2013

The Effects of Video Game Difficulty Selection on Flow Experience

Michael w. W. Buncher
Cleveland State University

THE EFFECTS OF VIDEO GAME DIFFICULTY SELECTION

ON FLOW EXPERIENCE

MICHAEL W. BUNCHER

Bachelor of Arts in Communication

University of Minnesota Duluth

May 2007

submitted in partial fulfillment of the requirements for the degree

MASTER OF APPLIED COMMUNICATION THEORY AND METHODOLOGY

at the

CLEVELAND STATE UNIVERSITY

May 2013

THESIS APPROVAL

SCHOOL OF COMMUNICATION

This thesis has been approved for

the School of COMMUNICATION

and the College of Graduate Studies by:

____

Thesis Chairperson, Cheryl Bracken

____

Department & Date

____

Gary Pettey

____

Department & Date

____

Elizabeth Babin

____

Department & Date

DEDICATION

To Dr. Paul Skalski; my advisor, teacher and friend.

You never gave up on me.

ACKNOWLEDGMENTS

First I would like to thank my parents, whose love and support constantly surprises me and without whom I am not sure what kind of trouble I would have gotten into.

I would like to thank Dr. Bracken, who really stepped up at what was surely a most inconvenient time. She introduced me to so much in my first graduate class; it is only fitting that I end my time at CSU with her leading the way.

No acknowledgment section would be complete without mentioning Dr. Pettey. His methods courses gave me the tools I needed to complete this endeavor. He was also the best at making me realize just how little I knew about anything.

To Dr. Babin, you have also earned my continued thanks for stepping in to help me out at the last hour. Thank you for your willingness to help someone you do not even know.

All of the time, effort, and patience Dr. Paul Skalski gave me for years also needs to be acknowledged. Without him this never would have been finished. I gave up on myself, and without him there to help me back I would never have finished.

Also deserving special mention are Dr. Aaron Boyson for getting me into this mess, Sandy Thorp for continually helping me to take care of paperwork I should have been able to take care of myself, and all of the wonderful faculty at CSU who made my time there the best experience possible.

Finally, a special thank you goes to my partner Olivia Seifert who has stood by me through all my troubles. Thank you for your support, love, and especially your patience. I could not have done this without you. I love you.

THE EFFECTS OF VIDEO GAME DIFFICULTY SELECTION ON FLOW EXPERIENCE

MICHAEL W. BUNCHER

ABSTRACT

This study investigates selective exposure and video gameplay by borrowing methods employed in previous selective exposure studies on television and the Internet. Also studied was the impact of mood-managing behaviors on the experience of flow, both of which are concerned with affective homeostasis. It was predicted that participants manipulated to experience stress would select easier difficulty levels and play at a slower pace than those who experienced boredom. Means of manipulated groups were consistently in the predicted positions, but there was limited support for hypotheses derived from selective exposure. A negative relationship between self-reported boredom and difficulty selection was counter to predictions derived from selective exposure, but a negative relationship between self-reports of stress and rate of play supported such predictions. Finally, there was limited evidence that flow experience was delayed due to mood-managing behaviors. These mixed findings are discussed and future research directions are recommended.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION AND RATIONALE

Video games have grown into a mainstream medium. Along with this rise in popularity has come a rise in popular and scholarly concern over the negative effects of gameplay, primarily violent content effects. Numerous studies have examined the impact of violent games on aggression, enough so that three meta-analytic reviews have been conducted (Anderson & Bushman, 2001; Sherry, 2001; Anderson, 2004). Beyond aggression, another popular concern is video game addiction, which has received inconsistent support (Lee & Peng, 2006). Concern is large enough that research has even been done to find ways to disrupt excessive gaming by testing physical and virtual video game alarm clocks (Eggen, Feijs, De Graaf, & Peters, 2003). Although negative as well as positive outcomes of gameplay are certainly of concern, more work is needed in understanding what individuals do with games (Weber, Ritterfeld, & Kostygina, 2006).

Most empirical work investigating why people play video games approaches the problem from a uses and gratifications perspective. Early uses and gratifications investigations of gameplay focused on arcade video gameplay (see Selnow, 1984;

Wigand, Borstelmann, & Boster, 1985). The focus on arcade video gameplay may inhibit the generalizability of those early studies to today's home console and PC fueled market. Myers (1990) later uncovered four factors that were positively related to video gameplay time which included: fantasy, curiosity, challenge, and arousal. Sherry, Desouza, Greenberg, and Lachlan (2003) uncovered similar uses including: arousal, challenge, competition, diversion, fantasy, and social interaction. These investigations provide a foundation for understanding conscious motivations for video gameplay, but the uses and gratifications approach cannot account for any drives or motivations that may not be apparent to the user. Motivations for use of which the user may not be cognizant also may play a role in video game selection and help to explain the continued expansion of their use.

A common explanation for why individuals play video games may simply be that they are fun or entertaining. Playing a video game makes a person feel good. Even these vague statements have some scientific support as research has shown that video gameplay results in general positive moods (Fleming & Rickwood, 2001). Kubey and Larson (1990) have demonstrated that young males reported feeling better after video gameplay compared to use of other media, a finding that may explain the increased use of video games among members of this population over time. In addition to self-reported measures of positive reactions, video games have been demonstrated to lead to physiological arousal changes in heart rate and blood pressure (Segal & Dietz, 1991) as well as other physiological measures of increased arousal as a result of gameplay rewards (Ravaja, Sarri, Salminen, Laarni, & Kallinen, 2006). Clearly, entertainment is a primary effect of video game use. This is in line with claims by Bryant and Miron (1994) that entertainment experience is *the* effect of entertainment consumption.

Grodal (2000) has suggested that the interactive nature of video games provides a more sophisticated means for managing individuals' emotional and cognitive states than those provided by more passive and traditional media such as television and film. This contention parallels work from selective exposure and mood management theory. Both theories address issues of media selection from a perspective that assumes individual drives need not be known to the user (Zillmann & Bryant, 1985). Surprisingly, when this current study began there had been few studies examining selective exposure and video games (Bryant & Davis, 2006). One related approach examining motivations to play video games was conducted by Ryan, Rigby, and Przybylski (2006). They applied self-determination theory (SDT) too look at the satisfaction of intrinsic needs including autonomy, competence, and relatedness in a series of four studies. They found evidence that those intrinsic needs independently predicted enjoyment as well as desire to play again. While their work clearly provides some theoretical explanations for motivations to play by examining intrinsic needs, more work is needed addressing the potential role of hedonistic drives. The current study attempts to fill this gap in the research.

In order to address this gap, this study aims to investigate the role of selective exposure in a video game context. In order to best address the highly interactive nature of video gameplay compared to other forms of media, this study will attempt to extend upon the method used by Mastro, Eastin, and Tamborini (2002) in their work on selective exposure and the Internet, which was in turn an extension of Bryant and Zillmann's

(1984) study on selective exposure to television. This approach will allow this work to employ established methodological treatment conditions while continuing to expand selective exposure studies to more interactive media.

CHAPTER II

LITERATURE REVIEW AND CONCEPTUALIZATION

Selective Exposure

Selective exposure theory asserts that individuals are motivated to maintain affective homeostasis, an excitatory state of well-being, and will arrange their media environment to alleviate noxious affective states (Bryant & Zillmann, 1984). To this end, individuals are driven to reduce negative and maximize positive affect. This is presumed to be a natural response learned through experienced outcomes of initial media use, which is more randomized (Zillmann & Bryant, 1985).

Selective exposure can be thought of as a specific instance of *mood management theory* (Zillmann, 1988), which has produced a well-established body of literature dealing with selective exposure to media in order to achieve an affective well-being (Oliver, 2003). Mood management theory, which details drives of selective exposure to media in order to regulate mood, is built around the premise that individuals are driven by hedonistic impulses to maximize positive affective states (Zillmann, 1988).

Bryant and Zillmann (1984) proposed two separate processes that may be operating during selective exposure in their study on selective exposure and television. The first expands upon the notion of “television the exciter”, describing a cognitive rehearsal interruption which suggests that bored *and* stressed noxious state are best reduced by exciting fare which requires the most cognitive involvement to alleviate rumination on the negative states. This process will be referred to as the rehearsal interruption route. The premise is that the more exciting the experience, the more it will distract from the noxious mood state. The second approach expands upon the notion of “television the unwinder” and suggests that seeking out non-involving fare may be a relaxing experience for someone who is suffering from stress. This process will be referred to as the emotionally opposite stimulus route. These separate processes suggest that boredom is best relieved through exciting fare, but that stress may be relieved by either exciting or relaxing programming. Both processes may be operating, or perhaps some individuals are conditioned in a way that fosters one approach over the other (Bryant and Zillmann, 1984). This is problematic for researchers as it would be difficult to predict the outcomes of using exiting fare to manage one’s mood; it could reduce or increase stress depending on which process is operating.

In their experiment, Bryant and Zillmann (1984) found that individuals who were under-stimulated, which was identified as boredom, were likely to choose a greater percentage of arousing television content as opposed to those who were over-stimulated, identified as stress, who opted for a greater balance of more and less arousing shows. This supports the notion that bored individuals opt for exciting fare, but the results for which operation drives stressed individuals are somewhat murky. Self-reports of why the subjects chose the shows they did lends some support for the emotionally opposite stimulus route as opposed to rehearsal disruption route, but only a small percentage of subjects were able to articulate using the shows to influence affect. There was not a significant difference in dependent measures of arousal for those in the stress condition who chose exciting as opposed to relaxing fare. Since all experienced a reduction in heart rate, it was concluded that even “exciting” television can be more relaxing than the activities used to induce stress. A stimulus that is capable of being stressful, such as video games which are an interactive medium that requires high levels of cognition, may be needed in order to better understand the selective exposure process. Bryant and Zillmann (1984) also conducted a post-test with a control group in order to demonstrate that television viewing, and not just time, influenced the return to base heart rates.

There are other elements of messages beyond their intervention potential and arousal level that can impact selective exposure outcomes. Zillmann (1988) suggests that media with high behavioral affinity, the extent to which message content and arousal state are similar, are less likely to disrupt rumination on the noxious state and may even reinforce it. Therefore, messages that are best at normalizing noxious affect are those that are low in behavioral affinity while also being absorbing (Zillmann, 1988). In essence, individuals who are stressed would be best relieved by engaging in the most relaxing behaviors, in a similar fashion to selecting relaxing content. However, Bryant and Zillmann (1984) found that individuals who were put in a stress condition had reduced heart rates after watching television whether or not it featured relaxing content, as either requires little behavior. Therefore, interactive media are better suited for investigating relationships between arousal and selective exposure to media of varying behavioral affinity than non-interactive media. However, to fully understand the relationship, a study looking at selective exposure across interactive and non-interactive media may be required. Such an investigation is beyond the scope of this study, but it can provide a foundation for further cross-media investigations of selective exposure.

Selective Exposure to Interactive Media

Due to the interactive nature of the Internet, Mastro et al. (2002) focused on the role of surfing behavior in their selective exposure study as opposed to the genre approach that has been used in previous studies. The surfer has the ability to reduce or increase stimulation through the Internet by altering their browsing speed as needed. This behavioral component is crucial to selective exposure studies of interactive media.

Mastro et al. (2002) manipulated subjects into over or understimulation in a similar manner as Bryant and Zillmann (1984), but reduced the number of tasks from three to two for twenty minutes each as well as adding a control group that did not receive the manipulation. Subjects were prescreened for computer and Internet skill as those lacking ability would find any level of surfing to be stressful. After the manipulation, subjects were allowed to surf the web. Each subject's web activity was recorded at 5- and 10-minute intervals. Mastro et al. (2002) found support for the hypothesis that those suffering from noxious overstimulation will engage in lower rates of web surfing than those who are under-stimulated. No significant difference was found between the control group and either experimental group in web surfing rates, but their mean rate was between the experimental conditions as predicted at both the 5- and 10-minute intervals. No support was found for a hypothesized homeostatic normalization after 10 minutes, as the experimental conditions still significantly differed. A third hypothesis dealing with hedonic affinity, which predicted that over-stimulated surfers would view relaxing pages more than under-stimulated surfers, was also not supported; however, means did follow the predicted pattern.

The significant findings on surfing rates provide support for consideration of behavioral variables that are crucial to understanding the mood managing potential of interactive media. The lack of support for selective exposure to hedonic content elements may indicate that the behavioral nature of interactive media may be more important than the content. As the authors suggest, however, this may simply be due to websites not varying in hedonic valence to a meaningful level due to uniform design procedures (Mastro et al., 2002).

Selective Exposure to Video Games

To date, few studies have examined selective exposure or mood management theory and video games despite the medium's popularity (Raney, Smith, & Baker, 2006). This may be attributable to the relative newness of games as a subject of scholarly inquiry as well as complications with studying games. One major complication is that game outcomes are dependent on the player's inputs, which lessens the chance of a positive outcome compared to less interactive media (Bryant & Davis, 2006). Vorderer (2000) pointed out that it is difficult, if not impossible, to fail at watching television, whereas a video game player may fail multiple times before potentially succeeding.

Although this is true, many games are designed with built-in learning curves so that a game's difficulty is increased as the player progresses in order to minimize frustration. Another feature of video games is that they often allow the player to select a difficulty level, which provides players an opportunity to match their skill level to the challenge presented by the game. These features, which are quite unique to video games, may actually increase their mood managing potential by proving a user with the means to arrange their media environment in a way that is more or less complex in order to alleviate noxious arousal levels. This ability to change the difficulty within the game, which in turn alters complexity and the required cognitive and behavioral skills required for success, is analogous to the rate of browsing web pages on the Internet.

Flow and Enjoyment

Video games allow users to match the difficulty of a game to their skill level (or above or below it). This unique structural feature has been argued to aid in the experience of *flow* (Sherry, 2004). Flow is used to describe the state of enjoyment that inherently comes from the act of engaging in an activity without consideration of external rewards (Csikszentmihalyi, 1993). This autotelic state is thought to be characterized by intense focus and concentration, a merging of action and awareness, loss of self-consciousness, a feeling of control over ones actions, temporal distortion, and experiencing a given activity as intrinsically rewarding (Sherry, 2004).

Flow in Video Games

Studies have examined the reinforcing relationship of flow to video game use as it pertains to media addiction, alternatively referred to as problematic media use (Lee & LaRose, 2007), and the role of flow as an intrinsic motivator in brand use and selection (Lu, Zhou, & Wang, 2008). These studies aid in understanding the importance of drives to achieve flow in media use and selection, but more experimental work needs to be done to complement and reinforce these survey findings.

In outlining how video games are ideal for attaining flow states, Sherry (2004) describes features of games that have been demonstrated to be components of flow states:

video games (1) have clear goals and rules of which the player is aware, (2) feature action which can be self- or auto-adjusted to the player's needs, (3) feature scores and other feedback of performance success level, and (4) are rich in visual and audio information, which enhance concentration. Tactile information may also be considered with the fourth feature as many game interfaces provide rumble features or are naturally mapped to the screen action (Skalski, Tamborini, Shelton, Buncher, & Lindmark, 2011).

Of course, not all games are equal in terms of matching difficulty to player skill. Games of varying difficulty levels facilitate flow states more effectively for some gamers than others. The better a game is at matching difficulty to a given player's skill, the more likely it is to be selected for play (Sherry, 2004). From a mood management perspective, this may only be true of those seeking to maintain positive moods. For instance, a stressed individual may choice to play at a difficulty level that below their skill if the emotional opposite stimulus route is operating. Alternatively, since flow is an optimal state, individuals may be expected to attempt zone in on an optimal balance of challenge and skill as quickly as possible regardless, or even because of noxious arousal. This is overlap with selective exposure needs to be addressed in order to fully understand the role of selective exposure in video games and if or how mood management impacts flow experience.

Homeostasis in Flow and Selective Exposure

Connecting flow to selective exposure theory in the context of video games is made easier by recognizing the role of homeostasis in each. Homeostasis is a key element of selective exposure in media use and refers to the process of achieving optimal levels of affective well-being by engaging in activities (media consumption, in this case) that raise arousal if it is currently too low, or activities that lower arousal if it is too high.

The identified bored-stress continuum from selective exposure research also plays a role in the experience of flow. Flow states are a function of a match between task challenge and individual skill. If the challenge level of a task is below an individual's skill, the activity will foster boredom (Sherry, 2004). Conversely, if the challenge of a task exceeds an individual's skill level the activity will foster anxiety. It is only when a balance between challenge and skill is achieved that enjoyment is at its peak. More precisely, the peak comes when fresh challenges slightly exceed the player's skill level in such a way that allows the player to succeed while also increasing their skill level (Sherry, 2004). Selective exposure deals primarily with the question of why people seek enjoyment, whereas flow deals with how they achieve it. By observing the shared homeostatic elements in the processes of selective exposure and flow, it follows that homeostatic drives to maximize enjoyment may foster selective exposure to content perceived to be most likely to foster a flow state (a homeostatic end state of maximum enjoyment).

Of course, based on evidence from selective exposure research, it may be unlikely that gamers who are suffering from noxious mood states of boredom or stress would quickly achieve a flow state as they are driven to first ensure reduction of the noxious state. This impulse may influence gamers to overshoot a balance between challenge and skill before switching directions to get to the appropriate flow-inducing balance. This proposed oscillation is a natural way to achieve a state of well-being and is similar to how a basic spring that is stretched or compressed would go about returning to a state of rest once released, by repeatedly over- and undershooting the target in shorter intervals over time. This is in line with the hypothesized normalization of Internet browsing speed as proposed by Mastro et al. (2002). Although results did not support their hypothesis, a longer time period for stimulus interaction might be able to demonstrate normalization.

If such overshooting of a balance between skill and difficulty is taking place for those at noxious arousal levels, individuals who are not in such states should be able to achieve flow more quickly. The ability of a medium to alleviate noxious states of excitation is greater to the extent that the medium is involving and absorbing (Mastro et al., 2002), which makes video games well-suited to this end. Video games may be able to alleviate noxious excitation states more quickly than Internet browsing, but stimulus length should exceed the 10-minute period used by Mastro et al. (2002) in order to increase the chance of observing excitation normalization.

Summary

This study proposes to examine selective exposure within the medium of the video game in similar fashion to studies investigating its role in television (Bryant & Zillmann, 1984) and the Internet (Mastro et al., 2002). The experiment will explore the effect of different levels of arousal on selective exposure to varying levels of difficulty using the Mastro et al. (2002) arousal manipulation. Additionally, this study aims to examine the effect of varying levels of arousal on the attainment of flow experience during video game play.

As this study has developed from Mastro et al. (2002), it would be prudent to test a series of hypotheses consistent with their study. These have been adjusted to account for the particulars of the video game medium. This study will also investigate rate of play in addition to difficulty selection as a more continuous measure of selective exposure, and hypotheses will be added to reflect these measures. Additional hypotheses will address the potential impact of selective exposure on the experience of flow.

Hypotheses and Research Question

Mastro et al. (2002) found support for a hypothesis testing rates of web surfing between experimental conditions manipulating level of stimulation. Therefore, a similarly derived hypothesis is proposed for video game play.

H1: Individuals suffering from overstimulation (stress) will select lower levels of difficulty than those in a state of affective homeostasis (control) and those in a state of understimulation (boredom), respectively.

Additionally, play rate will also be accounted for this study. A play rate measure (of how fast a gamer plays) is similar to the rate of web surfing measure used by Mastro et al. (2002), allowing for a parallel hypothesis to be advanced.

H2: Individuals suffering from overstimulation (stress) will engage in lower rates of play than those in a state of affective homeostasis (control) and those in a state of understimulation (boredom), respectively.

Self-reports of bored and stressed arousal levels will also be examined in order to assess the effectiveness of the arousal manipulations. These self-reports will be used as an alternative IV in hypotheses that mirror those of H1.

H3: There will be a positive correlation between reports of boredom and difficulty selection.

H4: There will be a positive correlation between reports of boredom and rate of play.

Mastro et al. (2002) failed to find support for their hypothesis that individuals would return to a state of homeostasis during their Internet browsing session. They predicted that initial differences in browsing speed between conditions would dissipate at subsequent time intervals. Although they did not find support for their hypothesis, a similar research question will be posed here. If video games are ideal facilitators of flow experience (Sherry, 2004), then returning to a homeostatic state may be achieved through video game use at a faster pace when compared to other media.

RQ1: Over time, will individuals suffering from both overstimulation and understimulation return to a state of affective homeostasis, as demonstrated by no longer displaying differences in difficulty selection?

The highly conductive flow aspect of video games is expected to influence a quick return to homeostasis in participants, but it will be more difficult for participants experiencing noxious affective states to achieve flow initially if gameplay is being used to facilitate mood management. Therefore, it is expected that a marked difference in flow experience between experimental groups should be observed at an initial time period.

They would be playing faster or slower than is ideal to them until they have normalized, at which point flow would be possible. Therefore, any difference in flow experience should dissipate at subsequent time periods, as suggested in the final hypothesis:

H5: The neutral (control) group will have higher flow scores than the other two experimental groups at the earliest time interval, but this difference will be reduced by the end of the total play time.

If this is the case, and groups are selecting difficulties which do not match their skill in order to manage noxious arousal states, it would be expected that there will be differences in flow between the first play session measure of flow, and the final measure of flow.

H6: Flow scale score will be higher at the end of game play than after the first game play interval.

Since flow is thought of as a state, it is therefore hard to draw conclusions from seeing higher score on a scale of flow at different time periods. In order to examine whether individuals are making a more concerted effort to achieve flow at different time periods, it would be informative to see if they are trying to match difficulty to perceived ability. Perceived skill level should be positively correlated with difficulty selection if individuals are driven to achieve flow. If individuals are holding off on trying to achieve flow in order to alleviate noxious arousal states, then difficulty and ability should only be correlated after initial media use.

H7: Difficulty level will be positively correlated with perceived gameplay skill at all time periods other than the initial measurement.

CHAPTER III

METHODOLOGY

Overview

To investigate how mood states affect selective exposure to a video game, this study adapted the methodological procedure of Mastro et al. (2002). Consistent with Mastro et al. (2002) an experiment utilizing a one-way factorial design with a manipulation of arousal state (bored, stressed, or control) was run.

Participants

A total of 63 undergraduate students from a mid-sized Midwestern university participated in this study. All did so as a requirement to earn class credit. At the end of the study, participants were informed they could opt out of having their data included.

Setting

The experiment took place in an experimental research laboratory designed to look like a living room. It contained a couch facing a large television and two small desks behind the couch facing opposite walls. One of the desks was used by the researcher. Participants in the bored and stressed conditions sat at the other desk to complete their tasks. Following the manipulation, participants were invited to move to the couch for the gameplay session. Subjects assigned to the neutral condition were immediately directed to the couch upon entering the room.

Stimulus

The game selected for this study was *Tetris* on the Nintendo Entertainment System. This game was chosen for a number of reasons. First, it is widely considered one of the most popular video games of all time. Second, the game has relatively simple controls and gameplay. Third, the game begins by asking players to select a starting difficulty level, which can be used as an indicator of selective exposure. Forth, the only change that occurs within the game as difficulty is increased is the speed with which the pieces fall. Many other games feature multiple changes with differences in difficulty selection, which can be difficult to track. Using a game in which the only change due to increasing difficulty is a change in speed allows for a better comparison with the Mastro et al. (2002) study, which examined browsing speed. *Tetris* also allows for play at an individually desired rate of speed regardless of selected difficulty. Even if a player picks the easiest (slowest) setting, he or she can move the pieces down more quickly to speed up the game if desired. Finally, the specific version of the game selected for this study provides a counter for each of the various pieces in the game which allowed for the calculation of the rate of play.

Procedure

Upon arriving at the research laboratory, participants filled out a consent form. They were then randomly assigned to one of the three experimental conditions (see the arousal manipulation in the Independent variables section). Following their manipulation tasks, participants in the bored and stressed conditions were told that they would be participating in an unrelated study while the next part of the study was being set up. It involved playing the video game *Tetris* and then answering questions. The researcher briefly explained how to control the game and also showed a demonstration of the game to illustrate the goal. Participants were informed that they would be playing for 15 minutes total. They were then instructed to pick game type A and music A. Following these choices, they were informed that they could choose to start at any difficulty level, ranging from 0 to 10, and that the higher the number selected, the faster the pieces would fall. Game play was paused every 5 minutes and at that time the number of blocks placed and the participant's score was recorded. This same information was recorded every time a player failed and the game stopped automatically. After the player's first fail or the initial five minute period, whichever came first, a flow scale was administered to the participant. Due to recording errors, scores for 14 participants were missing for this initial flow scale. Once the 15 minute play period was completed, the participant completed a questionnaire containing flow scale and demographic questions. The survey instrument used in this study appears in Appendix B. Additional measures were recorded based on how players played the game. Participants were debriefed once they had indicated that they had completed the questionnaire.

Debriefing consisted of the researcher telling the student that the study was investigating the relationship of arousal levels and video game play. Students were asked not to discuss the study with anyone else. Additionally, students were told that if they desired they could be exempt for the study and that their data would not be included. None of the participants elected to withdraw from the study.

Independent Variables

Arousal Manipulation

The manipulation utilized in this study was similar to that used by Mastro et al. (2002), with bored, stressed, and neutral (control) conditions.

Boredom condition. Participants assigned to the bored condition were instructed to string washers on a shoelace for 20 minutes. No vocal pressure was used to encourage subjects. Attempts at conversation by participants were dismissed as quickly as possible. Participants were informed to stop stringing washers when the time allotted had elapsed.

Stressed condition. Those assigned to the stressed condition were tasked with completing two separate sections of the GMAT, an entrance examination used by graduate business schools, for a total of 20 minutes. Participants were expected to complete such a large number of questions that it would have been nearly impossible to complete the task. Participants were urged to achieve high marks at 5 minute intervals.

Control. In the neutral (control) condition, participants received no manipulation. They were immediately instructed to play the video game selected for use in this study. For all conditions, the controls were explained and they also watched a brief demonstration of gameplay.

Once participants in the bored and stressed conditions finished the manipulation tasks, they were informed that the next part of the experiment would take some time to set up. It was then explained that in the meantime they would be briefly playing a video game as part of an unrelated study.

Measuring Self-Reported Arousal (Manipulation Check)

As a manipulation check, boredom (*M* = 5.58, *SD* = 2.93) and stress (*M* = 4.00, *SD* = 2.90) were measured directly using self-report items. The items asked participants to indicate the degree to which they experienced boredom or stress. Each was a ten-point scale from 1, anchored with "not at all" to 10, anchored with "extremely". Participants were asked to indicate their level of each right before they played Tetris.

Measuring Video Game Skill

Video game skill was measured using an adapted version of the GaPS (Game Playing Skill, see Table 1) scale developed by Bracken and Skalski (2006). This was included to control for potential variations in player skill level. It was assumed that players would attempt to match skill to difficulty level. The changes from Bracken and Skalski's (2006) original scale included (a) using a seven-point instead of ten-point scale and (b) the addition of two items on skill at puzzle games in general and *Tetris* specifically. Each item was anchored so that 1 = Strongly disagree and 7 = Strongly agree. Scores on the seven items were summed and averaged to form an overall measure of video game skill. The final scale had a Cronbach's alpha of 0.90, (*M* = 4.11, *SD* = 1.49, *n* = 62).

Table 1

Items in the Video Game Skill Scale

Item	*M*	*SD*
I often win when playing video games against other people.	3.84	1.85
I often win when playing video games against the computer.	4.23	1.89
I am a good video game player.	3.89	1.89
I think about different video game strategies.	4.05	1.95
I can easily figure out how to play new games.	4.32	1.92
I am skilled at puzzle games.	4.50	1.76
I am skilled at Tetris.	3.92	1.91

Dependent Variables

Measuring Difficulty Selection

Difficulty selection was recorded by a researcher upon selection by participants. Difficulty level was recorded on the same sheet upon which other information, such as number of pieces and time, were recorded to calculate rate of play. Players were allowed to choose any difficulty level they desired. The game's difficulty levels ranged from 0 (the easiest and slowest) to 10 (the hardest and fastest). For the initial play period, participants selected difficulty levels in the range of 0 to 7 (M = 1.49, SD = 1.63).

Measuring Rate of Play (RoP)

Rate of play was used as an analogous measure to browsing speed. It was calculated by dividing the number of *Tetris* pieces dropped by minutes played. The researcher used a stop watch to keep track of play time. The number of pieces played was checked at times when the game play was stopped. The game features a counter for each type of piece played so the researcher simply recorded those numbers. Players were instructed to stop playing at five minute intervals unless they failed the game before that time. At those times the researcher would record the time and number of pieces played.

Rate of play was then calculated using these data. Initial rate of play was calculated using the first interval of play which was a maximum time of 5 minutes, but shorter if the participant failed earlier. Additionally, an overall rate of play was calculated for the entire game play session. Initial rate of play had a mean of 15.83 pieces per minute (SD = 5.46), while overall rate of play had a mean of 17.69 (SD = 6.26).

Measuring Flow

Flow was measured using a five item scale with each item reflecting a different characteristic of a flow state. For instance, the autotelic experience of flow is partly characterized as an intense and focused concentration on what one is doing in the present moment (Sherry, 2004) which is reflected by the item, “I focused on the game”. Participants were asked to indicate their level of agreement with the statements on 7-point scales. Each item was anchored so that 1 = Strongly disagree and 7 = Strongly agree. Flow was measured twice; once after the initial play period and again after the entire play session had ended. After the initial five minute play period, the participant was asked to pause the game and was handed a questionnaire containing only the flow scale. Once the entire 15 minute play time had been completed the full questionnaire, including the flow scale and demographic questions, was given. Each participant's initial flow scale was kept by the researcher and the participant could not look at it to see how they previously responded. There was missing data for 14 participants flow scores at time 1 and a single participant at time 2. Scores on the item were and averaged to create a measure of flow. Overall, the flow scale had a Cronbach's Alpha of 0.72, (*M* = 5.30, *SD* = 1.00).

Table 2

Items in the Game Flow Scale at Times 1 and 2

Item	Time 1 (*n* = 49)		Time 2 (*n* = 62)	
	M	*SD*	*M*	*SD*
I focused on the game.	5.94	1.20	6,10	1.10
I concentrated on the game.	5.96	1.29	6.08	1.06
The game was rewarding.	4.08	1.69	4.27	1.26
I lost consciousness of the things happening outside of the game.	4.43	1.89	4.73	1.93
The game was moderately challenging.	4.52	1.54	4.87	1.44

CHAPTER IV

RESULTS

Results from this study will be presented in this section. First, a few descriptive statistics of the sample will be provided. After that the T-test for the manipulation check will be presented followed by tests of the hypotheses. The research question was not tested.

Descriptives

The control condition contained 23 participants and each of the other 2 conditions contained 20 participants. Of the sample, 35 participants (55%) were male and 27 (43%) were female, and one participant did not indicate sex. The average age was 24.84, years old (*SD* = 7.55). Race was assessed by having the participant mark if they were Asian, African American, Hispanic, Pacific Islander, White, or Other. If they selected other, a space was provided to specify. Of all the participants, 38 selected White, 14 selected African American, 5 selected Other, 4 selected Hispanic, 1 selected Asian and 0 selected Pacific Islander.

Participants reported playing video games for an average of 4.34 hours (*SD* = 6.42) per week. Platform experience was also measured to determine participants' familiarity with various types of gaming systems. Participants were asked to mark on a seven-point scale (1 = not experienced at all, to 7= very experienced) how experienced they were with a number of video game platforms including the Nintendo Entertainment System (M = 3.52, SD = 2.49) and others. The Nintendo Wii was the most familiar system to the sample (M = 4.15, SD = 2.16).

Manipulation Check

In order to check the manipulation, a T-test was conducted between the bored and stress conditions on the self-reported bored and stress items. It demonstrated that subjects were successfully manipulated to experience stress as groups significantly differed in self-reports of experienced stress, t (37) = .89, p = 0.01, whereas the boredom manipulation was not significant, t (37) = -2.88, p = 0.10. Additionally, means for each scale appeared to be in the correct directions. Participants in the bored condition had the highest score on the bored scale (M = 6.79, SD = 2.46) followed the stress condition (M = 5.35, SD = 2.89). Those in the stress condition had the highest score on the stress scale (M = 5.65, SD = 2.56) followed by the bored condition (M = 3.16, SD = 2.83).

Hypothesis 1: Condition Arousal and Difficulty Selection

Hypothesis 1 stated that individuals suffering from overstimulation (stress) will select lower levels of difficulty than those in a state of affective homeostasis (control) and those in a state of understimulation (boredom), respectively. The stress group did have the lowest mean (M=1.40, SD=1.96) for the initial difficulty selection when compared to the bored (M=1.55, SD=1.64), and control (M=1.52, SD=1.34) conditions. This difference was not statistically significant as determined by running a one-way ANOVA with the experimental condition as the IV and difficulty selection at time one (see table 3). The same test was carried for subsequent gameplay time periods with no significant differences appearing.

Table 3

ANOVA Results by Difficulty Selection

Condition	*M*	*df*	*F*
Difficulty Select 1		2, 60	0.05
Control	1.52		
Bored	1.55		
Stressed	1.40		
Difficulty Select 2		2, 60	0.14
Control	2.70		
Bored	2.45		
Stressed	2.80		
Difficulty Select 3		2, 60	0.25
Control	3.70		
Bored	3.30		
Stressed	3.41		

Note: $* = p < 0.10$; $** = p < 0.05$; $*** = p < 0.01$

Hypothesis 2: Condition Arousal and Rate of Play

Hypothesis 2 stated that individuals suffering from noxious levels of overstimulation (stress) will engage in lower rates of play (i.e., less pieces placed per minute) than those in a state of affective homeostasis (control) and those in a state of understimulation (boredom), respectively. For gameplay at time one, the stress group did have the lowest mean for rate of play at 14.48 pieces per minute (*SD* = 4.46), but it was not significantly different from the other group means as determined by a one-way ANOVA, F (2, 58) = 1.26, $p = 0.29$. However, the overall pattern of results at time one was in the expected direction, with bored participants playing the fastest (*M* = 17.21 pieces per minute, *SD* = 6.81) and control group participants playing the second fastest (*M* = 16.04 pieces per minute, *SD* = 4.80). There were also no significant differences at time period two (see table 4).

However, at time period three the differences in rate of play approached significance, F (2, 58) = 2.91, $p < 0.10$. Here the stress condition was still playing at the slowest rate (*M* = 16.52, *SD* = 6.82), followed by the bored group (*M* = 20.64, *SD* = 6.66) and the control group (*M* = 20.85, *SD* = 5.83). Differences created between groups in the manipulation were not initially expected to be influencing gameplay by time period three if there were no differences at earlier time periods due to a potential return to homeostasis.

Table 4

ANOVA Results by Rate of Play (RoP) Period

Condition	*M*	*df*	*F*
RoP Time 1		2, 58	1.26
Control	16.04		
Bored	17.21		
Stressed	14.48		
RoP Time 2		2, 58	0.61
Control	18.00		
Bored	20.46		
Stressed	17.48		
RoP Time 3		2, 58	2.91*
Control	20.85		
Bored	20.64		
Stressed	16.52		

Note: * = $p < 0.10$; ** = $p < 0.05$; *** = $p < 0.01$

Hypothesis 3: Self-reported Arousal and Difficulty Selection

Hypothesis 3 stated that there will be a positive correlation between reports of boredom and difficulty selection. Alternatively, it would be expected that there would be a negative correlation between self-reports of stress and difficulty selection.

Self-reports of boredom approached significance and were correlated with initial difficulty selection only, but it was not in the direction predicted, with an r (60) = -0.21, p

= 0.05. This means that the more bored someone reported being, the more likely they were to select a low level of difficulty.

No **s**elf-reports of stress were significantly correlated with difficulty selection (see table 5). A correlation of difficulty selection at time 1 with stress resulted in an *r* (60) = 0.01, *p* = 0.48 in a 1-tailed test.

Table 5

Correlation Results of Self-Reported Arousal and Difficulty Selection

Item		Stress	Difficulty Select 1	Difficulty Select 2	Difficulty Select 3	Mean Difficulty
Bored	Pearson Correlation	0.00	-0.21**	-0.08	-0.04	-0.12
Stress	Pearson Correlation	1.00	0.01	0.04	0.01	0.03

*Note: * = p < 0.10; ** = p < 0.05; *** = p < 0.01*

Hypothesis 4: Self-reported Arousal and Rate of Play

Hypothesis 4 states that there will be a positive correlation between reports of boredom and rate of play. Alternatively, it would expected that there would be a negative correlation between self-reports of stress and rate of play.

A correlation of self-reported boredom and rate of play at time one was not found to be significant, *r* (58) = -0.03 *p* = 0.40. Correlations at time two were also not significant (see table 6). However, a positive correlation, *r* (58) = 0.19, *p* < 0.10, between reports of boredom and the rate of play for the final gameplay period approached significance.

A correlation of self-reported stress with rate of play at time one was found to approach significance, *r* (58) = -.18, *p* < 0.10. The correlation between stress and rate of play was also in the predicted direction. The more stressed a participant reported being, the slower they were likely to play.

Table 6

Correlation Results of Self-Reported Arousal and RoP

		Rate 1	*Rate 2*	*Rate 3*	*Final Rate*	*Mean Rate*
Bored	*Pearson Correlation*	-0.03	-0.02	0.09	0.19*	0.12
Stress	*Pearson Correlation*	-0.18*	-0.04	-0.11	-0.11	-0.08

*Note: * = p < 0.10; ** = p < 0.05; *** = p < 0.01*

Research Question

RQ1: Over time, will individuals suffering from both overstimulation and understimulation return to a state of affective homeostasis?

RQ1 was not tested as Hypothesis 1 and 2 were not supported. There was no initial difference in initial difficulty selection or rate of play between condition groups. Additionally, the marginally significant difference between groups in rate of play (H1b) that occurred at time period 3 indicates it is likely this question will go unanswered, but with some evidence pointing to the need for more lengthy play sessions to fully investigate the issue.

Hypothesis 5: Condition Arousal and Flow

Hypothesis 5 states that for the initial time period, the control group will report higher flow than either experimental group. This was tested with a one-way ANOVA (see table 7) which found that the means did not differ significantly, F (2, 46) = 2.27, p = 0.11. Although the test did not meet the requirement for the means to be considered significantly different, they were in the predicted direction as the control group did have the highest flow score (*M* = 5.32, *SD* = 1.03), the stress group had the next highest score (*M* = 5.13, *SD* = 0.98) and the bored group had the lowest score (*M* = 4.59, *SD* = 1.04).

At the conclusion of all game play, the control group no longer had the highest flow score (*M*=5.36, *SD*=0.97). The highest scoring group was the stress group *(M*=5.40, *SD*=0.92*)* and the lowest was the bored group (*M*=4.86, *SD*=1.04). A one-way ANOVA of flow scores at the final time demonstrated these differences were not significant, F (2, 59) = 1.89, p = 0.16.

Table 7

ANOVA Results by Time Period

Condition	*M*	*df*	*F*
Flow Time 1		2, 46	2.27
Control	5.32		
Bored	4.49		
Stressed	5.13		
Flow Time 2		2, 59	1.89
Control	5.36		
Bored	4.86		
Stressed	5.40		

*Note: * = p < 0.10; ** = p < 0.05; *** = p <0.01*

Hypothesis 6: Paired samples Flow Test

Running a paired samples T-test on flow scale after the first gameplay time compared to the flow scale at the conclusion of all gameplay reveals support for hypothesis 6, that score on the flow scale would be higher after gameplay completion compared to after gameplay time one. Scores for the flow scale after game play were higher (M = 5.30, SD = 1.00), than after the first gameplay time (M = 4.99, SD = 1.05). These differences were significant as determined by a paired samples T-test, t (47) = -3.64, $p < 0.01$.

Hypothesis 7: Correlating Game Playing Skill and Difficulty Selection

Running 1-tailed correlations of difficulty selection at times 1, 2, and 3 with scores on the game playing skill scale, measured with a seven-point scale items (anchored with 1=strongly disagree to 7=strongly agree) stating "I am skilled at Tetris", and the perceived ability scale (mean of vplayer, vcomputer, vgood, vstrat, vnew, vpuzz, and vtetris), reveals support for hypothesis 7 (see table 8).

Specifically, the correlation between perceived skill at video games and difficulty selection at time 1 is not statistically significant, r (60) = 0.07, n = 62, p = 0.28. However, as predicted, perceived skill and difficulty selection are correlated at time two, r (60)= 0.32, $p < 0.05$) and at time three, r (60)= 0.32, $p < 0.01$.

Table 8

Correlation Results of Difficulty Selection and Game Playing Skill

Item		*Difficulty Select 1*	*Difficulty Select 2*	*Difficulty Select 3*
Mean Ability	*Pearson Correlation*	0.07	0.32**	0.38***

*Note: * = p < 0.10; ** = p < 0.05; *** = p <0.01*

Table 9

Hypotheses and Research Question Results

Hypothesis	Results
H1: Individuals suffering from overstimulation (stress) will select lower levels of difficulty than those in a state of affective homeostasis (control) and those in a state of understimulation (boredom), respectively.	Not supported; means in predicted direction
H2: Individuals suffering from noxious levels of overstimulation (stress) will engage in lower rates of play (i.e., less pieces placed per minute) than those in a state of affective homeostasis (control) and those in a state of understimulation (boredom), respectively.	Not supported; means in predicted direction
H3: There will be a positive correlation between reports of boredom and difficulty selection.	Not supported; correlation in opposite direction approached significance
H4: There will be a positive correlation between reports of boredom and rate of play.	Marginally supported
RQ 1: Over time, will individuals suffering from both overstimulation and understimulation return to a state of affective homeostasis, as demonstrated by no longer displaying differences in difficulty selection?	Not tested
H5: The neutral (control) group will have higher flow scores than the other two experimental groups at the earliest time interval, but this difference will be reduced by the end of the total play time.	Not supported, means in predicted direction
H6: Flow scale score will be higher at the end of game play than after the first game play interval.	Supported
H7: Difficulty level will be positively correlated with perceived gameplay skill at all time periods other than the initial measurement.	Supported

CHAPTER V

DISCUSSION

Overview

This study has been an initial step in investigating selective exposure in video game play. Unfortunately this study found little support for mood management in the context of video game play. This lack of support is not a major issue for the theory as others now had success with mood management studies in a variety of different video games, including investigations of casual video games (Russoniello, O'Brien, & Parks, 2009) as well as massively multi-player online games (Mulligan, 2008). The inconsistencies in this particular study may illustrate the need for an integrated approach in researching motivations and outcomes of media use in selective exposure.

This route is already being taken by other scholars such as the work by Reinecke et al. (2012) examining the roles of hedonic as well as non-hedonic needs in mood management. Reinecke et al. (2012) took a model developed by Tamborini et al. (2011), which integrated intrinsic hedonic and nonhedonic needs, and applied it to mood management. A false feedback experiment was conducted which varied the actual satisfaction of the nonhedonic needs of competence and autonomy. This was found to lead to differences in video game selection in regards to user demand, which was varied by more or less complex control schemes. The subsequent satisfaction of competence and autonomy was also found to predict enjoyment (Reinecke et al., 2012). This integration of nonhedonic needs into mood management research is a great step in addressing calls for integrating nonhedonic motivations into research on affect regulation as called for by Schramm and Wirth (2008).

The current study has also attempted, in part, to integrate the concept of flow to traditional selective exposure research. While nothing definitive can be concluded, this study illustrates the potential of mood managing behaviors to potentially delay flow experience. Specifically, support was found for individuals suffering from noxious mood states to not initially match difficulty to video game ability. This finding is strengthened by the fact that flow scores were significantly higher at the conclusion of play than after gameplay time one. This contribution illustrates a possible connection between mood management and flow.

Findings

The primary hypothesis of this study, that individuals in a condition of stress would be more likely than others to choose to play video games at a low level of difficulty, was not supported. However, the means were in the correct direction for the initial time period when looking at differences between conditions in initial difficulty selection (H1) as well as rate play (H2). For H1, it is possible that subjects overall tended to select the easiest difficulty level because it was viewed as the beginning of the game. Looking at the means for difficulty selection at time 1 (M = 1.49, SD = 1.63), time 2 (M = 2.65, SD = 2.10), and time 3 (M = 3.41, SD = 2.40), it simply looks like participants were just trying to play through the game in a linear fashion. Also, using a sample that was completely familiar with the game may have yielded larger differences. These results are particularly disappointing considering the significant results others have found (Mastro et al., 2002)

H2 had interesting results as differences between conditions in rate of play were marginally significant at time period 3. It is possible that the significant differences observed at time period 3 indicate players need some time to get used to the game itself. Perhaps some who were not familiar with the game built up expectations by time period 3 and then acted in accordance with predictions. Using a stronger manipulation, a larger sample, or a sample with known experience in playing *Tetris* may have aided in this investigation. These results seem to provide some indirect support for the notion that individuals use media randomly during initial use (Zillmann and Bryant, 1985).

The third hypothesis investigated was conceptually similar to H1, but used the self-reported and continuous measures of boredom and stress as opposed to the nominal experimental conditions for the IV. The finding that those who reported higher scores for boredom were more likely to choose a lower difficulty level is perplexing. While a significant result was anticipated, the correlation is negative where it was predicted as being positive (although it only approached significance). No significant correlations between stress and difficulty selection were observed. It is hard to speculate why this result occurred considering that previous research indicates that boredom is alleviated by selecting content that is exciting, either because of the rehearsal interruption route or the emotionally opposite stimulus route (Bryant & Zillmann, 1984).

When still using the self-reports of boredom and stress but changing the DV to rate of play as opposed to difficulty the selection (H4), the picture is quite different. No significant correlations are observed between boredom and the initial rate of play, but there is a positive correlation which approached significance at the final rate of play period. Other studies found support for mood management occurring at the initial time period (Bryant & Zillmann, 1984; Mastro et al., 2002), but as with H2, this delayed finding may be due to participants becoming familiarized with the game over time, building up expectations, and then acting in accordance to predictions of selective exposure.

For H4, there was a correlation which approached significance between stress and rate of play for the initial play period. This finding was the most in line with the major predictions in this study as the correlation was negative in direction as predicted. The correlation was not observed at later time periods unlike other similar studies (Mastro et al, 2002). While one would like to point to this as evidence of mood management behavior using a video game, and it seems to be, when taken together with all of the other results from H1, H2, and H3, this study as a whole has been inconclusive. It is interesting that the result which best supports any of hypotheses came from using a self-report of arousal as opposed to the experimental manipulation as the IV.

Of additional interest in this study was the role of flow in mood management. For H5, it was expected that those not trying to alleviate noxious arousal states would experience flow more quickly and strongly. For the initial play period the means suggested as much, with the control group having a higher flow score than either group assigned to a noxious arousal state. However, these differences were not significance. While the test was not significant, the means indicate that future research on the role of flow in mood management is warranted.

H6 looked at the differences between participant reports of flow from after the first gameplay period to the flow scale at the conclusion of all play. A significant difference was found and the means in the predicted direction. Without the confirmation from H5, that the control group would have higher flow at game play time one compared to manipulated groups, this result is difficult to interpret. Needless to say, flow scores significantly increased across all groups during game play. This may be due to individuals no longer needing to alleviate noxious mood states, but perhaps continued gameplay regardless of noxious arousal would have resulted in similar increases in flow scale scores.

H7 looked for indirect support of the impact selective exposure can have on flow experience. It has been suggested that individuals seek to match challenge to skill and that doing so leads to flow experience (Sherry, 2004). Flow experience has been demonstrated to be a positive experience, and should be sought out in media use. This may not be the case, however, when noxious affective states are present and individuals are attempting to use the media to quickly alleviate these states. These ideas were supported by demonstrating that perceived skill was positively correlated with difficulty selection at the second and third game play periods, but not the initial period. Although not directly measuring flow, this test has provided some evidence that mood managing behaviors may inhibit ones drive to experience flow for initial video game use.

This study was able to demonstrate that the stress manipulation used in many selective exposure studies is effective as demonstrated by the manipulation check. Unfortunately the bored condition did not significantly differ from other groups when comparing self-reports of boredom. This may have influenced results to be less than supportive of the presented hypotheses.. Although the results lacked many significant findings, it is helpful to know that it was most likely not due to a weak manipulation; stringing washers on a shoe lace remains a boring task for undergraduates. The results of the primary predictions of H1, H2, H3, and H4 were murky and the rest had limited support. It is best to keep in mind the multiple limitations of this study when reviewing the results.

Limitations

Throughout the course of conducting this study, several problems became apparent which should be kept in mind when reviewing these findings. First and foremost, the sample used was of limited generalizability due to the current popularity of video games. Future research should try to include subjects that are not only undergraduates from a medium sized Midwestern University. Other issues concerning the sample were that its size was somewhat small. A larger sample size may have led to more conclusive results. Finally, some individuals in the sample had never played *Tetris* before. This is problematic because the theory of mood management assumes that individuals learn to expect certain outcomes from subsequent media use, but that initial use is random (Zillmann and Bryant, 1985). Future research should include only those who are familiar with the medium being used so that participants come in with accurate expectations.

Methodologically, one major issue was player deaths. Since some players died more frequently than others, the time intervals for rate of play do not align well. Each play period took more or less time for different participants, and so participants also had more or less play periods than others. Video recording of gameplay may have allowed for more accurate calculation of rate of play across the same time periods. A game with a no fail mode, such a *Rock Band 2,* would prevent this problem. However, the use of another game could cause other issues with external validity since almost all video games allow the player to fail in some way.

Another major issue with this study, albeit one that should not be a problem for others, was the missing data for a number of flow scales. This was an unintentional result of a not completing this work in a timely fashion. . This unfortunate issue was particularly harmful to the study given the small sample size.

Directions for Future Research

Future research should look into a more direct test of the impact these homeostatic-focused concepts and theories have upon each other. In particular, a study could be designed to test the moderating or mediating potential of mood managing behaviors on flow experience. The many conceptual overlaps between absorption potential, rehearsal interruption, and flow experience need more clarity. For example, in a study where interactivity level was manipulated, Tamborini et al, (2011) found that at the low interactivity level, the only hedonic need associated with enjoyment was affect and not arousal. By contrast, at medium and high interactivity arousal accounted for more explained variance in enjoyment. Interestingly, for the high interactivity condition neither affect nor arousal significantly explained variance in enjoyment. Flow, and the link between difficulty and ability may be able to explain why at levels of high interactivity hedonic needs did not explain variance in enjoyment. High interactivity may have been too high.

Hedonic valence of media content was not tested in this particular study, but certainly video games can vary in this concept in ways similar to other media content. Although support for selective exposure to content of opposing hedonic valence in interactive media has not found much support (Mastro et al, 2002), it may still need to be examined further in the realm of video games.

Future research should also look into selective exposure across media and even non-media options. Tamborini et al. (2011) examined various level of interactivity, but a zero interactivity video game experience may lack some external validity when compared to television programs that are designed to be noninteractive. Finally, one aspect of selective exposure that gets little attention and needs to be investigated further is how individuals use media to maintain, rather than achieve, positive arousal or affective states.

Conclusion

Along with increases in concern about video game use, there has been an influx of research applying preexisting theories and methods to this relatively new medium. This study adds to that body of literature, by showing how individuals use video games to reduce noxious arousal states. Inconsistencies in this study's findings may partially be explained by the lack of consideration of nonhedonistic need satisfaction which has been demonstrated to be related to mood management concepts (Reinecke, 2012). Additionally, attempts to link selective exposure to concepts such as flow illustrate that it may be important for future research on flow to take arousal states or even prolonged mood states into consideration as a factor influencing the time it takes to achieve a flow state. Finally, the findings in this study suggest that more work may be needed in clarifying the theoretical processes involved in selective exposure and mood management and what predictions can be derived from them.

REFERENCES

Anderson, C. A. (2004). An update on the effects of playing violent video games. *Journal of Adolescence, 27,* 113-122. doi:10.1016/j.adolescence.2003.10.009

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, 12,* 353-359. doi:10.1111/1467-9280.00366

Bracken, C.C., & Skalski, P. (2006). Presence and video games: The impact of image quality and skill level. *Proceedings of the Annual International Meeting of the Presence Workshop.* Cleveland, OH: Cleveland State University.

Bryant, J., & Miron, D. (1994). Entertainment as media effect. In J. Bryant & D. Zillmann (Eds.), *Media effects: Advances in theory and research* (pp. 437-461). Hillsdale, NJ: Erlbaum.

Bryant, J., & Zillmann, D. (1984). Using television to alleviate boredom and stress: Selective exposure as a function of induced excitational states. *Journal of Broadcasting, 28,* 1-20. doi:10.1080/08838158409386511

Bryant, J., & Davies, J. (2006). Selective exposure to video games. In P. Vorderer, & J. Bryant (Eds.), *Playing video games.* (pp. 181-194). London: Lawrence Erlbaum Associates, Inc.

Csikszentmihalyi, M. (1993). *The evolving self: A psychology for the third millennium.* New York: Harper Perennial.

Eggen, B., Feijs, L., de Graaf, M., & Peters, P. (2003). Breaking the flow: Intervention in computer game play through physical and on-screen interaction. *Proceedings of the Annual Meeting of Digital Games Research Association*. Utrecht, Netherlands: University of Utrecht.

Fleming, M. J., & Rickwood, D. J. (2001). Effects of violent versus nonviolent video games on children's arousal, aggressive mood, and positive mood. *Journal of Applied Social Psychology, 31,* 2047-2071. doi:10.1111/j.1559-1816.2001.tb00163.x

Grodal, T. (2000). Video games and the pleasure of control. In D. Zillmann & P. Vorderer (Eds.), *Media Entertainment: The psychology of its appeal* (pp. 197-213). Mahwah, NJ: Lawrence Erlbaum Associates.

Kubey, R., & Larson, R. (1990). The use and experience of the new video media among children and young adolescents. *Communication Research, 17,* 107-130.

Lee, D., & LaRose, R. (2007). A socio-cognitive model of video game usage. *Journal of Broadcasting and Electronic Media, 51*(4), 632-650. doi:10.1080/08838150701626511

Lee, K. M., & Peng, W. (2006). What do we know about social and psychological effects of computer games? A comprehensive review of the current literature. In P. Vorderer, & J. Bryant (Eds.), *Playing Video Games* (p. 332). London: Lawrence Erlbaum Associates, Inc.

Lu, Y., Zhou, T., & Wang, B. (2008). Exploring Chinese users' acceptance of instant messaging using the theory of planned behavior, the technology acceptance model, and the flow theory. *Computers in Human Behavior, 25*, 29-39. doi:10.1016/j.chb.2008.06.002

Mastro, D. E., Eastin, M. S., & Tamborini, R. (2002). Internet search behaviors and mood alterations. *Media Psychology, 4*, 157-172. doi:10.1207/S1532785XMEP0402_03

Mulligan, M. (2008). *Exploring mood management via exposure to a massively multi-player online game* (Doctoral dissertation, Florida State University). Retrieved from http://diginole.lib.fsu.edu/cgi/viewcontent.cgi?article=4045&context=etd

Oliver, M. B. (2003). Mood management and selective exposure. In J. Bryant, D. Roskos-Ewoldsen, & J. Cantor (Eds.), *Communication and Emotion: Essays in honor of Dolf Zillmann* (pp. 85-106). Mahwah, NJ: Lawrence Erlbaum Associates.

Przybyliski, A. K., Ryan, R. M., & Rigby, C. S. (2009). The motivating role of violence in video games. *Personality and Social Psychology Bulletin, 35*(2), 243-259. doi:10.1177/0146167208327216

Raney, A. A., Smith, J. K., & Baker, K. (2006). Adolescents and the appeal of video games. In P. Vorderer, & J. Bryant (Eds.), *Playing Video Games* (p. 165). London: Lawrence Erlbaum Associates, Inc.

Ravaja, N., Saari, T., Salminen, M., Laarni, J., & Kallinen, K. (2006). Phasic emotional reactions to video game events: A psychophysiological investigation. *Media Psychology, 8,* 343-367. doi:10.1207/s1532785xmep0804_2

Reinecke, L., Tamborini, R., Grizzard, M., Lewis, R., Eden, A., & Bowman, N. D. (2012). Characterizing mood management as need satisfaction: The effects of intrinsic needs on selective exposure and mood repair. *Journal of Communication, 62,* 437-453. doi:10.1111/j.1460-2466.2012.01649.x

Rogatko, T. P. (2009). The influence of flow on positive affect in college students. *Journal of Happiness Studies, 10,* 133-148. doi:10.1007/s10902-007-9069-y

Russoniello, C. V., O'Brien, K., & Parks, J. M. (2009). The effectiveness of casual video games in improving mood and decreasing stress. *Journal of CyberTherapy & Rehabilitation, 2,* 53-66.

Ryan, R. M., Rigby, C.S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30,* 344-360. doi:10.1007/s11031-006-9051-8.

Schramm, H., & Wirth, W. (2008). A case for an integrative view on affect regulation through media usage. *Communications, 33,* 27-46. doi:10.1515/COMMUN.2008.002

Segal, K. R., & Dietz, W.H. (1991). Physiological response to playing a video game. *American Journal of Diseases of Children, 145,* 1034-1036. doi:10.1001/archpedi.1991.02160090086030

Selnow, G. W. (1984). Playing videogames: The electronic friend. *Journal of Communication 34*(2), 148-156. doi:10.1111/j.1460-2466.1984.tb02166.x

Sherry, J. L. (2001). The effects of violent video games on aggression. A meta-analysis. *Human Communication Research, 27,* 409-431.

Sherry, J. (2004). Flow and media enjoyment. *Communication Theory, 14,* 328-347. doi:10.1111/j.1468-2958.2001.tb00787.x

Sherry, J. L., Desouza, R., Greenberg, B., & Lachlan, K. (2003, May). *Relationship between developmental stages and video game uses and gratifications, game* *preference, and amount of time spent in play.* Paper presented at the International Communication Association annual conference, San Diego, CA.

Skalski, P., Tamborini, R., Shelton, A., Buncher, M., & Lindmark, P. (2011). Mapping the road to fun: Natural video game controllers, presence, and game enjoyment. *New Media & Society, 13*, 224-242. doi:10.1177/1461444810370949

Tamborini, R., Grizzard, M., Bowman, N. D., Reinecke, L., Lewis, R. J., & Eden, A. (2011). Media enjoyment as need satisfaction: The contribution of hedonic and non-hedonic needs. *Journal of Communication*, *61*, 1025-1042. doi:10.1111/j.14602466.2011.01593.x

Weber, R., Ritterfeld, U., & Kostygina, A. (2006). Aggression and violence as effects of playing violent video games? In P. Vorderer, & J. Bryant (Eds.), *Playing Video Games* (p. 347). London: Lawrence Erlbaum Associates, Inc.

Wigand, R. T., Borstelmann, S. E., & Boster, F. J. (1985). Electronic leisure: Video game usage and the communication climate of video arcades. *Communication Yearbook, 9*, 275-293.

Vorderer, P. (2000). Interactive entertainment and beyond. In D. Zillmann & P. Vorderer (Eds.), *Media Entertainment: The Psychology of its Appeal* (pp. 21-36). Mahwah, NJ: Lawrence Erlbaum Associates.

Zillmann, D. (1988). Mood management through communication choices. *American Behavioral Scientist, 31*, 327-340. doi:10.1177/000276488031003005

Zillmann, D. (2000). Mood management in the context of selective exposure theory. In M. f. Roloff (Ed.), *Communication yearbook 23* (pp. 103-123). Thousand Oaks, CA: Sage.

Zillmann, D., & Bryant, J. (1985). Affect, mood, and emotion as determinants of selective exposure. In Zillmann & J. Bryant (Eds.), *Selective exposure to communication* (pp. 157-190). Hillsdale, NJ: Lawrence Erlbaum Associates.

APPENDIX

APPENDIX A: SCRIPT

Researcher reads:

"Thank you for agreeing to participate in this study, before we begin would you please read and complete this consent form"

The researcher collects the consent form and begins to describe one of two activities.

"I have to read these instructions to you, so that all the participants hear them in the same way. You are about to engage in a few different activities."

If condition S (stress, GMAT test)

"This is a standardized test, you will have twenty minutes to answer as many questions correctly as possible. Your correct answers are important to the research and you must try your best to answer many questions in each section. Incorrect answers will count against your score, so it is crucial that you do not guess. I will continually update you on the time."

Every 4 minutes of the 20 minute time period encourage/pressure the subject to move onto a new section if they have not and to remember to answer many correctly and to not guess, tell them that it will hurt the study if they do not try to get as many correct as possible.

If condition B

"This activity requires you to string washers on a shoe lace for twenty minutes. It does not matter how fast you progress, you will still need to do the activity for twenty minutes. If you use all the washers, empty the string and restring all the washers as many times as is necessary until I say when the time is up. It is only important that you continually put washers on the string."

DO NOT TALK TO THEM, tell them it is crucial that you cannot converse with them since it will create differences between participants.

If condition N

Go straight into the game.

Researcher reads:
"While we set up the final part of the experiment, I am going to ask you to help with a separate study. For this I am going to have you play the NES version of Tetris for 15 minutes. Tetris is played by completing horizontal rows of blocks. This is accomplished with the falling blocks which you control. Move the blocks with the arrows as they fall, and rotate them with the "a" and "b" buttons.

If they are unsure of how to play, let them watch the demo at the start of the game for a bit (it begins after a little while of waiting at the title screen). Select game type "A" and music "1" for them, and tell them that they can select which level they would like to start on (record this on the block count sheet).

"You may select which level you would like to start on, the higher the level, the faster the blocks fall and the game becomes more challenging"

Every time they die, instruct them to hold on before continuing and fill out the block tally sheet with the time, blocks of each type, and score. Additionally, stop them after 5 minutes of play (total) and administer just the flow scale. Then have them begin again at whichever selected difficulty level they desire and record it. Stop them again at 10 minutes (total) if they do not die. And repeat.

After 15 minutes, stop them and record the time, blocks, and score on the block count sheet, then ask:

"Please complete this 4 page questionnaire on your gaming experience." If you are unsure about the question, answer to the best of your ability as the questions are asking what *you* think they are asking." **(you may have to explain the manipulation check question on the top of page four of the questionnaire to the control group)**

Debriefing

Please note there is a manipulation check question that the control group (N) will be confused about since it asked about being bored and stressed during the activity. Inform them to respond by saying how they felt during whatever they did right before game play. DO NOT TELL THEM THIS UNTIL THEY GET TO THAT QUESTION!

THANK YOU!

APPENDIX B: QUESTIONNAIRE

VIDEO GAME STUDY QUESTIONNAIRE

Here are some questions about your experience with the game.

1. I focused on the game.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

2. I concentrated on the game.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

3. The game was rewarding.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

4. I lost consciousness of the things happening outside of the game.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

5. The game was moderately challenging.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

Here are some statements about your video game playing ability. Please answer each using the scale provided.

1. I often win when playing videogames against other people.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

2. I often win when playing video games against the computer.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

3. I am a good video game player.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

4. I think about different video game strategies.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

5. I can easily figure out how to play new games.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

6. I am skilled at puzzle games.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

7. I am skilled at Tetris.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

The next set of questions asks about your use of ALL types of video games.

During an average WEEKDAY….

How many hours do you spend playing video games by yourself?
____ HOURS
How many hours do you spend playing video games with another person or group?
____ HOURS

During an average WEEKEND DAY….

How many hours do you spend playing video games by yourself?
____ HOURS
How many hours do you spend playing video games with another person or group?
____ HOURS

How experienced are you with each of the following game systems/platforms?

Playstation 2
Not experienced at all 1 2 3 4 5 6 7 Very experienced

PS3
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Xbox
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Xbox 360
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Nintendo GameCube
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Nintendo Wii
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Nintendo Entertainment System (NES)
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Arcade video games
Not experienced at all 1 2 3 4 5 6 7 Very experienced

PC video games
Not experienced at all 1 2 3 4 5 6 7 Very experienced

Which platform do you play video games on MOST FREQUENTLY? (check ONE)

__Playstation 2
__PS3
__Xbox
__Xbox 360
__GameCube
__Wii
__NES
__PC/Computer
__Arcade
__Other (specify)_______________

What video games are you currently playing MOST OFTEN? (list up to FIVE)

1.________________________
2. _______________________
3. _______________________
4. _______________________
5. _______________________

Please indicate the extent to which you experienced each of the following during your initial activity (the activity BEFORE the video game).

Boredom

Not at all 1 2 3 4 5 6 7 8 9 10 Extremely

Stress

Not at all 1 2 3 4 5 6 7 8 9 10 Extremely

INFORMATION ABOUT YOU

You're almost done with this questionnaire! These last questions are about you. Again, all of your responses will be kept strictly confidential, so please answer as accurately and honestly as possible.

Are you ____male OR ____female? (check one)

How old are you (in years)? ________

What is your race?

____Asian
____African American
____Hispanic
____Pacific Islander
____White
____Other______________________

What size screen do you most often play home video games on?
____Pocket (less than 6 inches measured diagonally)
____Small (6-18 inches measured diagonally)
____Medium (19-21 inches measured diagonally)
____Large (22-27 Inches measured diagonally)
____Extra large TV (regular tube type) (28-35 inches measured diagonally)
____Large screen projection TV (bigger than 35 inches measured diagonally)
____NOT SURE

THAT CONCLUDES THE POSTTEST. THANK YOU FOR YOUR TIME.