
THESIS

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By

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Abstract

Three out of five U.S. adults search the Internet for health information, and about one out of ten seek others who have similar health issues. Users can gather information and connect with others through virtual environments. This research tested the effect of the expectancy violations theory through immediacy and communicator reward value on evaluations of a virtual counselor during a health intervention. Participants ($N = 91$) interacted with a high or low reward communicator in Second Life who engaged in positive or negative immediacy behaviors. The participant’s perception of positive immediacy in the high reward virtual counselor increased evaluations of trust. For the low reward communicator, perceptions of positive immediacy increased evaluations caring and goodwill. These findings are partially consistent with expectancy violations theory. Belief in the virtual representation’s agency increased positive evaluations of the virtual counselor. Implications, limitations, and future directions are discussed.
To my father, Wang Xing Houamoua Vang.
Acknowledgments

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Fields of Study

Major Field: Communication
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Introduction

Three out of five U.S. adults search the Internet for health information, and about one out of ten seek others who have similar health issues (S. Fox, 2012). The Internet acts as a conduit through which people can gather information in order to understand their health. One way that users can gather information and connect with others is through a virtual environment (VE), which is a computer-generated simulation that emulates the physical world (J. Fox, Arena, & Bailenson, 2009; Jaccard & Jacoby, 2010).

People use virtual representations in order to navigate in VEs. Virtual representations are anthropomorphic virtual objects that allow people to experience an awareness of and interact with others. They have human-like characteristics such as the ability to talk, move, or look human (J. Fox et al., 2009; Lee, 2004) and are either controlled by a human (i.e., an avatar) or a computer program (i.e., an agent; Bailenson & Blascovich, 2004). Virtual representations can also influence the motivation and promotion of healthful behaviors (J. Fox, 2012). In addition, they can serve as the source of information and, as such, may help users in evaluating online information.

When a virtual representation shares the VE with a user, the user’s level of awareness of and experience of togetherness with these perceived others is termed social presence (Biocca, Harms, & Burgoon, 2003; Lee, 2004). Physical attributes (e.g.,
character form) and psychological aspects (e.g., reciprocity, interactivity; Lee, 2004), contribute to the level of social presence experienced by the user. When people interact with virtual representations, they often behave similarly to how they would with people during face-to-face interactions (Garau, Slater, Pertaub, & Razzaque, 2005; Nass & Moon, 2000; Reeves & Nass, 1996). However, a gap exists in the literature regarding the effect of virtual representations’ behaviors in health contexts. Computer-mediated health interventions employing virtual representations can influence users’ subsequent attitudes and behaviors (J. Fox, 2012), so the nature of these interactions and the behaviors that the representations engage in may also affect these outcomes. Through the analysis of nonverbal behaviors, communicator reward value, and social presence in VEs, some light can be shed on the effects of behaviors in a health context.

When interacting with a virtual representation, users may evaluate the virtual representation based on its behavior. Expectancy violations theory (EVT; Burgoon & Hale, 1988) considers what people perceive to be appropriate behavioral norms for a communicator and how individuals perceive the communicator when he or she violates those norms. These perceptions are based on the evaluation of the violation and the violator. Currently, a gap exists in the examination of EVT in VEs, especially in medical or health-related contexts. This preliminary study applies EVT in the virtual world of Second Life to determine the social implications of nonverbal behavioral cues exhibited by virtual counselors.

*Virtual Environments*
Virtual experiences are enhanced by simulations, which are virtual imitations of particular aspects of the physical environment (Jaccard & Jacoby, 2010). When using a VE for health interventions, it may help to simulate an environment that it is appropriate for a health context. For example, the virtual representation providing the health information can simulate behaviors of health officials that people would encounter in the physical environment. The use of virtual representations allows for the possibility of interactive social behavior. Their existence presents the user with stimuli during a social interaction that engage the senses and provide a greater perception of realism in the VE (Boellstorff, 2008).

Online avatar-based virtual environments such as Second Life provide users with a platform to meet, interact, and maintain relationships with others from around the world. These relationships can be formed through activities and interactions similar to those in real life. Interactions in virtual clubs and neighborhoods create relationships that sometimes transcend the VE and transfer into face-to-face or other mediated relationships (Woods, 2007). In Second Life, social interactions can mimic communication in the physical environment, which could help in a context such as health.

*Health communication in virtual environments*

Health organizations and campaigns can capitalize on virtual environments by granting users quick and easy access to health information. Although direct health interventions, such as therapeutic sessions with a practitioner, are not yet common in VEs such as Second Life, indirect research experiments measuring health are frequently
conducted (Beard, Morra, Wilson, & Keelan, 2009). Indirect measures include data on the topics on which users conduct searches, the physical location of the users, the topics that users discuss on forums, and the health concerns that lead a user to use this resource (Beard et al., 2009). Among the most common types of health interventions represented in Second Life focus on patient education and awareness (Beard et al., 2009). Users currently navigate through VEs in search of health information rather than receiving direct care, but future possibilities may allow users more direct access to physicians or health programs (J. Fox, 2012). Thus, it is important to study the utility of VEs for health-related interactions.

Virtual experiences allow the patient to visualize, rather than merely imagine, the problem at hand. Visualization helps the patient feel a sense of presence in the environment. For example, virtually recreating an encounter with a spider for a person with arachnophobia may allow better analysis of the patient’s behavior than when the patient merely thinks about the fear. Thus, when incorporating health communication in a VE, realism should be considered by the experimenter.

*Behavioral realism* is the level of perceived human behavioral similarity exhibited by the virtual representation (Blascovich, 2002) and may help to improve the user’s state of presence in the interaction. When a virtual representation behaves in a realistic manner and similarly to how the patient intends it to, this helps to maintain the patient’s illusion of inhabiting the VE (Gaggioli et al., 2003). When patients are engaged to the point where they become active participants instead of external observers, then this may be the most persuasive point during the health intervention.
(Riva, 2002). This sense of presence contributes to the virtual experience and may improve the effectiveness of persuasive health messages delivered within the VE.

**Presence**

Physical, self-, and social presence are three dimensions that people experience while in a VE (Lee, 2004). Presence is a subjective feeling that can encompass any or all of these areas. First, Lee (2004) describes *physical presence* as the interaction of the physical body with virtual objects. Virtual objects tend to be experienced visually and aurally due to the technology’s capabilities; other sensory information may be missing. People replace missing cues in order to create a complete experience in the VE. For example, a user may bounce a ball in the VE. Although the user cannot physically feel the ball as it bounces from the ground back into the user’s hand, the perception of bouncing the ball is still possible due to other visual and auditory cues in the environment. Additionally, from physical experience, the user knows what happens when a ball bounces off the ground and back into the hand. Thus the action is performed in the VE and understood by the user. Second, *self-presence* refers to the experience of the self in the VE. Self-presence is the level to which the user feels psychologically and physically connected to his or her representation within the virtual environment (Ratan & Hasler, 2010). Finally, *social presence* conceptualizes the awareness of others in the VE (Lee, 2004). When virtual objects evidence human-like characteristics, people orient more toward these objects and perceive that other humans occupy the VE with them. Although research finds that all three of these dimensions are
important factors during the virtual experience, this study focuses on social presence in the VE.

**Social Presence**

Early research on social presence examined the level of communication cues that were mediated by technology (Culnan & Markus, 1987; Short, Williams, & Christie, 1976). Short and colleagues viewed social presence on a continuum of nonverbal cues in which face-to-face communication was positioned at the higher end and mediated communication at the lower end. When communication occurred, the medium affected the degree to which people could perceive and interpret others’ cues. For example, people who communicate over the phone would be unable to see or interpret nonverbal cues such as facial expressions. Therefore, this mediated communication maintains a lower degree of social presence than face-to-face interaction. Thus, physically co-present communicators would experience a higher degree of social presence than computer-mediated communicators because there were no barriers to expressing nonverbal cues. In this paradigm, all forms of mediated communication are compared to face-to-face communication (Culnan & Markus, 1987). The perceived difference in communication, then, lies in the type of cues that people transmit.

*Immediacy cues* are communication cues that people perceive to indicate the level of liking toward the communication partner. Positive immediacy suggests higher availability, increases sensory stimulation, and decreases physical and psychological distance between communicators (Andersen et al., 1998). Immediate behaviors include
closer interpersonal distance, eye contact, direct body orientation, and forward lean (Andersen et al., 1998). When people demonstrate positive immediacy behaviors, they are liked, evaluated highly, and preferred. In contrast, when people demonstrate negative immediacy behaviors, they are disliked, evaluated negatively, and rejected by others (Richmond & McCroskey, 2000). These behavioral cues assist communicators in evaluating others during a social interaction.

Social presence, however, is not merely an awareness of communication cues: it is also an awareness of the potential for social interaction itself. Social presence speaks to the level of awareness of someone else’s presence, both psychologically and physically, in the environment. In the physical environment, people generally pay more attention to other people rather than to objects. In a VE, a similar phenomenon is evidenced: people orient more toward anthropomorphic virtual objects that express physical and psychological characteristics of humanness than toward inanimate objects (Lee, 2004). This behavior originates from the interactions that people have with others throughout their lives; people learn to shape mental models of behaviors and motives of others from past social interactions (Nowak, 2000). These mental models are not necessarily determined by comparing the number of cues in a virtual interaction versus a face-to-face interaction. Fewer cues may be exchanged during virtual interactions, but people still form impressions of their interaction partner throughout the exchange (Ramirez, 2007; Walther, 1992, 1996; Walther & Burgoon, 1992). Thus, it is not the number of cues that affect evaluations because people will substitute meaning in place
of the missing cues. Instead, people are affected by the accuracy and appropriateness to mental models that they have from prior social interactions.

Behavioral realism. Using behaviorally realistic cues, virtual representations can be used to investigate the effect of nonverbal behaviors such as immediacy during social interactions. Behaviorally realistic virtual representations are characterized as displaying appropriately contextual and accurately human behavioral cues, whereas immediacy is typically only characterized as the display of appropriate behavioral cues. For example, when people orient toward one another while talking, this indicates positive immediacy and liking; when people orient away from one another while talking, this indicates negative immediacy and disliking. Behavioral realism, on the other hand, is not a construct that people analyze in face-to-face communication. Although people evaluate the social appropriateness of a behavior in face-to-face communication, they do not question the accuracy of humanness in their communication partners. In VEs, behavioral realism indicates the user’s perception of the virtual representation’s similarity to a human based on the type of behaviors exhibited. Thus, in VEs, users evaluate both the accuracy of the behavior and its appropriateness in order to evaluate the entire interaction.

Behavioral realism also affects interactions because people may evaluate the virtual representation based on behavioral expectations that they evaluate people with in the physical environment. In the physical environment, if the communicator’s behavior does not conform to expectations, an expectancy violation occurs. Following the violation, an outcome, or the evaluation of the violator, arises. Expectancy
violations theory (EVT; Burgoon & Hale, 1988; Burgoon & Jones, 1976) predicts the outcome of behavioral violations based on characteristics of the communicator and the context of the exchange, and could help to indicate communication outcomes in the VE.

*Expectancy Violations Theory*

Expectancy violations theory (EVT) predicts a person’s response when exposed to nonverbal behavioral violations of social norms during an interaction. Within the situational context, the message receiver evaluates the action either as expected or as violating. *Behavioral expectancies* during relational communication can derive from social norms, prior experience, or individual idiosyncrasies (Burgoon & Walther, 1990). For example, in the United States, a behavioral expectancy upon initially meeting a client is a handshake (Burgoon & Walther, 1990). Generally, positive emotion accompanies this behavior. If one instead greets the client with kisses on the cheeks, as some European cultures do, this violates the behavioral expectancy. When the violation occurs, it triggers *arousal* in the body, manifesting as a physical response, distraction. The physical response includes orienting the client’s attention away from the conversation topic and toward the message source: the communicator. According to EVT, the client would then interpret the violation as positive or negative based on the relationship with the communicator, characteristics of the communicator, and context of the interaction.

In addition, the *reward value of the communicator*—that is, the overall perceived benefits and costs of interacting with the communicator—affects evaluations of the communicator following the behavior violation. Positive evaluations occur when
the benefits of the interaction exceed the costs (Burgoon & Hale, 1988). Negative evaluations, on the other hand, occur when the costs of interacting with the communicator outweigh the benefits. In EVT, behavioral expectancies and communicator reward value help to determine the evaluation of the communicator.

**Behavioral Expectancies**

People hold expectations regarding nonverbal behaviors exhibited in social contexts. Behaviors that conform to social norms are not as noticeable as unexpected behaviors. For example, a professionally dressed teacher who walks into a classroom and begins to lecture at the front of the class is not unexpected, whereas a casually dressed student who walks into the classroom and begins to lecture would be quite noticeable. In our society, it is normal for the instructor to lecture, but not for the student. In social contexts, people tend to expect certain behaviors and notice when others deviate from those expectations.

Behavioral expectancies are examined in this study through immediacy cues, which are multi-cue nonverbal behaviors that signify the level of “involvement, interest, affiliation, trust and caring, and sometimes composure, relaxation and dominance” (Coker & Burgoon, 1987, p. 69). Instead of only taking into account one cue, the measurement of immediacy allows for a multitude of nonverbal behaviors to be assessed during an interaction. People are affected by the entirety of an interaction within the situational context, and the conceptualization and operationalization of multi-cue behaviors helps to understand the process and the outcome of the interaction.

**Arousal**
Burgoon and Hale (1988) classified violations as arousing and distracting. When a violation occurs, the message receiver often experiences a physical reaction, shifting attention away from the conversation and causing distraction. Distraction from the conversation physically arouses the message receiver and elicits an orienting response (Andersen et al., 1998; Burgoon & Hale, 1988). Le Poire and Burgoon (1994, 1996) found support for arousing orienting responses during behavioral violations, indicating cognitive processing when a violation occurs. Cognitive processing suggests that the message receiver reanalyzes the situation in order to evaluate a response before responding.

Violation Valence

In reanalyzing the situation following arousal, the message receiver determines the valence of the violation. *Violation valence* describes the overall positive or negative evaluation of the behavioral violation. Positive evaluations of the violation elicit stronger positive evaluations than if no violation had occurred (Burgoon & Hale, 1988). Using the previous example, kisses to the cheeks by the American communicator may be considered positive if the action had occurred in Europe. Given the communicator is evaluated more positively in this context (e.g., the communicator is culturally sophisticated and aware), a positive violation evaluation occurs. However, if the communicator is evaluated negatively (e.g., the communicator has a history of violating personal space), then a negative evaluation occurs.

Communicator Reward Value
When the violation valence is ambiguous, though, a cue that moderates the interaction between the behavioral violation and the communication outcome is the communicator reward value. In face-to-face interactions, people evaluate the reward value associated with the communication partner based on a variety of personal characteristics such as sex, reputation, and status (Burgoon & Hale, 1988). For example, a physician may be perceived as rewarding if he or she provides medical advice because physicians are high status communicators in this area. On the other hand, if a business assistant offers medical advice, this may be perceived as less rewarding or unrewarding given this person’s status is low in the area of medicine. These traits add to the overall benefit or cost of interacting with the communicator. When the benefit of interacting with the communication partner exceeds the cost, the communicator reward value is positive. When the costs exceed the benefits, the value is negative. Communicator reward value influences the message receiver’s evaluation of the violation and responds accordingly.

*Communication Outcomes*

Evaluations of nonverbal behavioral violations during a social interaction tend to influence communication outcomes. These outcomes include the message receiver’s perceptions of credibility, intimacy, similarity, composure, and relational communication skills.

High-reward communicators. For high-reward communicators, positive violations yield more positive communication outcomes than if no violation had occurred. Similarly, when negative violations occur for rewarding communicators, the
literature also predicts an elicitation of more positive communication evaluations than if no violation occurred (Burgoon & Hale, 1988). To illustrate, when a friend hugs a person, this elicits positive thoughts in the person about the friend and the friend’s liking toward the person. If the friend instead slaps the person’s arm, this may be attributed to quirks in the friend’s character in trying to get the person’s attention, and a positive evaluation will still occur.

Low-reward communicators. On the other hand, both positive and negative violations yield more negative communication outcomes than if no violation had occurred. If, in the illustration above, a stranger had reached over and hugged the person—typically a positive violation—then this would elicit negative thoughts about the stranger being too forward. If the stranger instead slapped the person’s arm, then this would be perceived as too aggressive and negative evaluations would also occur.

Expectancy violations theory predicts the communication outcomes for a variety of social interactions. Relational communication often successfully tests this theory among dyads and strangers in face-to-face interactions. It has not, however, been tested using health interventions in VEs. With the proposal of the following hypotheses, EVT will be tested in the context of a health-based interaction between virtual representations wherein communicator reward value and immediacy will be manipulated.

Hypotheses

In this study, participants will interact with a confederate posing as a low-reward or a high-reward communicator in the virtual world of Second Life. The
confederate’s avatar will present the participant with a health message while engaging in either positive or negative immediacy behaviors.

Whether in a VE or a physical environment, people evaluate the communication partner based on cues such as the communication partner’s status. These evaluations can include perceptions of credibility, attractiveness, and satisfaction (Burgoon & Hale, 1988). When relaying health messages, a physician typically holds higher status due to the physician’s perceived source expertise (Eastin, 2001). High-status communicators have greater credibility and social attractiveness than low-status communicators and should elicit greater satisfaction (Burgoon & Hale, 1988). Given the findings that interpersonal interactions and communication outcome in VEs parallel the physical environment (Yee et al., 2007), it is expected that the same effects will occur for high-status communicators in the virtual environment. Hence,

H1: Virtual sleep specialists will (a) be perceived as more credible and socially attractive, and (b) elicit greater satisfaction than a virtual business assistant for a medical clinic.

When high-reward communicators exhibit greater immediacy, credibility, and attractiveness, they are positively evaluated (Burgoon & Hale, 1988). Among patient-physician interactions, increases in the physician’s immediacy cues increase the patient’s evaluations of physician credibility and satisfaction (Burgoon et al., 1987). In VEs, immediacy cues influence the perception of behavioral realism of the virtual representation (Guadagno et al., 2007), which positively affects social presence (Garau et al., 2005). Hence,
H2: In interactions with virtual sleep specialists, positive immediacy will yield (a) more credibility and social attractiveness, (b) more satisfaction, and (c) more social presence than negative immediacy.

For the low-reward communicator, the business assistant from a medical clinic, positive immediacy cues are expected to be evaluated negatively by the message receiver (Burgoon & Hale, 1988). When the low-reward communicator engages in positive immediacy cues, this may be interpreted as being too forward. In this case, the cue is interpreted as a negative behavioral violation and negative evaluations of credibility, attractiveness, and satisfaction occur (Burgoon & Hale, 1988). Similar to the high-reward virtual representation, though, immediacy cues in VEs influence the level of behavioral realism of the virtual representation (Guadagno et al., 2007), which positively affects social presence (Garau et al., 2005). Hence,

H3: In interactions with a virtual business assistant, positive immediacy will yield (a) less credibility and social attractiveness, (b) less satisfaction, and (c) more social presence than negative immediacy.

When an expectancy violation occurs in face-to-face interactions, people tend to experience physical and physiological arousal (Burgoon & Hale, 1988; Le Poire & Burgoon, 1994, 1996). Although Le Poire and Burgoon (1996) investigated the manifestation of an orienting response following a behavior expectancy violation, it remains unclear whether a difference exists between a positive violation and a negative violation. Additionally, when comparing positive and negative levels of immediacy in
VEs, it is unclear whether differences will be significant between the two conditions. Hence,

RQ1: Will the level of immediacy cues displayed by the virtual interactant affect participants’ arousal?

Although H1 posits comparisons between communicator reward value and immediacy cues on perceived credibility, social attractiveness, and satisfaction, it is unclear the exact relationship of whether an interaction effect will occur for social presence and arousal. Existing research regarding these variables does not provide sufficient information to make informed hypotheses. Thus, a second research question is forwarded:

RQ2: Will communicator reward value interact with immediacy cues to affect social presence and arousal?
Method

Participants

Data were gathered from 96 undergraduate students at a large Midwestern university. Participants were recruited from Communication courses and offered extra course credit. Five participants were discarded due to technical errors, including avatars that did not load, a participant who changed avatars 10 times throughout the session, and a technical malfunction with the confederate during the interaction, so the final sample included 91 participants. All subsequent analyses will be conducted with this sample size, which included 57 females and 34 males. Participants ranged in age from 18 to 31 ($M = 20.84$, $SD = 2.37$), with one participant not reporting age, and were 54.9% White, 25.3% Asian, 7.7% African-American, 5.5% other, 4.4% multiracial, and 2.2% unreported.

Design

The study used a 2 (low CRV: business assistant, high CRV: sleep specialist) x 2 (positive immediacy, negative immediacy) between-subjects experimental design. Participants were randomly assigned to one of four conditions: positive immediacy with a business assistant, positive immediacy with a sleep specialist, negative immediacy with a business assistant, or negative immediacy with a sleep specialist.

Procedure
All participants provided informed consent after entering the laboratory. First, the research assistant informed participants that they would meet and interact with a representative from the medical center who would communicate with them via a virtual counselor from an off-site office provided by the medical center. Based on the communicator status manipulation, participants were informed that they would interact with a business assistant or with a sleep specialist. This virtual counselor was always male and controlled by a confederate. Research indicates that female avatars are often perceived as less competent than male avatars (Nowak & Hamilton, 2010), and thus this factor was eliminated so as not to confound sex with credibility. The confederate was a second trained research assistant sitting in another room in the same building. The second research assistant followed a script created by the experimenter, but improvised if unexpected events occurred. For example, if the participant did not understand the question, then the research assistant could clarify. The script used for the health intervention is available in Appendix A.

Participants were told that before they arrived, the representative had called to inform the research assistant that he was finishing up with a patient or a business meeting. The research assistant then said that while they waited, she would give the participant a brief tutorial regarding the basics of navigation in Second Life, and then she would call the representative to verify his availability. After giving the tutorial and calling the second research assistant, the research assistant would apologize to the participant for the inconvenience, and say that the virtual counselor would enter the virtual room in a few minutes to begin the interaction. In the meantime, the research
assistant informed participants that she would sit on the other side of the room the entire time in case any technical difficulties occurred.

Participant avatars were presented in the third-person point of view from the back. All participants began the interaction with a White male avatar clothed in a shirt and jeans. During the tutorial, they were instructed to look through generic avatars offered in Second Life. They were allowed to change their avatar before the interaction so as to get them more invested in the interaction.

Following the confederate’s introduction, the virtual counselor would then present information about sleep while engaging in either positive or negative immediacy cues. When the interaction finished, the virtual counselor told the participant to inform the research assistant that the interaction had ended. At that point, the participant was instructed by the research assistant to close the program and open a web browser containing the self-report measures. After participants completed the questionnaire, they were debriefed.

*Stimuli*

Virtual environment. The virtual environment consisted of an empty room in the online program Second Life. The room contained two black loveseats situated on opposite ends of the room. Both the training phase and the interaction took place in this area. The confederate avatar waited in a separate virtual space until the interaction began, approximately two minutes after the research assistant communicated with the confederate (allegedly the business assistant or sleep specialist) on the phone.
Communicator reward value. Communicator reward value (low x high) was indicated by priming participants as to whether the virtual counselor was a sleep specialist or a business assistant for a medical clinic. The research assistant informed participants that they would interact with (1) Mr. Allen, a business assistant with 18 years of experience, or (2) Dr. Allen, a sleep specialist with 18 years of medical experience. A pre-test was conducted with undergraduate students to investigate the static photographic appearance of credibility and physical attractiveness in male virtual representations, which were created by the experimenter. Participants either encountered a casually-clothed virtual business assistant, or a casually-clothed virtual sleep specialist. Sixteen avatars were pre-tested and two that were judged to be equally credible and physically attractive were chosen to control the influence of these factors. These cues from the avatar’s appearance were held constant across both the high and low communicator reward value conditions.

Low-reward communicator. In this health intervention manipulation, the low-reward communicator was manipulated by informing the participant that he or she would interact with Mr. Allen. Mr. Allen was described as a business assistant with 18 years of experience.

High-reward communicator. Participants in the high-reward communicator condition were informed that they were interacting with Dr. Allen, who was described as a sleep specialist with 18 years of medical experience. A physician typically holds higher status than others in a medical environment due to the physician’s perceived source expertise (Eastin, 2001).
Behavioral expectancies. Behavioral expectancies are represented by two immediacy cue levels (negative x positive). This manipulation follows Burgoon and Hale’s (1988) test in a face-to-face interpersonal setting.

Positive immediacy. Similar to Burgoon and Hale (1988), positive immediacy behaviors included (1) gradually moving toward the participant and staying within virtual arm’s length of the participant’s avatar and (2) rotating to look at the participant. In addition, participants were allowed to move around the room as they wished. When participants sat on one of the two sofas in the virtual room, the confederate sat next to them.

Negative immediacy. Negative behavioral violations are indicated by avoidance immediacy cues. Avatars conveying negative immediacy behaviors (1) gradually moved away from the participant and (2) looked away from the participant when the participant spoke. When participants sat on one of the sofas, the confederate would sit on the sofa across the room.

Measures

Table 1 contains descriptive statistics for the following measures. Appendix B contains a complete list of all the measure items.

<table>
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<th>Theoretical Range</th>
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<td>1.00 – 7.00</td>
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<td>0.36</td>
<td>3 – 4</td>
<td>0 – 5</td>
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<td>1.12</td>
<td>2.40 – 7.00</td>
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<tr>
<td>Social presence</td>
<td>3.99</td>
<td>1.10</td>
<td>1.57 – 6.43</td>
<td>1.00 – 7.00</td>
<td>.79</td>
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<td>Credibility</td>
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<td>0.78</td>
<td>2.39 – 6.56</td>
<td>1.00 – 7.00</td>
<td>.76</td>
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<tr>
<td>Competence</td>
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<td>3.33 – 6.67</td>
<td>1.00 – 7.00</td>
<td>.84</td>
</tr>
<tr>
<td>Caring and goodwill</td>
<td>4.71</td>
<td>1.10</td>
<td>2.00 – 7.00</td>
<td>1.00 – 7.00</td>
<td>.83</td>
</tr>
<tr>
<td>Trustworthiness</td>
<td>5.40</td>
<td>1.01</td>
<td>1.83 – 6.83</td>
<td>1.00 – 7.00</td>
<td>.86</td>
</tr>
<tr>
<td>Social attractiveness</td>
<td>4.34</td>
<td>0.91</td>
<td>2.33 – 6.67</td>
<td>1.00 – 7.00</td>
<td>.74</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>5.17</td>
<td>1.26</td>
<td>1.80 – 7.00</td>
<td>1.00 – 7.00</td>
<td>.93</td>
</tr>
<tr>
<td>Immediacy</td>
<td>3.90</td>
<td>1.17</td>
<td>1.00 – 6.25</td>
<td>1.00 – 7.00</td>
<td>.72</td>
</tr>
<tr>
<td>Belief of humanness</td>
<td>4.12</td>
<td>0.66</td>
<td>3.00 – 5.00</td>
<td>1.00 – 7.00</td>
<td>.73</td>
</tr>
</tbody>
</table>

Table 1. Descriptive statistics of variables

Communicator physical attractiveness. Communicator physical attractiveness was measured with six items on a seven-interval Likert-type scale measuring physical attraction. (McCroskey & McCain, 1974). Items included: (1) I think he is very handsome and (2) He is somewhat ugly.

Sleep knowledge. Five sleep knowledge test items contained information during the interaction and included: (1) Good sleep hygiene includes worrying in bed, and (2) Healthy sleep hygiene includes developing a regular bedtime routine. These items were true or false (or “not sure”) items.

Issue involvement. Issue involvement was measured using five items on a 7-point Likert scale that included (1) I think good sleep habits are important, and (2) It’s important for me to get 7-9 hours of sleep every night.

Social presence. Social presence was measured using the actor within the medium scale from the Temple Presence Inventory (Lombard and Ditton, 1997). The scale had seven items and responses were measured on 7-point Likert-type scales. Items
included: (1) How much did it seem as if you and the person you saw/heard both left the places where you were and went to a new place? and (2) How much did it seem as if you and the person you saw/heard were together in the same place?

Communication outcomes. Communication outcomes were measured as participant’s self-reported evaluations of the communicator’s credibility and social attractiveness.

Communicator credibility. Communicator credibility (McCroskey & Teven, 1999) was measured on three six-item subscales: competence, caring/goodwill, and trustworthiness. Responses were provided on 7-point semantic differential scales.

Communicator social attractiveness. Communicator social attractiveness was measured with six 7-point Likert-type items (McCroskey & McCain, 1974). These items included (1) I think he could be a friend of mine, and (2) I would like to have a friendly chat with him.

Arousal. The stimuli assessment manikin (SAM; Bradley & Lang, 1994, 1999) gives an affective measure of arousal. SAM uses a one-item self-report measure of five pictorial representations arranged on a 9-point scale.

Satisfaction. Satisfaction with the interaction was measured on five 7-point Likert-style items that included (1) I am very satisfied with Mr./Dr. Allen’s ability to hand my medical care, and (2) I am very satisfied with Mr./Dr. Allen’s ability to communicate with me in a social manner.

Manipulation checks. Manipulation checks determined whether participants perceived the immediacy behaviors as positive or negative, whether they perceived the
communicator as having high or low reward, and whether they believed they communicated with a human or an computer-controlled agent. Additionally, the pre-test physical attractiveness scale was given again to verify that attractiveness did not confound with communicator reward value. Thus, physical attractiveness was held constant across all conditions.

Immediacy. Immediacy was measured on four 7-point Likert-style items (Richmond, McCroskey, & Johnson, 2003) that included: (1) He uses his hands and arms to gesture while talking to people, and (2) He sits close or stands close to people while talking with them. The original scale includes 26 items, but only the items relevant to the manipulation were selected. Unfortunately, the manipulation check for immediacy revealed that there was no significant relationship between manipulated immediacy and participant-perceived immediacy, $t(87) = 1.40, p = .164$.

Belief of humanness. Belief in the virtual counselor’s humanness was measured with three 7-point Likert-style items that included: (1) I believe that I communicated with a real person, (2) I believe that I communicated with a computer-controlled avatar, and (3) I believe that I communicated with someone who knew what he was talking about. Belief in the virtual counselor’s humanness positively affected competence, $t(87) = 2.56, p < .05$, caring and goodwill, $t(86) = 5.17, p < .0001$, trust, $t(86) = 4.54, p < .0001$, social attractiveness, $t(86) = 4.05, p < .0001$, satisfaction, $t(87) = 6.51, p < .0001$, and social presence, $t(86) = 3.88, p < .0001$. 
Results

H1 proposed that virtual sleep specialists would (a) be perceived as more credible and socially attractive, and (b) elicit greater satisfaction than a virtual business assistant for a medical clinic. There were no significant effects of communicator on perceptions of credibility (competence, \( t(88) = 1.26, p = .212 \), caring and goodwill, \( t(87) = 0.798, p = .427 \), or trust, \( t(87) = 1.04, p = .301 \)), social attractiveness, \( t(86) = -1.38, p = .170 \), or satisfaction, \( t(88) = -0.10, p = .921 \). The manipulation of communicator reward value showed no significant effect in the experiment. H1 was not supported.

H2 proposed that in interactions with virtual sleep specialists, positive immediacy would yield (a) more credibility and social attractiveness, (b) more satisfaction, and (c) more social presence than negative immediacy. For virtual sleep specialists, immediacy had no significant effect on perceptions of credibility (competence, \( t(43) = 0.88, p = .386 \), caring and goodwill, \( t(43) = 0.11, p = .915 \), or trust, \( t(42) = 1.64, p = .110 \)), social attractiveness, \( t(42) = 0.44, p = .659 \), satisfaction, \( t(43) = 0.74, p = .464 \), or social presence, \( t(43) = 1.08, p = .284 \). H2 was not supported.

H3 proposed that in interactions with a virtual business assistant, positive immediacy would yield (a) less credibility and social attractiveness, (b) less satisfaction, and (c) more social presence than negative immediacy. Contrary to the hypothesis, positive immediacy positively affected the credibility component of caring and goodwill,
although it was not at a significant level, \( t(42) = -1.98, p = .054 \). Immediacy had no significant effect on other credibility components (competence, \( t(43) = -0.75, p = .459 \), or trust, \( t(42) = 1.64, p = .110 \), social attractiveness, \( t(42) = 0.44, p = .659 \), satisfaction, \( t(43) = 0.74, p = .464 \), or social presence, \( t(43) = 1.08, p = .284 \). H3 was not supported.

In addition, the first research question, RQ1, inquired as to whether the level of arousal elicited depended on the level of immediacy cues. There was no effect of immediacy on arousal, \( t(84) = 1.63, p = .106 \).

RQ2 inquired as to whether communicator reward values would interact with immediacy cues on social presence and arousal. The communicator reward value of the virtual counselor had no interaction effect with immediacy on social presence, \( F(3, 85) = 0.59, p = .624 \), or arousal, \( F(3, 82) = 1.03, p = .384 \).

**Additional Analyses**

After controlling for belief of humanness, the sleep specialist’s positive immediacy had a positive effect on trust, \( t(42) = 2.98, p < .01 \). In addition, after controlling for belief of humanness, the business assistant’s positive immediacy had a negative effect on caring and goodwill, \( t(42) = -2.04, p < .05 \).

Differences also arise when analyzing immediacy of the virtual counselors as perceived by the participant (as opposed to the experimental manipulation). When the participant perceived the sleep specialist’s immediacy to be more positive, perceptions of trust also increased, \( F(1, 42) = 9.18, p < .01, d = .93 \). In addition, when analyzing immediacy of the business assistant as perceived by the participant (as opposed to the experimental manipulation), some differences also emerge. When the participant
perceived the business assistant’s immediacy to be more positive, perceptions of caring and goodwill also increased, $F(1, 41) = 6.33, p < .05, d = .79$. Positive effects also occurred for trust, $F(1, 42) = 8.43, p < .01, d = .98$, and satisfaction, $F(1, 42) = 5.54, p < .05, d = .73$.

In addition, users also experienced greater social presence when their evaluations of the virtual counselor’s competence increased, $t(87) = 2.38, p < .05, d = .50$. It was hypothesized that immediacy would affect social presence. However, immediacy did not directly affect social presence, $t(87) = 0.15, p = .881, d = .93$. Despite the lack of hypothesized support for the effect of immediacy on communicator evaluations, an interaction (Figure 1) occurs with competence on social presence, $F(3, 85) = 6.18, p < .001, \eta^2 = .18$ (Table 2; Table 3; Figure 2).

![Figure 1. Interaction of immediacy and competence on social presence](image.png)

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.07</td>
<td>1.21</td>
<td>4.17</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Competence</td>
<td>-0.21</td>
<td>0.23</td>
<td>-0.91</td>
<td>ns</td>
</tr>
<tr>
<td>Immediacy</td>
<td>-5.58</td>
<td>1.63</td>
<td>-3.43</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Competence x Immediacy</td>
<td>1.05</td>
<td>0.30</td>
<td>3.49</td>
<td>&lt; .001</td>
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</table>

Table 2. Coefficient values for the moderation of immediacy
Table 3. The conditional effect of immediacy on social presence

<table>
<thead>
<tr>
<th>Immediacy</th>
<th>$\theta_x$</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Negative)</td>
<td>-0.21</td>
<td>0.23</td>
<td>-0.91</td>
<td>ns</td>
<td>-0.65</td>
<td>0.24</td>
</tr>
<tr>
<td>1 (Positive)</td>
<td>0.85</td>
<td>0.20</td>
<td>4.20</td>
<td>&lt; .0001</td>
<td>0.45</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Figure 2. Moderation graph

When users perceived the virtual counselor’s competence as low, those in the negative immediacy condition experienced greater social presence than those in the positive immediacy condition. However, the opposite occurs as competence increases: for users who perceived the virtual counselor as highly competent, social presence was experienced more by those in the positive condition than those in the negative condition. As perceived competence increased for those in the positive immediacy condition, the perception of social presence also increased. People perceived that the virtual counselor’s positive immediacy, coupled with higher competency, indicated a greater sense of the
other in the VE. For those in the negative immediacy condition, as competence increased, social presence decreased. Interestingly, social presence did not vary as widely for those in the negative immediacy condition as it did for those in the positive immediacy condition.
Discussion

Although the analyses did not entirely support the application of EVT in VEs, the evidence suggests that further exploration is needed. Participants interacted with a high or low reward communicator in Second Life who engaged in positive or negative immediacy behaviors. The manipulated communicator reward value of the sleep specialist versus the business assistant was limited and did not directly affect perceived credibility, social attractiveness, or satisfaction. Both the manipulations of communicator reward value and immediacy were flawed in operationalization, so this could have greatly impacted the results.

For the communicator reward value manipulation, the decision to use the same two avatars for the high and low reward conditions did not visually cue the participant in order to enhance the manipulation. Physical attractiveness was kept constant across both low and high reward conditions so as not to confound it with the sleep specialist and the business assistant. However, physical attractiveness is often a cue for communication reward value (Burgoon & Hale, 1988), so this may have lessened the manipulation. Another visual cue for the high reward status could have been a white lab coat. White lab coats are symbols that people frequently associate with physicians and the medical field (Blumhagen, 1979). During the interaction, participants were informed of the high reward
virtual counselor’s occupation as a sleep specialist who was a doctor, but a visual cue such as the white lab coat could have enhanced the manipulation.

For the immediacy manipulation, the immediacy behaviors may have been too subtle for participants to notice. Although the behaviors were derived from existing literature (Burgoon & Hale, 1988), they were not pretested using avatars to determine whether people perceived the behaviors as positive or negative in a virtual environment. In addition, participants were allowed to walk around in the room as they wished. Thus, conveying positive or negative immediacy to the moving participant may also have been compromised.

In addition, the avatar manipulation was not strong enough to convince participants that the virtual counselor was controlled by a human. Despite efforts to enhance the realism that they were communicating with another person in the experimental setting, participants did not interact with the virtual counselor beyond the text-based interaction. This may have increased suspicion about the existence of a person controlling the virtual representation. Also, the virtual counselor’s responses may have appeared robotic. If the participant spoke out of turn, some of the virtual counselor’s questions may have seemed out of place. Suspicion, which may not have been present during the interaction, may also have been primed merely by asking about belief in the virtual counselor’s humanness. When combined, the weaknesses in these three manipulations may have affected the ability to test the hypotheses and research questions.

The manipulation for immediacy had no direct effect on credibility, social attractiveness, satisfaction, or social presence. However, this project indicates that the
user’s perception of the virtual counselor’s immediacy positively affected evaluations of trust in the sleep specialist and evaluations of caring and goodwill, trust, and satisfaction in the business assistant. Although the business assistant elicited more evaluations than the sleep specialist, people tend to evaluate doctors differently depending on their relationship. People perceive more positive immediacy in physicians whom they have had more interactions with than in physicians whom they have had less association with (Burgoon et al., 1987). Thus, the sleep specialist’s immediacy could have impacted evaluations of subsequent interactions, but this manipulation did not have an effect during this initial interaction.

Additionally, when users believed that they were interacting with a real human, they evaluated the virtual counselor more positively in all categories than when they believed they were interacting with a computer-controlled agent. This may be driven by the effect in which people are more influenced by virtual representations that they believe to be controlled by humans than computers (J. Fox et al., 2010).

The interaction between immediacy and competence on social presence indicates that for competent virtual counselors, positive immediacy had a greater effect on social presence than negative immediacy. In learning environments, instructor immediacy and social presence are positively related (Schutt, Allen, & Laumakis, 2009), and this relationship could have interacted with competence in this experiment. When the virtual counselor had lower competence, though, users may have evaluated the virtual counselor’s reward value based off of competence rather than title, which could have decreased evaluations when his immediacy cues were positive (Burgoon & Hale, 1988).
Alternatively, this effect may actually be reversed: social presence tends to influence evaluations of trust and social attractiveness (Lee & Nass, 2002) rather than vice versa. Future research can investigate the relationship between social presence and EVT.

**Implications**

Findings from this study can inform researchers on the value of the expectancy violations theory (EVT; Burgoon & Hale, 1988; Burgoon & Jones, 1976) on health messages in virtual environments and provides avenues for future research. The hypotheses were not supported, but users still evaluated their communication partner based off of what they perceived as positive or negative immediacy. Although behavioral violations may be interpreted differently in VEs than anticipated, positive immediacy increases social presence, whereas negative immediacy decreases social presence. When evaluating positive and negative behaviors in a health context in virtual environments, researchers should take care to pretest behaviors that are both appropriate for and accurate of health officials.

For those designing virtual health environments, this indicates that people may be more comfortable with negative immediacy behaviors from the virtual counselor during initial interactions, especially if they do not perceive the virtual counselor to have competence. Although physicians with greater immediacy are evaluated more favorably (Richmond, Smith, Heisel, & McCroskey, 2001), this effect may occur due to the established relationship between the patient and the physician rather than merely because of the immediacy cues. Designers of virtual health interventions should design virtual representations, and their behaviors, based on the type of relationship that the patient has
with the virtual counselor. That is, if the user has no prior familiarity with the virtual
counselor, or the user controlling the virtual counselor, then the intervention may be less
effective when the virtual counselor is represented as a doctor. These effects, however,
are speculative due to the lack of strong support from the manipulations.

**Limitations and Future Research**

One major limitation is that the manipulation for communicator reward value
could have been heightened. Although higher reward value was attributed to the sleep
specialist due to the perceived source expertise that the doctor would have in a health
intervention (Eastin, 2001), it remains unclear whether participants actually perceived the
sleep specialist as having higher reward value than the business assistant due to the lack
of a manipulation check for this variable. In this case, it is speculated that the users may
have identified more with the business assistant and, thus, he may have had a higher
reward value (Burgoon & Hale, 1988) than the sleep specialist. Identification was not
tested in this experiment, however, so its effects are uncertain.

Another limitation occurred in the manipulation for immediacy. The immediacy
manipulation may not have been effective because participants may not have watched the
virtual counselor’s movements during the interaction. The interactions were text-based,
so while the virtual counselor engaged in the immediacy behaviors, participants may
have been too busy typing to pay attention. In addition, while the virtual counselor was
typing, participants may have been too busy reading. In Second Life, users cannot type
and move at the same time, so future research could control for and investigate voice-
based interactions, as opposed to text-based interactions. Interestingly, though, the
manipulation check for immediacy indicated that even though the manipulation did not work, differences in immediacy were still perceived based on caring and goodwill, trust, and satisfaction. Although some behaviors (e.g., interpersonal distance) may translate from the physical environment to virtual environments (Yee et al., 2007), behaviors in a health context may be more sensitive to interpretation. Future research could also investigate virtual behaviors that people perceive as positive or negative among medical personnel versus regular people.

A third limitation was that the immediacy cues that the virtual counselors engaged in were not pretested to determine whether they were both appropriate and accurate. As mentioned in the literature review, virtual representations should act both appropriately in the social context, as well as accurately human. These behaviors could be pretested so as to distinguish purposeful movements from perceived errors in technology.

A fourth limitation was that many users did not believe that they interacted with another person, which significantly affected their evaluations of the virtual counselor’s credibility, social attractiveness, and satisfaction, as well as their own level of social presence in the VE. The differences in perception between interacting with an agent and with an avatar have been shown to significantly affect users’ evaluations (Fox et al., 2010), so an effort to ensure that participants believed they were interacting with a real person was induced during the experiment. However, people may have been skeptical of the induction due to the nature of the experience in the laboratory. In order to enhance the belief that participants are interacting with a real person, future research on virtual
counselors could include first interacting with the confederate in the physical environment, then interacting in the VE.

Conclusion

Prior to this investigation, a gap remained in the literature regarding the application of EVT to health messages in virtual environments. People are increasingly going online in order to connect with others regarding health issues, so this research bridges the gap in examining nonverbal behavioral cues exhibited by virtual counselors. This current investigation fills the gap in the literature by testing EVT on health messages in a virtual environment through immediacy cues and communicator reward value. In the future, health interventions can be implemented successfully in VEs from this preliminary research.
Appendix A: Confederate Script

You’ll be asked to interact with an avatar in the virtual world of Second Life regarding health habits. An avatar is a character in the virtual world that is controlled by another person. The Ohio State University is a large university, and it aims to keep its students healthy, especially during flu season. More students tend to get sick during this time, so it’s hard to make an appointment due to the high demand. So, OSU is testing out a system wherein virtual interactions will help so that people don’t have to wait in the waiting room. It’s also difficult sometimes for students who are sick to get up and go see their doctor in order to receive a note. Other universities such as Stanford University and Yale University have implemented “virtual checkups” where students can have a virtual visit with a doctor. OSU is collaborating with the OSU Medical Center to test out Second Life, which is a social virtual world, for a possible future virtual checkup system.

We’re using Second Life to test out certain topics and we have asked Mr./Dr. Allen to help us test a virtual counselor that may be used for medical consultations in the future. > <Mr. Allen is a business assistant, has eighteen years of experience as an assistant> / <Dr. Allen is a sleep specialist, has eighteen years of experience in the medical field>, and has volunteered his time with the project, and has volunteered his time with the project. He will be communicating with you from an office that the OSU Medical Center has provided us with.
I just spoke with Mr./Dr. Allen before we began, and he told me that he was finishing up with a business meeting/patient. You might have to be a little patient today, so while we wait for him, I’ll go ahead and start off with a tutorial of how to use Second Life. When we’re done, I’ll give Mr./Dr. Allen a call and see if he’s ready for the interaction to begin.

<VER BATIM> Now, if you use your mouse to click on the icon on the toolbar with the green hand on it, a window will pop up. The character on the screen is your avatar.

You can choose how your avatar looks by clicking on the small icon to the far left with the two people on it. <PAUSE> You can scroll around and choose one that you’d like to use. I’ll give you a few minutes to do that and will be right here. Just let me know when you’re done. <WAIT WHILE THEY DO THAT.>

You can control your avatar by moving the arrow keys on the keyboard. By holding down the left arrow key, you’ll move the camera angle left. <PAUSE WHILE THEY TRY> By holding down the right arrow key, you’ll move the camera angle to the right. <PAUSE WHILE THEY TRY> To move your avatar forward, you can hold down the “up” arrow to move forward. <PAUSE WHILE THEY TRY> And by holding down the “down” arrow, you’ll move your avatar backwards. <PAUSE WHILE THEY TRY>

If you hover your mouse over the chair, a chair icon will appear. By clicking on the chair, your avatar will sit in the chair. While you’re sitting, you won’t be able to walk, but if you hold down the left or right arrow keys, the camera angle will move to the left
or right. In order to stand and start walking again, you’ll have to click on the stand button at the bottom. <PAUSE> You can also use your mouse to double-click on a spot on the ground and your avatar will walk to it. <PAUSE>

I’ll give you about a minute to get comfortable with moving your avatar around in the room and get used to the controls. In the meantime, I’ll give Mr. Allen a call and see if he’s ready for us.

<CALL ALLEN>

<ALLEN> Hello?

<CALL ALLEN: “Hi, Mr./Dr. Allen, this is _____________ with the Avatars & Health project. I have a participant here.”>

<ALLEN: “Hi, __________. I’m still finishing up with the meeting/patient, so give me another few minutes, and I’ll begin.”>

<RA: “Ok. Thanks, Mr./Dr. Allen.”>

<ALLEN: “Bye.”>

<RA: “Bye.”>

<HANG UP>

<RA TO PARTICIPANT; PARAPHRASE:> Mr. Allen is actually finishing up with his meeting, so you’ll have to wait another few minutes. Sorry about the delay, but he’ll be here soon. Feel free to look around the room.

<VER BATIM> I’ll be sitting here in the room with you, so let me know if any technical problems occur.
Please be honest with your answers. You’ll be interacting with Mr./Dr. Allen through a text chat. When he comes into the room, he’ll start the conversation. You can click on the “Chat” button at the bottom and type out your responses.

When you’ve completed your conversation with Mr./Dr. Allen, please let me know and I’ll have you complete a survey about your experience.

[SCRIPT FOR AVATAR INTERACTION]

Hello. As you may have already been informed, my name is Mr./Dr. Allen.

How are you?

< Participant’s response >

<IF THEY ASK HOW YOU ARE:> I'm well. Thanks.

Today, I'm assisting the Sleep Disorders Center at the Ohio State University Medical Center.

I'm a business assistant/sleep specialist with 18 years of experience <only in Dr. condition: in the medical field> and I'm helping them with improvements to their virtual health organization.

With your help today, the center will be able to improve the ability of their virtual counselor.

If you have any questions that pop up during our conversation, please wait and ask them at the very end. How does that sound?

< Participant’s response >

<IF NO/NOT GOOD:> That’s ok. I’ll still encourage you to hold your questions until the end.
<IF YES/OK¹>: Ok. Let’s begin.

Research finds that lack of sleep affects energy levels, reaction time, and memory.

On an average night, during the quarter, how many hours of sleep do you think a college student should get?

< Participant’s response >

< Participant’s response >? Hm.

Ok. How many hours do you think you actually get?

< Participant's response >

< Participant’s response >? Interesting.

Well, it’s recommended that college students should get 7 to 9 hours of sleep each night. It looks like you get <below/about/above> that amount.

Now, have you ever stayed up late at night cramming for a test the next day?

<IF YES>: Can you briefly describe it?

< Participant’s response >

<IF NO²>: When you learn something new, you learn it better when you’re fully rested, so it’s better that you get the 7 to 9 hours of sleep a night.

What factors do you think have prevented you from getting a full night's rest in the past?

< Participant’s response >

Can you briefly describe what happened the last time you couldn't get a full night's rest?

¹ Still write this line down even if the participant says “no.”
² Still write this line down even if the participant says “yes.”
What emotions did you have?

How did it hurt or constrain you?

Hm.

While adequate sleep at night helps to improve memory, daytime naps after learning something have also been shown to be helpful in improving the learning process.

Just be careful that your naps don't interfere with your sleep hygiene.

Do you know what I mean by "sleep hygiene"?

Could you tell me what you think of when you see these words?

Hm.

Well, when we apply this concept to sleep, healthy sleep hygiene also includes developing a regular bedtime routine.

A routine such as worrying in bed is bad sleep hygiene. Good sleep hygiene also includes clearing your mind before you get into bed.

What are some healthy sleep habits that you have?

Ok. And how about unhealthy sleep habits?

< Participant’s response >
Hm

Other routines that may help you fall asleep: go to bed at the same time each
night, make sure your bedroom is dark and quiet, and avoid taking naps if they interfere
with establishing a normal routine.

Do you currently have problems with any of these?

< Participant’s response >

<IF YES:> Which ones? And can you briefly describe an example?

< Participant’s response >

What emotions did you have about it?

< Participant’s response >

How did it hurt or constrain you?

< Participant’s response >

<IF NO> Oh. Hopefully, you'll still be able to make some changes in your
routines in order to develop good sleep hygiene.

When you develop bad sleep hygiene, this affects you for life.

Hopefully this information can help you improve your sleep habits since it's
important that people get a full night's rest each night.

Do you have any other questions for me about good sleeping habits?

<Dr. Allen's responses>

(a) Well, as a sleep specialist, that's not really in my domain.

(b) That subject is beyond the scope of this study. The researcher can provide you

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3 Still write this line down even if the participant says “yes.”
with contact information for the OSU health center. You can contact them for more information.

(c) We don't have much time, but you may give your information to the researcher, and she will get you in contact with the OSU Medical Center in case you want to make an appointment.

Ok. Thanks for participating in this chat. Your help today will assist in improving the virtual counselor.

Have a good day and please let the researcher know that we've finished our conversation.
Appendix B: Measurement Items

Physical Attractiveness

(1) I think he is very handsome
(2) He is somewhat ugly
(3) He is very sexy looking
(4) I find him very attractive physically
(5) I don’t like the way he looks
(6) He is not very good looking.

Items 2, 5, and 6 were reverse-coded.

Sleep Knowledge

(1) Good sleep hygiene includes worrying in bed
(2) Healthy sleep hygiene includes developing a regular bedtime routine
(3) Naps help in the learning process
(4) Sleep hygiene can affect you for life
(5) When you learn something new, you learn it better when you’ve had over 9 hours of sleep

Issue Involvement
(1) I think good sleep habits are important
(2) It’s important for me to get 7-9 hours of sleep every night
(3) I try to maintain the same routine every night before I go to bed
(4) I go to bed around the same time every night
(5) I try to get 7-9 hours of sleep every night.

Social Presence
(1) How much did it seem as if you and the person you saw/heard both left the places where you were and went to a new place
(2) How much did it seem as if you and the person you saw/heard were together in the same place
(3) How often did you have the sensation that the person you saw/heard could also see/hear you
(4) How often did it feel as if the person you saw/heard in the virtual environment was talking directly to you
(5) How often did you want to or did you make eye contact with the person you saw/heard
(6) To what extent did you feel you could interact with the person you saw/heard
(7) Seeing and hearing a person through a medium constitutes an interaction with him. How much control over the interaction with the person you saw/heard did you feel that you had?
Items 1 and 2 were measured on 7-point Likert-style scales from *Never* to *Very Frequently*. Items 3, 4, and 5 were measured on 7-point Likert-style scales from *Never* to *Always*. Items 6 and 7 were measured on 7-point Likert-style scales from *Not At All* to *Very Much*.

Communicator Credibility

On the scales below, indicate your feelings about <Dr. Allen/Alan>. Numbers 1 and 7 indicate a very strong feeling. Numbers 2 and 6 indicate a strong feeling. Numbers 3 and 5 indicate a fairly weak feeling. Number 4 indicates you are undecided.

Competence

<table>
<thead>
<tr>
<th>Intelligent</th>
<th>Unintelligent *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informed</td>
<td>Uninformed *</td>
</tr>
<tr>
<td>Bright</td>
<td>Stupid *</td>
</tr>
<tr>
<td>Incompetent</td>
<td>Competent</td>
</tr>
<tr>
<td>Untrained</td>
<td>Trained</td>
</tr>
<tr>
<td>Inexpert</td>
<td>Expert</td>
</tr>
</tbody>
</table>

Caring and Goodwill

<table>
<thead>
<tr>
<th>Cares about me</th>
<th>Doesn’t care about me *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concerned with me</td>
<td>Not concerned with me *</td>
</tr>
<tr>
<td>Has my interests at heart</td>
<td>Doesn’t have my interests at heart *</td>
</tr>
<tr>
<td>Insensitive</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Self-centered</td>
<td>Not self-centered</td>
</tr>
</tbody>
</table>
Not understanding 1 2 3 4 5 6 7 Understanding

Trust

Honest 1 2 3 4 5 6 7 Dishonest *

Honorable 1 2 3 4 5 6 7 Dishonorable *

Moral 1 2 3 4 5 6 7 Immoral *

Untrustworthy 1 2 3 4 5 6 7 Trustworthy

Unethical 1 2 3 4 5 6 7 Ethical

Phony 1 2 3 4 5 6 7 Genuine

* These items were reverse-coded.

Social Attractiveness

(1) I think he could be a friend of mine

(2) I would like to have a friendly chat with him

(3) It would be difficult to meet and talk with him

(4) He just wouldn’t fit into my circle of friends

(5) We could never establish a personal friendship with each other

(6) He would be pleasant to be with

Items 3, 4, and 5 were reverse-coded.

Arousal
We call this set of figures SAM. SAM shows Controlled vs. In-control feelings. Please notice that it is arrayed along a scale.

The excited or calm scale is displayed here. At one extreme of this scale, you are stimulated, excited, frenzied, jittery, wide-awake, or aroused. When you feel completely excited, select the figure at the left of the row.

Now look at the other end of the excited-calm scale, which is the completely opposite feeling. Here you would feel completely relaxed, calm, sluggish, dull, or sleepy. Indicate feeling calm by bubbling in the figure at the right of the row.

If you are not excited nor at all calm, select the figure in the middle of the row. If you wish to make a more finely tuned rating of how excited or calm you feel, select the space between the pictures.

Aroused

Unaroused

Satisfaction

(1) I am very satisfied with Mr./Dr. Allen’s ability to handle my medical care
(2) I am very satisfied with Mr./Dr. Allen’s ability to communicate with me in a social manner

(3) I am very satisfied with Mr./Dr. Allen’s ability to communicate with me regarding my health

(4) I am satisfied with Mr./Dr. Allen’s level of medical knowledge

(5) I am satisfied with how Mr./Dr. Allen treated me as a person

Immediacy

(1) He uses his hands and arms to gesture while talking to people

(2) He sits close or stands close to people while talking with them

(3) He moves closer to people when he talks to them

(4) He looks directly at people
References


