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Exploring factors related to college student expertise in digital games and their relationships to academics

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Abstract

Digital game play is a common pastime among college students and monopolizes a great deal of time for many students. Researchers have previously investigated relationships between subject-specific game play and academics, but this study fulfills a need for research focusing on entertainment game strategies and how they relate to strategies and success in other contexts. Utilizing a survey of 191 undergraduate students, the goal was to investigate students' digital game play habits, strategies, and beliefs that predict gaming expertise, and to determine if these relate to academic success. Factor analysis revealed three latent variables that predict expertise: dedication, solo mastery, and strategic play. Multiple regression analysis was used to determine whether these three components could also predict academic outcome variables. Findings point to the absence of a relationship between these variables and academic GPA, but to the presence of a tentative relationship between confidence in game play and confidence in personal control over academic success.

Keywords*: computer game; undergraduate; survey; learning strategy*

Introduction

Video game play is a common and time-consuming pastime for people of all ages, particularly for college students (Lenhart, Jones, & MacGill, 2008). When engaging in video game play, individuals employ specific strategies for learning and navigating the game, they have certain attitudes toward game play, toward challenge, and winning and losing, and they choose to approach gameplay for various reasons and under varying circumstances. All of these choices, whether conscious or not, are important because they are practiced and reinforced continually in an activity that consumes a great deal of time—in some cases, even more time than a student spends in classes. It has been theorized that these choices are related to, and may even influence, formal learning choices and experiences (Blumberg, Altschuler, Almonte, & Mileaf, 2013). By examining choices made in both contexts, we are able to explore themes and patterns in student approaches to learning activities and to overcoming obstacles.

1. Background and Research Questions

Self-determination theory is a theory of motivation that examines choices made with and without external influence. It has long been used to explain student motivation that leads to academic success (e.g., Deci, Vallerand, Pelletier & Ryan, 1991; Taylor, et al., 2014). It has also been used to explore video game motivations (Przybylski, Ryan, & Rigby, 2009). Concurrently, it has been theorized and confirmed that personality traits can predict academic success, even to a larger extent than some academic predictors (Chamorro-Premuzic & Furnham, 2003) and that certain personality traits also predict video game approaches and behaviors (Worth & Book, 2015). It is thus posited that perhaps approaches to digital game play and development of gaming expertise reveal general personality traits, habits, and motivations that will also predict motivations and success in academics. This study is an examination of traits that describe individuals' digital game play and predict expertise in game play. Following that is an exploration of relationships between these traits and academic outcomes.

1.1 *Time and Expertise*

While time spent practicing is not the only factor in the development of skills and expertise, students who spend more time deliberately practicing an activity, such as a digital game, are more likely to develop expertise in the activity, and vice versa (Kulasegaram, Grierson, & Norman, 2013). Through playing digital games, students can develop expertise both in the game content and in general problem-solving strategies. Both problem-solving strategies and general learning habits that are learned in the context of games may also be applied to other pursuits, including academics (Squire, DeVane, & Durga, 2008).

1.2 *Video Games and Academic Skills and Attitudes*

There have been several fundamental studies relating video game play and academic attitudes and uses of strategies in academics. Researchers have found increases in academic self-efficacy after students played subject-related educational video games (Ritzhaupt, Higgins, & Allred, 2011). This was an experimental study in which students played mathematics video games, which increased their academic self-efficacy specifically in mathematics. This is an important connection, but it is not clear whether or not this would apply to general entertainment video game play and general academic self-efficacy. In another study, middle school students who played a serious educational game demonstrated not only increased knowledge and changed attitudes toward the content but also performed cognitive and metacognitive learning strategies within the game play to help them learn the game more efficiently (Cheng & Annetta, 2012). Again, this relationship shows potential for connections between game play and academic strategies and beliefs, but further research is needed to determine if these relationships exist among entertainment video game play and attitudes toward academics in general. Not many college undergraduates are playing subject-specific educational games as were used in the aforementioned studies, though they may play general strategy-based puzzle games (Ream, Elliott, & Dunlap, 2013). Researchers, however, have also found relationships between general strategic video game play and self-reported problem-solving skills (Adachi & Willoughby, 2013), as well as between video game play preferences and social problem-solving skills (Hancock, 2010). Interestingly, it seems that there can also be a negative effect from playing digital games perceived to be too difficult, which can potentially decrease cognitive control in a player (Engelhardt, Hilgard, & Bartholow, 2015). This finding suggests that the relationship can work both ways, where a good balance of skill and challenge relates to higher feelings of control, and a poor balance or perceptions of extreme difficulty relate to lower feelings of control. Researchers have found significant positive relationships between digital game play and locus of control (Koo, 2009), as well as between academic effort (time spent studying) and academic locus of control (Bodill & Roberts, 2013). In this study, it is hypothesized that those who are more likely to persevere and engage in problem solving in digital games are also more likely to have a higher GPA and to have greater feelings of control over their academic success.

1.3 *The Current Study*

The current study is based on the hypothesis that ways of developing expertise in digital games may predict a student's habits and attitudes toward learning and developing expertise in other contexts—specifically, in formal academics. Previous research has focused on these same relationships in more specific contexts, such as associations between playing violent games and engaging in violent behaviors and academic outcomes, (Gentile, Lynch, Linder, & Walsh, 2004) or associations between playing prosocial games and engaging in prosocial behaviors in school (Harrington & O'Connell, 2016). This study focuses instead on general strategies and attitudes toward digital games, and general academic approaches, beliefs, and outcomes. The purpose of this study was to investigate variables or traits to describe college students' digital game play habits, strategies, and beliefs and to see whether or not these can predict student expertise in games. If so, the secondary goal was to determine whether the primary components or factors being measured on the survey could predict the student's current GPA, and the student's level of feelings of control over academic success. The specific research questions are:

- What are the overarching constructs that emerge from information about digital game play habits, strategies, and beliefs among college students?
- Are these factors surrounding digital game play beliefs and habits effective predictors of expertise in digital games? If so, are they also predictors of academic success, as measured by current GPA, and levels of feeling of control over academic success?

2. Method

A survey was administered online among undergraduate students at five different colleges and universities across the United States, as part of a larger study about problem solving. The advertising methods at the universities consisted of flyers, emails, and announcements in general education classes. The survey was password protected with a unique password for each university; the students were required to give a valid university email address, with only students from one university targeted at a time. This was done to ensure validity with regard to the participants, so they could not complete it multiple times and to verify they were current students. Additionally, to improve the validity of the survey

data, checkup questions were scattered throughout the survey to make sure the participant was actually reading each question. For example, one of these checkup questions read "To continue taking this survey, please select I agree." If the participant did not follow these instructions, the survey would automatically exit and the observation was deleted from the database. Eighteen participants were eliminated because they did not answer the checkup questions as instructed. In each of these eighteen cases, the participant was choosing the same answer throughout the entire survey, so it is likely that they were not reading the questions.

2.1 *Participants*

Participants in this study were 190 full-time undergraduate students, currently enrolled in an American college or university. The age range was 18-25, with a mean age of 20.5 (s.d. 1.75). Within this group, 56.6% were identified as female (n = 108), 39.8% as male (n = 76), 3.1% as transgender (n = 6), and one participant chose not to answer. The vast majority, 79.6%, identified themselves as Caucasian (n = 152), with 4.7% African American or Black (n = 9), 7.9% Hispanic or Latino (n = 15), 9.9% Asian or Pacific Islander (n = 19), 4.7% Middle Eastern (n = 9), 2.1% Native American or Alaskan Native (n = 4), 2 others and 3 who did not wish to answer. Note that participants could identify with more than one race/ethnicity. There was a fairly even representation of freshmen (n = 56), sophomores (n = 33), juniors (n = 51), and seniors (n = 42), with 9 participants falling outside these categories (e.g., fifth year or higher, irregular years). There was also a very wide representation of majors from all disciplines, with most majors being represented by five or fewer participants. The three majors represented by more than five participants were nursing (n = 10), biology (n = 8), and psychology (n = 7).

The participants' digital game play ranged from 0 to 105 hours in a typical week. The mean amount of digital game play in a typical week in this sample was 12 hours (s.d. 15), distributed between games on the computer (M = 4.4, s = 9.0), games on a phone or other mobile devices (M = 3.1, s = 5.4), games on a regular-sized gaming console (M = 2.3, s = 3.7), and games on a tablet (M = 1.4, s = 4.1), handheld video game system (M = 0.91, s = 2.8), or at an arcade (M = 0.14, s = 0.64).

As for academics, the participants in this sample spend an average of 14.7 hours per week (s = 11.6) studying or doing school-related work outside of class time in a typical week. The average estimated current GPA of the group was 3.43 (s = 0.5).

2.2 Instrument

The survey included questions about students' digital game play—frequency, type, medium, habits, strategies used, and beliefs. Not all of the questions on the survey were of interest in this analysis, so the focus in this section will be on the questions that were included in the analysis of this study.

2.2.1. MSLQ.

While there were twenty questions from the Motivated Strategies for Learning Questionnaire, or MSLQ (Pintrich, Smith, Garcia, & McKeachie, 1991), the two used in this analysis were the two that measured Control of Learning Beliefs. According to Pintrich et al. (1991), "Control of learning refers to students' beliefs that their efforts to learn will result in positive outcomes. It concerns the belief that outcomes are contingent on one's own effort, in contrast to external factors such as the teacher. If students believe that their efforts to study make a difference in their learning, they should be more likely to study more strategically and effectively. That is, if the student feels that she can control her academic performance, she is more likely to put forth what is needed strategically to effect the desired changes." Based on this definition, it was hypothesized that the same students who approach digital games strategically and with the belief that they have control over the outcome based on their game play would also believe they have control over their academic success through studying and use of strategies. The questions on the MSLQ are scored on a 7-point Likert scale with anchors 1 = Not at all true of me and 7 = Very true of me.

2.2.2. Digital Games Survey.

Forty items from the survey focused on strategies used when playing digital games, and attitudes and preferences toward playing digital games. The attitudes and preferences questions were modeled after the MSLQ, so were also scored on a 7-point Likert scale. Examples of questions about attitudes toward digital games are: (a) I prefer video games that really challenge me so I can learn to play better, (b) Passing levels and winning the game are usually the most satisfying things for me when playing a video game, and (c) I have an uneasy feeling when I play video games because I don't want to fail. The items focusing on strategies used when playing video games were posed on a 5-point Likert scale (1 = Very Unlikely, 5 = Very Likely). The prompts for these items were "When playing a video game, how likely are you to:" and "When playing a video game, if you become stuck in a difficult part, how likely are you to:"

Examples of items from these sections are (a) Access extra tutorials/training from the game menu, (b) Watch someone else do it first, (c) Practice it over and over until you can pass it.

Additionally, students reported their GPA on a 4.0 scale and answered basic demographic questions, as outlined in the participants section.

2.3 *Analysis*

For the first portion of the analysis, exploratory factor analysis was performed to identify latent variables being measured by the digital game-related questions. Included in this factor analysis were 40 items from the survey that focused on strategies used when playing video games, and attitudes and preferences toward playing video games. While there are many different standards and opinions regarding sample size, some researchers recommend at least 50 observations and approximately five times as many observations as variables for factor analysis (e.g., Habing, 2003; Hatcher, 1994). The sample size in this study, after eliminating incomplete surveys, was 191. Five times as many observations as factors would be 200, so the sample size of 191 was determined to be satisfactory to meet these recommendations, considering that the data presented high item communalities and stable factors (Costello & Osborne, 2005).

In the second portion of the analysis, these newly identified factors were saved as variables and entered into multiple regression analyses, to determine to what extent these components can predict: (a) hours spent playing video games weekly, (b) self-reported level of expertise in digital games, (c) current GPA, and (d) level of feelings of control over academic success.

3. Results

A factor analysis was performed using varimax rotation, which maximizes variance of loadings on each factor and simplifies interpretation (Abdi, 2003; Tabachnick & Fidell, 2013). Based on the standard of Eigenvalues greater than one (Kaiser, 1960), fourteen components were extracted. Variables that had loadings of at least an absolute value of 0.4 for each component were identified. Only three components had five or more strongly loading items, which is the standard by which Costello and Osborne (2005) identify a solid factor. A reliability analysis was performed on the sets of variables that strongly loaded into each component, and those for which Cronbach's alpha was at least 0.7 were retained. This left only three reliable components: Component 1 (Cronbach's alpha = 0.837), Component 2 (Cronbach's alpha = 0.765), and Component 3 (Cronbach's alpha = 0.765). There was one item that loaded onto both Component 1 and Component 3: "When I am working on a video game, I try the tough parts over and over again until I get through them." This item was included in both components because it has a theoretical basis for being both an aspect of dedication and also can be used as a specific strategy.

Table 1 shows the variables (survey items) with loadings of at least 0.4 for each of the three reliable components.

Table 1. Factor Analysis Results: Components and Corresponding Survey Items with Loadings

Component 1: Dedication	**Component 2: Solo Mastery**	**Component 3: Strategic Play**
I try to play a game regularly enough that I do not lose track of where I was (0.765)	I use the strategy: ask others how to do it (−0.824)	I use the strategy of practicing it over and over until I can pass it (0.771)
I work hard to get through even the parts of a video games that are not as fun or interesting so that I can reach my goals in the game (0.754)	I use the strategy: watch someone else do it and do what they did (−0.738)	I use the strategy of problem solving and thinking through the best possible option (0.750)
If I try hard enough, I will succeed at the video games I play (0.578)	When I am stuck, I ask someone else to do the difficult part for me (−0.630)	I use the strategy of trial and error to figure out what might work (0.719)
I want to do well when I play video games so I can show my ability to my friends, family, or others (0.543)	When I am stuck, I give up on the game (−0.461)	I prefer video games that really challenge me so I can learn to play better (0.580)
I'm certain I can do well at even the most difficult video games (0.512)		When I am working on a video game, I try the tough parts over and over again until I get through them (0.556)
When I am working on a video game, I pull together information from different		

sources, such as the Internet, friends, and YouTube videos (0.467)
When I am working on a video game, I try the tough parts over and over again until I get through them (0.467)
I try to play video games with other people so we are working together to solve them (0.400)

Component 1 focuses on dedication to digital games. It highlights hard work despite obstacles, focused and regular game play, and interest in showing abilities to others. It was termed "Dedication." The loadings in Component 2 are all negative, so should be interpreted as "I do not…" for each survey item. This component is made up of unwillingness to seek help from others when playing digital games, as well as unwillingness to give up. For this reason it was termed "Solo Mastery." Finally, Component 3 focuses on the use of different strategies and interest in a challenge, even when it is difficult. This component was termed "Strategic Play." In general, dedication to digital game play, solo mastery of video games, and use of varying strategies to overcome challenge were the strongest factors to emerge from the larger survey about college students' digital game play.

All three new component variables were entered into four separate regression analyses, to determine to what extent these components can predict: (a) hours spent playing digital games weekly, (b) self-reported level of expertise in digital games, (c) current GPA, and (d) level of feelings of control over academic success.

3.1 Hours Spent Playing Video Games Weekly

The three new components were entered as independent variables and hours spent playing video games in an average week was the dependent variable in the first multiple linear regression analysis. Overall, the regression was significant $F(3,132) = 3.545$, $p = 0.016$. Adjusted $R2 = 0.054$, indicating that, while significant, only a small 5% of the variation in game play hours can be explained by these variables. One individual factor, Component 1, was significant ($t(187) = 3.046$, $p = 0.003$, $\beta = 0.255$). As might be expected, an increase in hours spent playing digital games in a typical week is associated with an increase in Dedication in video game play. Engaging in Solo Mastery and Strategic Play are not related to overall amount of time spent playing digital games in a typical week.

3.2 Expertise

With the three components as independent variables and level of self-reported digital game expertise as the dependent variable, the omnibus regression was significant $F(3,132) = 23.005$, $p < 0.001$. Adjusted R2 was.328, indicating that approximately 32.8% of the variation in self-reported expertise can be explained by the model. All three individual components were significant: Component 1 ($t(187) = 4.584$, $p < 0.001$, $\beta = 0.323$), Component 2 ($t(187) = 6.221$, $p < 0.001$, $\beta = 0.439$), Component 3 ($t(187) = 3.050$, $p = 0.003$, $\beta = 0.215$). In general, an increase in dedication to digital game play, an increase in solo mastery behaviors when playing digital games, and an increase in strategic types of game play are all associated with an increase in self-reported level of expertise in digital game play. Solo mastery behaviors have the strongest association, indicating that either playing alone allows one to develop greater expertise, or that those who have greater expertise in video game play end up playing alone and not asking for help since they have already achieved levels that others have not.

3.3 GPA

The variable current academic GPA was not normally distributed, so GPA scores were transformed to natural logs of original values, which resulted in an approximately normal distribution. With the three components as independent variables and transformed current GPA as the dependent variable, the third regression was not significant $F(3,131) = 0.711$, $p = 0.547$. In addition, none of the individual components was significant at $p < 0.05$. In general, these traits and habits of video game players do not relate to current academic success as measured by grade point average.

3.4 Level of Feelings of Control over Academic Success

Two questions on the MSLQ assessed feelings of control over academic success or failure. These were (a) If I try hard enough, then I will understand my course material, and (b) If I don't understand the material for my classes, then it is because I didn't try hard enough. These were summed into one variable called Control and a regression was performed with the three components as independent variables and Control as the dependent variable. The overall regression was significant, $F(3,132) = 3.358$, $p = 0.021$. Adjusted $R2 = 0.050$, which indicates that approximately 5% of the variation in feelings of control over academics can be explained by this model. While significant, this is a very small amount of variation that can be explained by the model. The one significant individual component was Component 2

($t(187) = 2.989$, $p = 0.003$, $\beta = 0.251$). In general, an increase in solo mastery in digital game play is related to increased feelings of control over academic success. It is possible that those who develop high levels of skill without help in one area are more likely to feel confident in their ability to control their skills, knowledge, and outcomes in other areas.

4. Discussion

4.1 Dedication

Grit is a term used in recent years in education to describe qualities of perseverance, dedication, and beliefs in students who tend to be more successful. Grit is characterized by perseverance, which includes self-efficacy and time management, as well as consistency of interest and focus on long-term goals (Wolters & Hussain, 2015; Duckworth, Peterson, Matthews, & Kelly, 2007). These qualities match fairly well with the qualities that were highlighted in the Dedication variable in this study. In other words, the Dedication variable could be identifying a form of "grit" in digital game play, as characterized by self-efficacy ("I'm certain I can do well at even the most difficult video games."), time management ("I try to play a game regularly enough that I do not lose track of where I was."), consistency of interest ("When I am working on a video game, I try the tough parts over and over again until I get through them."), and focus on long-term goals ("I work hard to get through even the parts of a video game that are not as fun or interesting so that I can reach my goals in the game."). This variable also significantly predicts hours spent playing digital games each week, which might be expected because dedication involves putting time into the activity to be successful, and the more successful someone is, the more likely they are to keep spending time on the activity. Given the matching qualities with grit, a predictor of success in academics, it was hypothesized that dedication to digital game play would significantly predict academic success, as measured by current GPA. However, this hypothesis was not supported by the data, and such a relationship was not found in this study. This shows that, while the qualities of success may be similar between video games and academics, they may not carry over from one activity to the other. For example, an individual who has a high level of dedication specifically in digital game play may not have a high level of dedication in academic pursuits.

4.2 Solo Mastery

Solo mastery indicates an unwillingness to ask for help or seek advice, while also being unwilling to give up when stuck in a video game. This variable is not related to time spent playing digital games, but it is related to feelings of expertise, which implies that those who have high levels of solo mastery prefer to solve the challenges alone but do not necessarily need great amounts of time to develop expertise or be successful. Possibly they are using better problem-solving techniques or strategies. Use of solo mastery is not related to academic GPA but it is related to higher feelings of control over academic success. This is important because it shows that those who are persistent in solving digital games on their own feel more in control of their success in other areas (academics) than those who are more likely to ask someone for help or to give up when stuck in games. This aligns with the theory that increased effort and persistence lead to greater feelings of control over success, both in digital games and in academics because it is not a domain-specific belief (Granic, Lobel, & Engels, 2013).

4.3 Strategic Play

Strategic play involves using greater levels of problem-solving, practice, and desiring challenge in game play. This variable was primarily related to expertise in digital games, where those who engage in greater levels of strategic play also tend to feel they have greater expertise in video games. This is consistent with the well-known "deliberate practice" theory of the development of expertise (Ericsson, Krampe, & Tesch-Römer, 1993), although recently researchers have concluded that other traits such as age when first learning the activity and particular cognitive skills and abilities also play a strong role in the development of expertise in an endeavor (Hambrick, Oswald, Altmann, Meinz, Gobet, & Campitelli, 2014).

4.4 Game Play Outcomes

While the combination of the variables dedication, solo mastery, and strategic play together significantly predicted both game play time and expertise in video games, the highlights of this aspect of the study are that it is primarily dedication that predicts game play time, while all of them—both together and individually—predict video game expertise. A combination of dedication, persistence in problem solving without getting help from others, and strategic play all play a large role in the outcome of expertise in digital game play.

4.5 Academic Outcomes

The hypotheses of this study were not confirmed by the analyses when looking at relationships between game play style and beliefs and academic success. These three variables were not related to current GPA in school. While digital game dedication, solo mastery, and strategic play are related to in-game expertise, they are not necessarily related to

academic success. Either the qualities do not carry over to other domains, or it is different traits and habits that relate to success in academics than to expertise in games. It is noteworthy that increased use of solo mastery in digital games does relate to increased feelings of control over academic success. While it does not provide a large amount of explanatory value, it does indicate that certain beliefs and habits in digital games are applicable beyond the domain of games and relate to academic pursuits as well.

5. Limitations

Given that this is a correlational, nonexperimental study, conclusions may be interpreted in multiple ways. For example, possibly dedication, solo mastery, and strategic play lead to things like greater game expertise and feelings of control over academic success, but perhaps it is greater game expertise and feelings of control over academic success that lead to higher levels of dedication, solo mastery, and strategic play in games. Alternatively, there may be other mediating or moderating variables at play. The explanatory value in most of the regressions was not high, so conclusions must be interpreted with that in mind. This may be, in part, because the sample size was only minimally adequate for the analyses conducted. Finally, results should also be interpreted keeping in mind that this was a self-report survey. While measures were put into place to increase the validity of survey results, it is always possible that students were not completely truthful or that their perceptions of themselves differ from reality.

Conclusions and Implications

This study utilized a survey to determine self-reported behaviors, preferences, and strategies in digital game play. Factor analysis was used to determine latent variables describing students' digital game play. Dedication, solo mastery, and strategic play were the latent factors that emerged from the analysis. In other words, when undergraduate college students reported their behaviors in learning digital games and preferred strategies for getting out of difficult situations in the games, they were essentially reporting their levels of dedication, solo mastery, and strategic play in games. Dedication in digital game play includes playing the games regularly, working hard to reach goals—even through parts that are not as fun or interesting, the belief that trying hard will result in success and belief that one is capable of doing well in even difficult games. Dedication also includes the desire to do well to show ability to others and working together with other people to solve the games. Solo Mastery indicates being unwilling or uninterested in help from others, including asking others for help, watching others do it, asking someone to do it for you, or in giving up when stuck. Strategic Play includes using the strategies of practicing over and over, problem-solving and thinking through the best possible option, using trial and error, trying the difficult parts over and over, as well as a preference for digital games that are challenging to allow for greater learning.

Using regression analyses, these three variables together significantly predicted hours spent playing digital games each week, with dedication being the only significant individual predictor. They also together and individually significantly predicted game expertise, all with positive relationships with expertise. Higher levels of dedication, increased use of solo mastery over games, and greater levels of strategic play all relate to higher feelings of expertise in video games. The three components did not significantly predict current academic GPA, but they did predict level of feelings control over academic success, with the solo mastery component, in particular, significantly predicting this.

The study of motivations, beliefs, habits, and strategies in digital games is a growing field of research, and one from which researchers hope to learn more about the way individuals choose to pursue and overcome challenges in various domains. In this study, three general traits were revealed to describe the digital game play of undergraduate students: levels of dedication, solo mastery, and strategic play. Furthermore, these variables significantly and directly relate to levels of expertise in digital games. Higher levels of dedication, mastering the game play without help, and utilizing strategies all relate to the development of expertise in digital games. In other words, digital game expertise is not just the result of mindlessly doing the same thing over and over but actually requires the same sorts of traits that might be expected when developing expertise in other pursuits.

The fact that these traits in digital games do not relate to academic GPA shows us that either traits and habits that provide success in digital game play do not necessarily translate directly to success in other areas, or that there is a more complex relationship where other variables such as motivations moderate these relationships. Finally, there was a weak but significant relationship between solo mastery in digital games and level of feelings of control over academic success, which may be pointing to a larger relationship between confidence in oneself and in the effort expended and beliefs that one can control an outcome through effort and practice. Further research focusing on this relationship is warranted, given the tentative findings of this study but the important implications of such a finding.

For those playing digital games for entertainment, it is clear that habits, strategies, and attitudes play a large role in developing expertise and success. While the traits related to expertise in games are similar to traits that have been found to relate to academic success, there does not appear to be a direct relationship between these traits in video game play and academic success. It is possible that another variable, such as motivations for game play, may moderate any relationships that might exist. The significant relationship between solo mastery in digital games and feelings of control over academic success was weak but could prove to be very interesting if further research confirms it. If confirmed, this

would give gamers, educators, and researchers a reason to pursue building up self-efficacy in various contexts to benefit academic performance and success in a variety of pursuits.

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