely to engage in deleterious health behaviors (Dutta-Bergman, 2004b). It would thus follow that these passive media users would have less favorable attitudes about smoking cessation and sun protection. Active information seekers (i.e., those who
seek information on the Internet) would be more health-conscious and thus have more favorable attitudes about health-protective behaviors.

Given the positive relationships between (1) media use and intentions to use protection when tanning, as well as (2) various psychological states and intentions to use sun protection, it would logically follow that positive relationships would occur between media use and internal psychological states pertaining to the use of sun protection, if the hypothesized mediation had taken place. Media use, however, was negatively associated with internal psychological states pertaining to the use of sun protection (Internet use, Health Internet use, and one instance of newspaper use were the exceptions). Indeed, only one hypothesized mediation model was found to be significant in the current study. Specifically, general news use was associated with a greater perception of one’s peers and important others engaging in sun protective behaviors, which in turn increased one’s own intentions to engage in sun protection behaviors.

A single case of suppression was also present. Suppression is often characterized by interrelationships between three variables (i.e., the independent variable, dependent variable, and 3rd variable) that differ in the direction of their relationships. For example, in the current study, general newspaper use and perceived severity were both positively related to intentions to use sun protection; however, the relationship between general newspaper use and perceived severity was negative. Individuals’ decreased perceptions of the severity of cancer enhanced the relationship between general newspaper use and sun protection intentions.
One possible explanation for the overall lack of support for mediation is that unmeasured, and perhaps more salient psychological processes, affect the ways in which media influence behavioral intentions. Indeed, reaching a decision to engage in or refrain from a specific behavior is complex. Individuals often undergo a weighing of pros and cons before coming to a decision. The Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1992) posits that readiness to engage in a behavior is a precursor to behavior change. According to this model, attitudes, subjective norms, perceived behavioral control, and other psychological states would have little influence on individuals’ behavioral intentions unless the individuals are ready to engage in a behavior. Perhaps study respondents’ readiness to refrain from smoking and to use sun protection when tanning is a better predictor of behavioral intentions than the psychological states measured in the current study. Readiness, however, was not measured, and future studies should take behavioral readiness into account.

Limitations

Findings from this study should be considered in light of its limitations. First, this study employed a cross-sectional design; thus, it is unclear whether media use affects people’s intentions or if people who have certain beliefs about abstaining from activities that are detrimental to one’s health are more likely to be consumers of media. An experiment, where people are randomly assigned to specific media environments (e.g., only able to watch, listen, or read certain media channels vs. limited, or restricted, media exposure) over time could address this issue. Non-experimental longitudinal designs that
assess patterns of media use over time may also prove useful in elucidating the temporal relationship between media use and health behaviors.

A second limitation concerns the calculation of response rates. The nature of the study precludes identification of the number of professors who forwarded the survey link to their students and the proportion of solicited students who actually completed the survey. It is clear that the number of respondents across all schools is much smaller than the number of individuals who could have potentially completed the survey, given the recruitment strategy. People who decided to respond to the online survey could systematically differ in one or more salient ways from those who chose not to participate. Thus, generalizability of these findings to the greater college student population, let alone the Southeast Ohio college student population, may be compromised.

Third, this study may have misrepresented the actual college student demographic in the United States in other ways. Specifically, 25% of the sample was over the age of 30, and these “nontraditional” college students may have had experiences earlier in life that cemented certain behaviors. It is possible that these individuals are at a different developmental stage, relative to individuals in their late teens and early 20s who have recently left home for the first time.

Fourth, whereas many of the psychological constructs were shown to be highly related to behavioral intentions in the hypothesized direction, the more general media use measures were more variably related to behavioral intentions. A lack of specificity in the measurement of media use may have contributed to this variability. Future studies should inquire about specific types of magazines (e.g., *Rolling Stones, Vogue, Newsweek*) and
television stations/shows (e.g., The Today Show, The Daily Show, MTV) to obtain a more precise measurement of types of media used in college student populations. In addition, participants in the current study were asked about weekly media use across specific channels (e.g., the number of days of television exposure in an average week). Because the amount of media consumed in a given day is variable, it is possible that one person may have reported 2 days of exposure to television for 10 hours per day, while a second person may have reported 2 days of exposure for one hour per day. Although the first person watches 10 times the amount of television as the second person, they both would receive the same media exposure score using this study’s instrument. Memory biases could also influence people’s estimates of media exposure and attention. Future studies should address this weakness by utilizing more objective media use measures such as daily media diaries or mobile technology devices that would allow for precise measurement of actual media exposure time.

Lastly, this study had relatively small effect sizes, which may be an artifact of the imprecision of how media use was measured. However, given the expansive reach of mass media, even small effect sizes can have a great public health impact (Noar, 2006).

Conclusions

Despite its limitations, the current study provides seminal evidence on the relationship between media use and health behaviors, namely cigarette smoking and sun tanning. Findings from this study have far reaching implications for the fields of mass media, health communications, and public health. For example, given the impact of both general and health-specific media use on health behavior intentions, media corporations
will likely play a vital role in conveying healthy information to consumers. Although congress banned cigarette advertising on television and radio in 1971 and both Google and Microsoft currently have advertising policies that prohibit the promotion of tobacco products in their advertising agreements, media corporations must still consider the ways in which non-advertising portrayals of risky health habits (e.g., sexy, cool characters who smoke on a television show) affect young media consumers. These covert messages may, over time, shape consumers’ perceptions of smoking and tanning as innocuous behaviors. Corporations should make a socially responsible commitment to be health promoting, especially across content most used by young adults. Exposing media’s covert messages to the public may also create social pressure on media conglomerates to offer a more balanced portrayal of media characters, such that not all smokers and tanned persons are viewed as glamorous.

Active media messages that are health-promoting will also be necessary to impact health behavior change. Despite the widespread use of Internet among college populations, more traditional forms of media may be most efficacious for the conveying of health information. This raises some concern given the current media climate, one that is driven by technology and on-demand information. The deluge of information across these new media channels, coupled with the capability of media consumers to selectively search for desired information, results in a “filtered” media experience. Media environments are becoming increasingly complex and individualized so that even mass media are affecting individuals in very disparate ways—depending on personal needs, wants, and motivations. Further, media consumption is more fragmented than ever before
with the use of technology and multitasking; individuals are attending to many different
types of media in smaller chunks of time, often incorporating media intentionally and
unintentionally into daily routines and habits, rather than dedicating longer lengths of
time for media consumption.

Health communicators must work with the more technologically advanced forms
of media and creatively tailor information so that individuals cannot selectively avoid it.
For example, social marketing campaigns should utilize frames, content placement, and
culturally relevant lexicons specific to more defined audience segments in order to
capture intended audience attention. Pre-campaign formative research is also essential in
this context to both understand the uniqueness of the intended audience and to provide a
base for which to measure post-campaign outcomes against. Additionally, media use is
increasingly combined with social interactions (e.g., social networking sites, commenting
on news stories or blogs, and sharing news stories via email, news aggregates, and
tweets), making it integral for public health advocates to present health messages in ways
that capitalize on the phenomenon of social communication over the Internet.

Finally, media have traditionally been a cornerstone of public health campaigns.
The current study provides supporting evidence for the appropriateness of this strategy.
Funding agencies that include national, state, and local government agencies, as well as
non-governmental organizations, should continue to support efforts that aim to improve
the health of our nation through mass media messaging. In addition, projects that actively
create and disseminate health messages, as well as those that aim to reduce media content
that promote deleterious health behaviors, should be targeted by funding agencies.
Many public health efforts rely on health communication campaigns to make a difference on individual-level behavior in order to lead to societal-level health improvements. Thus, numerous communication campaigns are continually launched with specific health-oriented goals, yet questions still linger about if and, if so, how the information dissemination may or may not be effective. The focal point of this study, exploring how media consumption related to health behaviors, acknowledges the temporality, or rather vulnerability, of individuals’ internal processes. And, more importantly, that over time media consumption potentially has a polemic effect—either temporal or lasting—on specific health behaviors. Thus, mass media’s role in health behaviors must be continually reassessed in order to keep up with the slew of intervention efforts.

The power of media to shape beliefs and ideologies of populations is well documented (e.g., Bryant & Oliver, 2009). An understanding of the nuances of how and why media impact decision making must be a primary goal of health communication researchers. Although the processes by which media influence individuals’ behaviors remains somewhat ambiguous, it is our hope that this study will catalyze additional research that aims to elucidate these relationships.
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APPENDIX A: MEDIA EXPOSURE AND ATTENTION QUESTIONS

General Media Exposure
“In a typical week, how many DAYS would you say you spend any time watching, reading, or listening to sources of News or Information”:
1. On a broadcast network on television (e.g., NBC, ABC, CBS, etc.)?
2. On a cable network on television (e.g., CNN, MSNBC, Fox, etc.)?
3. In a local print newspaper (e.g., town, university, or county paper)?
4. In a national newspaper (e.g., USA Today, NY Times, Washington Post, etc.)?
5. In a news magazine (e.g., Newsweek, Time, The Nation)?
6. In a special-interest magazine (e.g., sports, health, beauty, fashion, etc.)?
7. On the Web/Online (e.g., MSN.com, Yahoo.com, ESPN.com, NYTimes.com)?

General Media Attention
“How would you describe how closely you pay ATTENTION to general NEWS or general Information on these general media sources”:
1. Broadcast Television Networks?
2. Cable Television Networks?
3. Local Print Newspapers?
4. National Print Newspapers?
5. News Magazine?
6. Special Interest Magazine?
7. Web/Online

Health Media Exposure
“Now, we are specifically interested in health-related media. In a typical week, how many DAYS would you say you spend any time watching, reading, or listening to HEALTH-RELATED News or Information”:
1. On a broadcast network on television (e.g., NBC, ABC, CBS, etc.)?
2. On a cable network on television (e.g., CNN, MSNBC, Fox, etc.)?
3. In a local print newspaper (e.g., town, university, or county paper)?
4. In a national newspaper (e.g., USA Today, NY Times, Washington Post, etc.)?
5. In a news magazine (e.g., Newsweek, Time, The Nation)?
6. In a special-interest magazine (e.g., sports, health, beauty, fashion, etc.)?
7. On the Web/Online (e.g., MSN.com, Yahoo.com, ESPN.com, NYTimes.com)?

Health Media Attention
“How would you describe how closely you pay ATTENTION to HEALTH-RELATED News and Medical Information on these media sources”:
1. Broadcast Television Networks?
2. Cable Television Networks?
3. Local Print Newspapers?
4. National Print Newspapers?
5. News Magazine?
6. Special Interest Magazine?
7. Web/Online
APPENDIX B: INTERNAL PSYCHOLOGICAL STATE QUESTIONS

**Smoking attitudes** (1=Strongly Disagree, 5=Strongly Agree)

Health attitudes toward smoking:
1. If I do not smoke cigarettes I will be healthier
2. If I do not smoke cigarettes I can become better at sports
3. If I do not smoke cigarettes I will become prettier or better looking
4. If I do not smoke cigarettes I will live longer
5. If I do not smoke cigarettes my hair and skin will be healthy

Social attitudes toward smoking (reverse coded: 1=Strongly Agree, 5=Strongly Disagree)
1. Smoking can help people when they are bored
2. Smoking can help people relax
3. Smoking can help people feel comfortable at parties and in other social situations
4. Smoking can help people stay lean
5. Smoking can help people fit in

**Sun/tanning attitudes** (1=Strongly Disagree, 5=Strongly Agree)

Aging Attitudes toward Tanning:
1. If I avoid the sun my skin will have fewer wrinkles
2. If I avoid unprotected sun exposure by staying out of the sun or wearing sunscreen my skin will not age as much

Social Attitudes toward Tanning (reverse coded: 1=Strongly Agree, 5=Strongly Disagree).
1. If I am not tan I will be less attractive in pictures
2. If people are tan I am more attracted to them
3. Sunbathing is a good way to relax or study
4. I like sunbathing and or tanning

**Subjective Norms of Smoking** (reverse coded: 1=Strongly Agree, 5=Strongly Disagree).
1. Most people I know smoke regularly
2. Most people I know smoke occasionally
3. Many of my friends smoke
4. Many of the people that I know my age have had a cigarette in the last 30 days

**Subjective Norms of Tanning/Sunbathing** (reverse coded: 1=Strongly Agree, 5=Strongly Disagree).
1. Most people I know go tanning, either naturally or in tanning beds frequently
2. Most people I know go tanning, either naturally or in tanning beds occasionally
3. Many of my friends want to have tan skin
4. Many of the people that I know have either gone sunbathing or tanning in the last 30 days.
Perceived Behavioral Control over NOT smoking (1=Strongly Disagree, 5=Strongly Agree)
1. For me it is easy not to smoke when I go out with friends
2. If I try I can avoid smoking
3. It will be easy to not smoke a cigarette this weekend
4. I have a lot of control over not ever smoking during my college years

Perceived Behavioral Control over NOT being in the sun
1. For me it is easy to protect myself from the sun or to not go tanning
2. If I try I can use sunscreen every time I am in the sun for longer than 10 minutes
3. It will be easy for me to not get a tan this year
4. I have a lot of control over whether I ever get sunburned during my college years

Perceived Susceptibility of Lung Cancer (1=Extremely Low, 5=Extremely High)
1. Compared to most people my age I understand that my RISK of getting LUNG cancer is…
2. The likelihood of my getting LUNG cancer is…
3. I am at risk for getting lung cancer
4. It is likely that I will be diagnosed with lung cancer
5. It is possible that I will get lung cancer at some point in my life

Perceived Susceptibility of Skin Cancer (1=Extremely Low, 5=Extremely High)
1. Compared to most people my age I understand that my RISK of getting SKIN cancer is…
2. The likelihood of my getting SKIN cancer is…
3. I am at risk for getting skin cancer
4. It is likely that I will be diagnosed with skin cancer
5. It is possible that I will get skin cancer at some point in my life

Perceived Severity of Lung Cancer (1=Extremely Low, 5=Extremely High)
1. Lung cancer is a serious disease that can kill
2. Lung cancer is more deadly than most people can realize
3. I believe that lung cancer is severe
4. I believe that lung cancer is serious
5. I believe that lung cancer is significant

Perceived Severity of Skin Cancer (1=Extremely Low, 5=Extremely High)
1. Skin cancer is a serious disease that can kill
2. Skin cancer is more deadly than most people realize
3. I believe that skin cancer is severe
4. I believe that skin cancer is serious
5. I believe that skin cancer is significant
APPENDIX C: SMOKING AND TANNING BEHAVIOR QUESTIONS

Smoking Past and Current Behavior
1. Have you EVER smoked a cigarette (yes/no)?
2. Have you EVER had more than a few cigarettes in your life (yes/no)?
3. Have you EVER regularly smoked cigarettes (yes/no)?
4. Have you EVER socially smoked cigarettes (e.g., having or sharing at least one cigarette with friends in social situations) (yes/no)?
5. Do you regularly smoke cigarettes NOW (yes/no)?
6. Do you socially smoke cigarettes NOW (e.g., having or sharing at least one cigarette with friends in social situations) (yes/no)?

Smoking Intentions
1. I do not plan to smoke cigarettes.
2. I plan to quit smoking cigarettes in the next 30 days.
3. I plan to quit smoking cigarettes sometime during college.
4. I plan to quit smoking cigarettes immediately after college.
5. I plan to quit smoking cigarettes in the years after I graduate from college.
6. I do not plan to quit smoking cigarettes.

Tanning Intentions
“In thinking about your exposure to the sun...”
(Answers: 1 = “Strongly disagree” to 5 = “Strongly Agree”)
1. I intend to avoid the sun between the hours of 10 a.m. and 4 p.m.
2. I intend to apply and reapply sunscreen of SPF 15 or higher out in the sun.
3. I intend to protect my skin from UV rays even when cloudy or overcast outside.
4. I intend to ensure that most of my body is clothed and covered when out in the sun.
5. I intend to stop spending time outside strictly for the purposes of getting a tan.
APPENDIX D: CORRELATIONS OF ALL MEDIA USE VARIABLES

Table 11

*Pearson's r Correlations of Exposure Media Use Variables* \(^a\) (N=1,251)

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\(^a\) All correlations were \(p < .01\) (two-tailed tests).

Table 12

*Pearson's r Correlations of Attention Media Use Variables* \(^a\) (N=1,251)

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\(^a\) All correlations were \(p < .01\) (two-tailed tests).