

11-2015

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Recommended Citation

Bachen, C. M., Hernández-Ramos, P. F., Raphael, C., & Waldron, A. (2015). Civic play and civic gaps: Can life simulation games advance educational equity? *Journal of Information Technology & Politics*, 12, 378-395.

<http://dx.doi.org/10.1080/19331681.2015.1101038>

This is an Accepted Manuscript of an article published by Taylor & Francis in *Journal of Information Technology & Politics* in November 2015, available online: <http://www.tandfonline.com/10.1080/19331681.2015.1101038>.

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Post-print author version

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Civic Play and Civic Gaps: Can Life Simulation Games Advance Educational Equity?

Abstract

Digital games and simulations (DG&S) could help mitigate inequities in civic education and participation, which are found in many contemporary democracies. Yet incorporating DG&S into the curriculum may reinforce or introduce inequities for students who are less engaged by game-based learning. A quasi-experimental study of 301 U.S. high school students in social studies classes examined whether prior academic performance, civic engagement, civic game play experience and gender affected how (and which) students benefit from playing a life simulation game. Dependent variables included several civic dispositions: justice-oriented citizenship norms, and interest in politics, news, and global issues. The simulation game especially enhanced political interest among lower-performing students and those with fewer informational resources. While prior civic activity and civic gaming experience provided advantages for some outcomes, for the most part, gender did not. We conclude that life simulation games have potential to advance both equity and excellence in civic education, engaging males and females, and advantaged and disadvantaged students, and we theorize about the reasons why.

Running Head: *Civic Play and Civic Gaps*

Keywords: games, simulations, civic education, civic engagement, equality, gender, quasi-experiment

Preparing youth for informed and effective citizenship has long been one of the main rationales for education in democracies and for public investment in schooling (Gould, 2011). However, civic education in U.S. schools has been diminished in recent decades in favor of more instruction in basic reading and mathematical skills, or to avoid politicized controversies over civics curricula (Levinson, 2007). Low-income and immigrant youth have the least access to high quality civic education, learn less in civics classes than their peers, and participate less in public life as adults (Kahne & Sporte, 2008; Torney-Purta & Wilkenfeld, 2009). These educational inequities undermine the democratic promise of equal opportunity to participate in civic life.

In response, some educators are employing digital games and simulations (DG&S) as one strategy for re-engaging disadvantaged youth with formal and informal learning about civics, including history, social studies, geography, and government (Ito et al., 2013). DG&S may boost disengaged students' motivation by affording active learning and tapping students' interest in digital media (Bers, 2010; Squire, 2011).

However, empirical research offers little insight into whether students benefit equally from civic DG&S. As a recent report summarizing findings from the MacArthur Foundation's Digital Media and Learning Initiative concludes, research is needed on the uses of new media "for self-directed, interest-driven, and technologically enabled learning through the lens of equity and opportunity" (Ito et al., 2013, p. 25). Similarly, leaders in American civic education have issued a recent call to "[d]evelop research that both documents the extent of and offers solutions to the disparity of civic learning opportunities in schools" (Gould, 2011, p. 43), including the use of DG&S.

In this multi-site quasi-experimental study, we test whether a biographical life simulation game “levels the playing field” for high school students who are not well-served by existing citizenship education. In particular, we examine whether DG&S play helps lower-performing students as well as high achievers to develop citizenship norms and interest in politics, news, and global issues. Prior empirical research on civic DG&S examines the impact of “top down” games and simulations in which players manage societies from above as leaders (Egenfeldt-Nielsen, 2007; Lee & Probert, 2010; Neys & Jansz, 2010; Squire, 2011; Yang, 2012). In contrast, this study examines whether a “bottom up” approach to civic DG&S might pique less advantaged students’ curiosity about and consideration of justice in social structures by experiencing them from below as individual characters immersed in everyday life. If so, the life simulation genre could add a valuable tool to civic educators’ toolkits, one that is both a hammer for constructing a strong educational platform and a level for ensuring the platform is even for all students.

Literature Review

Civic Education and Inequity

American civic education is marked by inequity, defined as “persistent patterns of difference in educational opportunities and achievement among students” (Achinstein & Athanases, 2005, p. 845). Students who are low-performing academically and less engaged in civic life tend to have the least access to the most effective civic pedagogies (Levinson, 2007; Torney-Purta & Wilkenfeld, 2009). These successful teaching methods include projects involving service learning and civic problem-solving, discussions of current events, an open classroom climate in which students can voice differing perspectives on public controversies, student governance, and, most relevant to the current study, participating in face-to-face simulations of civic activities, such as mock trial or Model United Nations (Gould, 2011). These

pedagogies can offset a number of other factors that reduce civic learning and participation in public life, including neighborhoods and homes that are less attentive to and supportive of civic activity (Kahne & Sporte, 2008).

Unequal opportunities for civic education affect students' civic engagement later in life. The high school years are a crucial time in which youth develop their civic identities (Yates & Youniss, 1998). Effective civic education directly strengthens commitment to participate in community activities and politics, which predicts adult participation (Kahne & Sporte, 2008). Good civic schooling also increases participation indirectly by boosting students' likelihood of graduating from high school and attending college. High quality civic education helps raise students' educational attainment, which is among the strongest predictors of adult civic engagement (Nie, Junn, & Stehlik-Barry, 1996; Schlozman, Verba, & Brady, 2012). For example, participating in class-related community service in high school contributes to higher gains in math, science, and history, and to students' probability of graduating from college (Dávila & Mora, 2007).

Potential Contributions of DG&S to Equity

DG&S appear to employ many of the active and cooperative methods that are most effective in face-to-face civic education (Bers, 2010; Raphael, Bachen, Lynn, Baldwin-Philippi, & McKee, 2010). Students can explore the effects of multiple factors (political, environmental, social, military, economic, diplomatic, etc.) on complex systems such as cities, nations, and civilizations. Many DG&S give players access to institutional, geographical, and temporal settings that would otherwise be inaccessible, permitting students to learn from the consequences of choices made on the screen that would be difficult or perilous to experience in the real world. DG&S often involve comparing multiple perspectives – both among game characters and

through social interaction with peers, either online or in front of the screen – which affords opportunities for collaboration and discussion about civic matters between players. Much play involves civic problem-solving.

A few studies of *civic* learning with DG&S find that it can inspire more intrinsic motivation to learn compared with traditional forms of instruction (Bagley & Shaffer, 2011; Yang, 2012). However, these studies do not differentiate between effects on high- and low-achieving students, and therefore do not address the question of whether DG&S can narrow gaps in motivation.

Only a handful of studies isolate the effects of civic education with DG&S on low-performing students. In a study of 12 students in a remedial class in U.S. History, Lee and Probert (2010) found that use of the historical simulation game *Civilization III* in whole-class learning led by the teacher helped students to master basic geographical and political concepts, as well as the skill of collaborative inquiry. Squire's (2011) research found that low-achieving students, and especially low-performing males, were more motivated to learn about history from *Civilization III* than from textbooks and lecture, that the simulation game increased these students' interest in the subject, and that they were able to engage in sophisticated critical and moral thinking about historical developments, such as European imperialism. In an experimental study of a virtual reality game designed to teach geography (a core subject in U.S. social studies courses) to 127 fourth graders, Virvou, Katsionis, and Manos (2005) found the game raised players' motivation to learn compared to a control group who did not use the game, and that low-achieving students who played the game demonstrated significantly higher gains on post-play geography tests than high-achieving players, whose test scores were not affected by the game.

To summarize, compared with traditional teaching methods (lectures, textbooks, and multiple choice tests), DG&S may contribute to equitable civic education by motivating low-achieving students more effectively through active, experiential, and collaborative learning. Although a handful of small-scale studies offer glimmers of hope, there is a need for further research on whether DG&S can reduce or eliminate inequities in civic education. Only one of these studies (Virvou et al., 2005) compared the effects of play on students with different levels of academic achievement and none controlled for prior civic activity or civic media use. Most of what we know about equity and civic learning with DG&S comes from two studies of less than a hundred students who played a single game: *Civilization III*. More research is needed that tests a wider range of game and simulation designs, that includes larger samples, and that employs more systematic research designs. Our study contributes to the literature in each of these ways.

DG&S and Inequity

Despite reasons for optimism, a turn to DG&S-based civic education might also introduce new inequities or reinforce old ones. A widely cited, representative survey of Americans aged 12-17 (Lenhart et al., 2008; also analyzed in Kahne, Middaugh, & Evans, 2008) found a significant correlation between the frequency of teenagers' civic gaming experiences (such as play that elicits cooperative behavior and that focuses on social or moral issues) and players' real-world civic engagement. We draw two implications from this study. First, because interest is strongly predictive of learning outcomes (Renninger, Hidi, & Krapp, 1994; Hidi & Ainley, 2008), students who have more civic gaming experience may benefit more from civic DG&S because of their greater interest in these kinds of games or in their subjects, or because these gamers are more familiar with tacit knowledge of how to play civic DG&S (Whitton, 2013). Second, students who are more civically engaged outside of school may be more

interested in civic DG&S. For example, Neys and Jansz (2010) found that several political games and simulations inspired greatest interest in learning more about the subject among players who were already the most politically active.

In addition, DG&S-based civic instruction may favor males over females. Not only do boys often have more experience playing games, they often report greater levels of computer self-efficacy (e.g., Verhoeven, Heerwegh, & De Wit, 2010) and Internet self-efficacy (e.g., Hu, Zhang, Dai, & Zhang, 2012) than girls do. Some research finds that girls can become as motivated as boys to use particular games and genres for learning (e.g., Papastergiou, 2009). But many studies report that females find game-based learning less attractive in general than males do (e.g., Bonanno & Kommers, 2008; Hartmann & Klimmt, 2006). These gender differences may be mediated by several factors, such as experience with game play and whether games are perceived as easy to use (Bourgonjon, Valcke, Stoetaert, & Schellens, 2010). However, there are good reasons to be especially concerned about gender differences in *civic* game play. In the survey of American teens' gaming experiences, boys reported having about twice as much civic gaming experience as girls (Lenhart et al., 2008). Squire (2011) reports that girls who performed well in traditional schooling were the students who expressed greatest discomfort with his introduction of *Civilization III* into their social studies classes because these students were skeptical about whether game play was a legitimate pedagogy.

It is possible that DG&S-based civic education may advantage students who are more experienced with civic gaming or more civically active than their peers. There may be lingering inequities in males' and females' attitudes toward, and experience with, DG&S. It is important to investigate these potential unintended consequences of employing DG&S in civics classes.

Civic Dispositions

Educators aim to cultivate responsible civic engagement by developing students' political knowledge (of the structure of government and the policy-making process, for example), skills (such as public advocacy and community organizing), and dispositions (such as interest in civic life, a commitment to participate in it, and a personal identity that includes active citizenship) (Colby, Beaumont, Ehrlich, & Corngold, 2007; Gould, 2011; National Council for the Social Studies, 2010). Educators and scholars are paying increasing attention to the contribution of civic dispositions to active participation. For example, in introducing its national curriculum standards, the National Council for the Social Studies (2010, ¶ 18) asserts:

The civic mission of social studies requires more than the acquisition of content. Since social studies has as its primary goal the development of a democratic citizenry, the experiences students have in their social studies classrooms should enable learners to engage in civic discourse and problem-solving, and to take informed civic action.

We inquire into the effects of DG&S play on several dispositions: interest in politics, news, and global issues, and norms of justice-oriented citizenship.

Interest in politics is an especially important precursor for acquiring and retaining political knowledge, as well as participating in politics (Colby et al., 2007; Delli Carpini & Keeter, 1996). Late adolescence is a critical stage of life, in which people form knowledge bases on which they build their later understanding of public life (Jennings, 1996). Arguments for the value of DG&S in education often center on their ability to increase student interest; as a recent review of the literature observes, motivation “has driven much of the interest in instructional game research” (Wilson, et al., 2009, p. 221).

Interest in following public affairs news has long been considered another important aspect of civic engagement (e.g., Putnam, 2000). Consumption of public affairs journalism in print, television, and the Internet correlates strongly with many aspects of local and national civic engagement, including interest in, knowledge of, and participation in politics (Romer, Jamieson, & Pasek, 2009; Shah, 1998; Shah, Cho, Eveland, & Kwak, 2005).

Many civic educators call for preparing youth for global citizenship in an age of greater economic, political, and social interdependence of nations, increased migration, and rising significance of supra-national institutions (Cogan, 2000; Schattle, 2008). Major statements of educational standards now include cultivating students' attention to global issues (Gould, 2011; National Council for the Social Studies, 2010).

Civic education also seeks to develop students' citizenship norms. In an influential review of the field, Westheimer and Kahne (2004) distinguished three major norms of citizenship that have been taught in schools. These include the traditional norm of personal responsibility (emphasizing patriotism and obedience to laws), a mainstream norm of participatory citizenship (focused on voting and joining voluntary organizations), and a critical norm of justice-oriented citizenship (which involves reflecting on the fairness of social, political, and economic arrangements and taking action to transform them in the interest of justice). Justice-oriented citizenship is the most complex of these norms because it requires greater reflection on what is best for oneself and society, including questioning existing socio-political structures and practices, rather than simply accepting them. This approach is also most likely to encompass universal concerns of global citizenship, which extend beyond the borders of one's own country to take into account issues of fairness, justice, and rights around the world.

Advocates of DG&S argue that games can inspire the kind of systemic and critical thinking about civic life that characterizes justice-oriented citizenship. This is because DG&S challenge students to enact civic characters, explore multiple policy options, see the consequences of their choices for societies in the game, and, perhaps most importantly, reflect on how the game models social reality in debriefing sessions with teachers and peers (Jenkins, 2006; Squire, 2011). While many DG&S invite the exercise of citizenship practices that are locally or nationally oriented (e.g., working for a candidate on a campaign), the simulation game used in this study asks the players to experience life in other countries with diverse governments, and different citizens' rights and responsibilities.

DG&S's potential effects on these civic dispositions are also important to study because they are unequally distributed in the population. Interest in civic life is one of the main preconditions for participation and an important dimension of the "civic achievement gap" between more and less privileged students (Levinson, 2007, p. 9). Lower-income and lower-achieving students often voice less interest and intention to take part in politics. Similarly, these students are less likely to follow national and global political news regularly (Gould, 2011, p. 19). As noted, these students are also less likely to be offered the kind of engaging civic teaching methods that might best develop a systemic, critical, and active approach to citizenship. If playing well-designed DG&S can reduce these disparities that would make a valuable contribution to civic education.

Research Questions

Given the nascent state of the research on DG&S-based civic education and equity, our study is exploratory and therefore poses research questions. Our primary focus is on whether students benefit equitably from the game. It is also important to know whether equity is obtained

at the price of reduced benefits for other students because civic educators do not want to achieve equity by making students who are more interested and reflective less so (Kahne & Sporte, 2008). Instead, the goals are for all students to gain from DG&S play *and* for the least engaged to catch up with the most engaged, promoting both equity and excellence. The civic outcomes we compare include political interest, interest in news topics relevant to the game, interest in global issues, and orientation to justice-oriented citizenship. We ask how game play affects these civic outcomes for students with varying levels of academic performance (RQ1), civic engagement (RQ2), civic gaming experience (RQ3), as well as male and female students (RQ4).

Methodology

Participants

Our data come from a quasi-experiment carried out in 12 9th and 10th grade classes taught by four different teachers in three Northern California high schools. These were classes on Geography (two 9th grade), World History (seven 10th grade), and Advanced Placement World History (three 10th grade). Classes within each school were randomly assigned to a treatment condition (playing *Real Lives*) or a control condition (described below). While 323 students participated in this study, the analyses presented here are based on 301 students (158 female, 141 male, 2 non-identified) who completed surveys from all three waves of data collection. A total of 120 students were in the control classrooms (67 female, 51 male, 2 non-identified) and 181 in the treatment classrooms (91 female, 90 male). Of the latter, 51 students were assigned to play *Real Lives* alone and 130 to play in pairs, which are both common conditions for playing DG&S (Lenhart et al., 2008). All students received class participation credit, including students who did not agree to participate in the study or who did not obtain parental consent (comprising 6 percent

of all students in classes recruited for the study), in keeping with human subjects requirements to avoid penalizing non-participants.

Real Lives Simulation Game

The treatment group played *Real Lives* (Educational Simulations Corporation, 2010), which gives students the opportunity to experience vicariously what it would be like to be born and live in a different country. To advance in the simulation game, students click a button to age their characters one year at a time. In most of these transitions, students learn the consequences of their choices at prior ages and are confronted with new decisions to make, as well as relevant information about the surrounding social conditions (see Figure 1). Information about the character's current status and life history is displayed within the "Self" tab, while the "Country" tab presents summary statistics about the character's country of birth. Players can make life choices for their characters using the "Actions" tab. The evolution of the character's happiness, health, wealth, and other characteristics over his or her lifetime is tracked in the "Stats" tab. As in real life, players have greater control over their characters' choices as they age. Like many DG&S, *Real Lives* does not assign a single goal to players—they may choose to maximize their wealth, love, morality, happiness, or other attributes, or to achieve a balance among them.

[Figure 1 around here]

We chose *Real Lives* for several reasons. First, the simulation game introduces the kinds of knowledge students often encounter in civics courses such as social studies and world history. In the 40-60 minutes it might take to "live a life," players encounter information about a country's child rearing practices, education system, economic and political conditions, and so on. Real-world data shape the probabilities for events that may occur in a character's life.

Background information on the country's economy, history, culture, and politics is presented through short texts and via links to websites.

Second, we chose *Real Lives* because prior research suggests that it offers the advantages of DG&S-based learning discussed above, including the ability for players to make decisions and receive clear feedback on the consequences, experience multiple perspectives by playing different lives, and engage in critical reasoning about one's choices. *Real Lives* has been found to develop character identification and empathy among U.S. high school players (Bachen, Hernández-Ramos, & Raphael, 2012). In a study of middle school students in Australia, the U.S., and Switzerland, Struppert (2010) found positive impacts on students' learning of intercultural competence, as well as on their perceptions of learning as enjoyable and engaging. Her analyses, however, did not address potential differences by gender or levels of academic performance, prior gaming experience, or interest in civic issues.

Third, *Real Lives* was chosen because it is of a similar genre as some of the most widely used DG&S in American schools. *Real Lives* is a simulation game, which includes the characteristics of a simulation, yet incorporates a few elements of a game (Warren, Jones, Dolliver, & Stein, 2012, p. 10). Like other educational simulations, *Real Lives* models a reality (life within the socio-economic systems of different countries) and poses authentic tasks (making choices for oneself as an individual, worker, and citizen). As in many games, the player's decision-making is shaped by conflicts, in this case over whether to maximize one's wealth, health, civic engagement, or other goals, not all of which can be pursued equally effectively. There is no single win or loss outcome because the player can choose to define a "good life" by many criteria, but players' decisions affect their longevity, so they can lose the opportunity to exercise the full range of choices that become available as characters age.

As a simulation game, *Real Lives* shares characteristics with some of the most widely used and studied DG&S, such as the *Civilization* series, which models the historical impacts of geography, technology, trade and other factors on societies, yet allows players to set their own goals for their societies. However, in *Real Lives* players experience social structures from the perspectives of individuals and citizens within society, rather than from the point of view of leaders who manage a society from above.

Procedure

Students in both the treatment and control conditions worked either in their classrooms or the school's computer lab. Two researchers and the teacher were available in each period to address any student questions.

Participants in the treatment condition played *Real Lives* three times in 55-minute periods. This is a medium level of engagement with a game, between the brief one-shot games that students play in a single class period and the weeks of extensive play required to complete complex games such as *Civilization*. In the first class, the researchers demonstrated how to play and students practiced by creating a character from the United States. On the second and third days, students played a character from a list of countries chosen by the teacher to correspond with their unit of study, varying the country and the character's gender each day. Given the focus of our study and the students' courses, students were directed to select "Social and Political Activities" any time the simulation game allowed them to choose their characters' leisure activities. The majority of students were able to complete a character's entire life in a single class period.

We included a control group that engaged in another computer-based lesson to disentangle the effects of DG&S play from other kinds of computer-assisted instruction. This

also controlled for potential differences in students' levels of confidence in using computers (Verhoeven et al., 2010) and for the potential novelty effect of using computers in the classroom, in which the initial excitement of using technology in class increases student motivation (Annetta, Minogue, Holmes, & Cheng, 2009).

The control group engaged in a non-game assignment that involved choosing a country from the same set of countries available to the treatment group, then working in pairs over the same three-day period to gather data from the Internet and create a PowerPoint presentation on their country's key indicators, such as birth rate, life expectancy, political system, geographical features, literacy levels, and communication systems. Thus, as in the simulation game play condition, students in the control group worked independently with computers and the Internet to complete a project on similar countries in the same amount of time.

Data Collection and Debriefing

We administered three surveys: a pre-test about one week before the class activity; a post-test the day after the class activity; and a follow-up survey about three weeks later, which tested for more enduring changes in student attitudes. The first two surveys took about 20 minutes each to complete, while the follow-up took about 10 minutes. Students completed the surveys in class with the teacher and two researchers present.

On the day after students completed the treatment or control activity and before completing the post-test survey, researchers returned to the classroom to lead a brief discussion with the teacher and all students about their learning experiences. Researchers asked students to draw conclusions about factors that influenced social and economic well-being in the countries studied, and to comment on what information or experiences during the treatment or control activity had made an impact on them and why. The aim was to help students connect their

DG&S and control group activities with other knowledge in the course and their own experiences (as recommended by Barizlai & Blau, 2014; Peters & Vissers, 2004).

Measures

Independent variables

The measures of prior civic activity and civic gaming experiences were based on Lenhart et al. (2008). Level of civic activity included nine items measured on a nominal scale (yes/no), with a range from 0 to 9 (Cronbach's alpha = .61). These items asked about whether students had engaged in service activities (such as volunteering in their community or school or trying to help people in another country) as well as in traditional political activities (such as trying to influence others' votes, or protesting). The results for civic activity were recoded into two levels, low and high, using a median split in which "low" referred to having engaged in three or fewer activities and "high" referred to having participated in four or more activities.

Frequency of prior civic gaming experiences was measured by seven items employing a three-point frequency scale (often, sometimes, never) with a range from 7 to 21 (Cronbach's alpha = .75). Example questions asked how often students engaged in DG&S play that involved actions such as helping or guiding other players; organizing game groups or guilds; or learning about social problems. These results were recoded into two levels, low and high, with low indicating "never" or only "sometimes" civic gaming experiences (a score of 12 or lower) and high indicating more frequent experiences of this kind (a score of 13 to 21).

The measure of academic performance—self-reported GPA—was based on a six-point scale ranging from 3.5 - 4.0 to below 1.5 and then recoded into two levels, low (3.0 or below) and high (greater than 3.0).

We also included two variables to measure prior exposure to news and informational sources. Frequency of exposure to news media was measured using one variable on a five-point scale ranging from “never” to “every day,” which we recoded into two levels, with low representing “about once a week or less” and high including “several times a week” or “every day.” We also measured students’ agreement or disagreement with two statements about frequency of exposure to media with international content – each time on a six-point scale, recoded into a single variable then split into low = 2 to 7 (indicating mostly disagreement) and high = 8 to 12 (indicating mostly agreement). Such prior exposure represents another form of academic preparedness and could predispose students to engage differently with the simulation game content or control activity.

Dependent variables

All four civic outcomes were measured through indices. Two were constructed from measures given at both pre-test and post-test.

Political interest, following Lenhart et al. (2008) consisted of three items (e.g., “I am interested in political issues”) measured on a six-point Likert scale ranging from “Disagree Strongly” to “Agree Strongly,” with values ranging from 3 to 18 (Cronbach’s alpha = .87 at pre-test and .89 at post-test).

Responses to four post-test items were combined to measure interest in global issues, collected at post-test only, with values on the same Likert scale ranging from 4 to 24 (Cronbach’s alpha = .86). These questions included whether students find it interesting to see statistics about what things are like in other countries and whether they would like to learn more about people’s lives in other countries.

Justice-oriented citizenship was measured through five items (e.g., the importance of challenging unequal conditions in society, understanding the root causes of problems, or questioning whether laws are fair) using the same six-point scale, with values ranging from 5 to 30 (Cronbach's alpha = .78 at pre-test and .85 at post-test).

The follow-up survey, three weeks after simulation game play, measured whether students were interested in relevant news topics about the countries they had studied, utilizing a new set of measures that would allow us to test the persistence and generalizability of their interest. Students were presented with a set of hypothetical news story topics, half that involved the countries students had studied and half that concerned domestic or other unrelated international issues. Participants were asked to indicate how curious they were about each article on a scale of 1 to 5. From these items an index was created measuring interest in five "study-relevant news topics," with values ranging between 5 and 25 (Cronbach's alpha = .67).

To facilitate interpretation of results, all indices were normalized using Z-scores.

Results

Because there were no significant differences on any of the dependent variables in this study between students who played the simulation alone versus in pairs, we combined all players into a single treatment group. In all analyses we included classroom as a clustering factor.

Each of the research questions was tested using OLS regression with robust standard errors to correct for the fact that randomization occurred at the classroom rather than individual level. Two of the dependent variables—political interest and justice-oriented citizenship—had pre-test measures that were included in the analyses. Each analysis paid particular attention to whether significant effects occurred for students of different groups according to experimental

condition. If game play especially promotes civic orientations in higher or lower performing students, for example, we would see this through an interaction effect.

RQ1: How does game play affect civic outcomes for students of varying levels of academic performance?

To answer RQ1, we first examined the relationship between experimental condition and academic performance for the four outcome variables. Post-test scores for political interest were regressed against treatment condition, GPA, and pre-test interest scores. The pre-test interest score was significant ($t = 15.59, p = .000$), but in addition, a significant two-way interaction was found between academic performance and treatment condition for political interest ($t = 2.83, p = .017$). The lower academically performing players had the highest levels of post-test political interest. An examination of the difference scores (T2-T1) further illustrates the nature of the interaction (see Figure 2). Pairwise comparisons of the difference scores revealed that lower academically performing players had significantly greater gains in political interest ($z = .355$) compared to the higher academically performing players ($z = -.102$) ($p = .003$), the higher academically performing controls ($z = -.113$) ($p = .001$), and low GPA controls ($z = -.217$) ($p = .011$).

Insert Figure 2 about here

The interaction between treatment condition and GPA was also a marginally significant predictor for interest in relevant news topics (measured three weeks after the treatment) ($t = 1.92, p = .082$), revealing a pattern similar to the findings obtained for political interest. Lower GPA students who played the simulation had significantly higher levels of interest in relevant news topics ($z = .253$), when compared to lower GPA control students ($z = -.558$ for lower academic performing control) ($p = .018$).

The regression analysis of post-test justice-oriented citizenship including treatment condition, GPA, and the pre-test measure as predictors showed two nearly significant findings: one for treatment condition, in which players had higher levels of justice-oriented citizenship than controls ($t = 1.79, p = .100$), and the second for GPA, in which the higher academically performing students had stronger justice-oriented citizenship orientations than the control students ($t = -2.00, p = .071$). The pre-test measure of justice-oriented citizenship was a significant predictor ($B = .668, t = 18.24, p = .000$).

Finally, there was a marginal effect of treatment condition for interest in global issues, with players demonstrating more interest than those in the control group ($t = 1.79, p = .101$).

The ability of the simulation game to stimulate political interest among students with lower academic performance was reinforced when we examined not only the effects of GPA, but whether students had frequent prior exposure to the news. For gains in political interest, in addition to a significant two-way interaction ($B = 1.001, t = 3.26, p = .008$) showing the same effect as noted in the previous analysis, there was a significant three-way interaction ($B = -1.128, t = -2.35, p = .039$) between treatment condition, GPA, and news exposure. Pairwise comparisons showed that the students who played the simulation, who had a lower GPA, *and* who had infrequent exposure to news showed significantly greater gains ($z = .545$) than all other comparison groups (see Table 1 and Figure 3).

Insert Table 1 and Figure 3 about here.

A similar pattern emerged when we examined students' exposure to international media content along with treatment condition and GPA. However, in this case, while the two-way interaction between treatment condition and GPA was significant ($B = 1.094, t = 2.43, p = .033$), the three-way interaction was marginally significant ($B = -1.210, t = -1.96, p = .076$). Once again,

the greatest gains of all were for the lower performing, low exposure players ($z = .794$) (see Table 2). Prior exposure to international media content ($B = -.371, t = -2.65, p = .023$) was also a significant positive predictor of gains in political interest with students with lowest exposure making the greatest gains.

Insert Table 2 about here

For justice-oriented citizenship, when frequency of news exposure was included along with GPA in the regression predicting gains, treatment condition emerged as a significant predictor with the players showing greater gains than non-players across all GPA groups ($B = .424, t = 2.32, p = .04$). There were no significant predictors of gains in justice-oriented citizenship when exposure to international media was included in the regression.

Frequency of news exposure was a significant positive predictor for both interest in global issues ($B = .463, t = 2.34, p = .039$) and interest in relevant news topics ($B = .530, t = 3.71, p = .003$). Similarly, frequency of exposure to international media content was a significant predictor of interest in global issues ($B = .791, t = 3.85, p = .003$) and interest in relevant news topics ($B = .696, t = 5.08, p = .000$). In both cases, students who were more exposed to international media content showed higher levels of interest, regardless of treatment condition or level of academic performance.

Across these analyses, we see several effects of playing the simulation game on lower academically performing students. Players with lower GPAs and with limited exposure to news or international media content consistently gain more political interest than students in the control condition. Additionally, players with lower GPAs also demonstrated nearly statistically significant higher levels of interest in relevant news topics (a measure taken three weeks after the study intervention) compared to the lower GPA controls. The effects of simulation game play on

its own were also manifest for players of all academic backgrounds: those who played were more strongly oriented to justice-oriented citizenship compared to the students in the control group and the same trend was seen for interest in global issues.

RQ2: How does game play affect civic outcomes of students with varying levels of civic activity?

Did prior civic activity affect outcomes for students who played *Real Lives* versus those who participated in the control activity? Because level of civic activity was positively associated with GPA ($r = .284, p = .000$), we included GPA as an additional variable in analyzing the effect of treatment condition and civic activity on our dependent variables.

Findings showed prior civic activity did not have an effect in conjunction with game play or the control activity, although it did help predict all civic outcomes. In the case of political interest, there was an interaction between academic performance and civic activity ($B = .533, t = 3.31, p = .007$), where the lower GPA, more civically active students showed the highest levels of post-test political interest compared to all other groups. In addition, those with lower GPAs showed higher levels of interest than their counterparts ($B = -.479, t = -3.69, p = .004$). There was also an interaction between treatment condition and academic performance, as previously seen ($B = .644, t = 3.63, p = .004$). Civic activity was a marginally significant predictor of justice-oriented citizenship ($B = .302, t = 2.16, p = .054$), with those higher in civic activity expressing higher levels of post-test justice-oriented citizenship. Civic activity also predicted interest in relevant news topics ($B = .526, t = 4.46, p = .001$). Finally, civic activity was also a significant positive predictor for interest in global issues ($B = .785, t = 3.25, p = .008$), along with treatment condition, with players demonstrating greater interest in learning more about global issues compared with control group members ($B = .653, t = 2.74, p = .019$).

RQ3: How does game play affect the civic outcomes of students with varying levels of civic gaming experience?

Similar to Kahne et al. (2008), we found a significant association between civic gaming experience and gender ($r = .350, p = .000$). Therefore, we included both variables in the analysis of RQ3 and RQ4.

Civic gaming experience was a significant predictor of political interest ($t = -3.18, p = .009$), but the interaction between treatment condition and civic gaming experience was also a significant predictor ($B = .504, t = 3.97, p = .002$). Players with more civic gaming experience were higher in political interest ($z = .165$) compared with players with less gaming experience ($z = .001$) as well as both control groups (more civic gaming- control: $z = -.172$; less civic gaming- control: $z = .016$). Pairwise comparisons revealed that differences were significant between high and low gaming players ($t = 3.63, p = .024$) and between high gaming players and high gaming controls ($t = 4.25, p = .008$).

Civic gaming experience was a marginally significant predictor of justice-oriented citizenship ($B = -.271, t = -2.05, p = .065$). Students with *lower* gaming experience showed higher levels of justice-oriented citizenship compared to those with more civic gaming experience ($z = .084$ versus $z = -.063$). It is interesting to note that pre-test scores on justice-oriented citizenship were higher for the students with more civic gaming experience ($z = .294$) than those with less civic gaming experience ($z = -.110$), but the gains of the less frequent players were much greater across both treatment conditions.

Civic gaming experience was not a significant predictor of interest in global issues or interest in relevant news topics, nor did it interact with the treatment condition.

In sum, political interest was the principal outcome influenced by the interaction between civic gaming experience and treatment condition, showing that greater prior gaming experiences led to more political interest for simulation players.

RQ4: How does game play affect the civic outcomes of male versus female students?

Only one gender difference emerged across the four civic outcome variables and it was not influenced by treatment condition. Gender was a significant predictor of political interest with boys showing greater interest than girls ($t = -2.52$, $p = .028$).

Discussion

The unequal distribution of civic learning opportunities and outcomes in many schools suggests that academically and civically rich students benefit most, while low-performing and low-engaged students remain comparatively civically poor. Indeed, our results confirmed that students with higher GPAs and those with greater exposure to relevant news or information sources were initially more interested in politics, more inclined toward justice-oriented citizenship, and more civically active. However, this study indicates that a DG&S intervention can increase interest among students who are less academically prepared without dampening other students' interest. The game especially inspired political interest among students who were lower performing academically and less likely to attend to general news or international media, even though *Real Lives* requires reading more text than a typical commercial entertainment game does. These findings support the handful of previous studies that have found simulation games can usefully supplement other teaching methods for lower-achieving and less civically engaged students (Lee & Probert, 2010; Squire, 2011; Virvou et al., 2005). Our results extend prior research by finding that these students' civic interests can be stimulated by playing a life simulation game rather than a game that models management of society from above.

In regard to concerns that game-based education may introduce new inequities, our study supports all-too-rare findings that boys and girls can benefit equally from simulation game play (e.g., Papastergiou, 2009). This is seen by the notable *absence* of gender differences connected to treatment condition in the study. While the males in our study had more experience with civic game play, playing *Real Lives* did not directly advantage them on any outcome variables.

Some have argued that the pursuit of educational equity for all students sacrifices educational excellence for the highest achievers by “dumbing down” the curriculum (e.g., Argys, Rees, & Brewer, 1996). However, our analyses showed that *Real Lives* benefited both low and high achievers in two civic outcomes: justice-oriented citizenship (with GPA and frequency of news exposure factored in) and interest in global issues (with GPA and prior civic activity included in the regression).

Our study also confirms the importance of prior civic experiences for explaining civic outcomes. More civically active participants showed higher interest in politics, global issues, and news than less active students showed; these findings echo Neys and Jansz’s (2010) study of political DG&S players.

The informational assets students bring to a learning experience are also important. Both levels of exposure to news and to international media positively affected levels of interest in global issues and relevant news topics, and exposure to media with international content predicted political interest. While these measures focused on non-gaming sources of information, it is important to note that civic games themselves can be an effective source of information about news and international topics. *Real Lives*, for example, also includes links to relevant websites that were sources of information or allow users to dig deeper. In this way, games might help close these informational gaps.

Our results suggest that civic gaming experience can be an asset when DG&S are used in the civics curriculum. As Jenkins (2006) has speculated, this may be because experienced civic players are more practiced at using games to explore social and ethical issues, make decisions about how a polity should function, and learn collaboratively. Despite this advantage, we found some gaps can be narrowed. While the overall level of justice-oriented citizenship was higher for students with more gaming experience at pre-test, the greatest *gains* were made by those with less gaming experience—albeit, across both conditions. This suggests that well-designed simulation games could help students to work through the kinds of questions that typify justice-oriented citizenship, such as how to address systemic inequality and the root causes of social problems.

Our findings suggest that the life simulation genre could be effective at boosting interest among females (who have less civic gaming experience than males) and lower performing students. In many DG&S, such as *SimCity*, *Civilization*, and various geopolitical strategy games, players manage a city, country, or civilization as a top-down ruler in an urban, national, or global system. Many of these games and simulations cultivate a *realpolitik* mindset, in which politics is presented as the application of power through war, diplomacy, bargaining, or campaigning in pursuit of material rewards and prestige, rather than developing a more just politics that better meets human needs. In *Real Lives*, players experience their country from the bottom-up, as citizens, seeing things from the perspective of their individual lifeworlds, families, and communities.

This ground-level biographical perspective on civic life may be more appealing for many female players. Women are often socialized to be more interested in, knowledgeable about, and active in local issues than in national or international affairs (Coffé, 2013; Delli Carpini &

Keeter, 1996). Scholars such as Coffé (2013) attribute these differences in part to social pressures on women to support families and communities, which may explain women's greater interest in issues such as education and social services, and affinity for taking local and personal actions where the public realm most clearly touches the private sphere. In addition, the biographical perspective may provide a more effective pathway to building interest in global issues because it allows female players to take local actions as individual characters in distant lands. These hypotheses are ripe for further research.

The biographical approach may also be more effective at engaging lower-academic achievers. This less-empowered point of view may allow educationally disadvantaged youth to see playing civic DG&S as more relevant to their civic lives outside the game. The more that DG&S offer players unlimited power to control society, the farther the world of a game or simulation may seem from disadvantaged youths' actual experience of public life and political leaders. Lower-income youth in the U.S. are less likely to believe that they have personal efficacy (the ability to influence government), and express less political trust (in government) and social trust (in other citizens), compared with their higher-income counterparts (Levinson, 2007). Robert Putnam observes that, "In virtually all societies 'have-nots' are less trusting than 'haves,' probably because haves are treated by others with more honesty and respect" (2000, p. 138). Playing a simulation game from the perspective of a potentially omnipotent ruler may be more likely to appear to disadvantaged students as a fantasy that allows them to *escape* from their disempowered situation in the world, rather than fostering their interest in reflecting on and applying their power in more realistic ways that are available to them in public life outside the simulation or game, such as participating in demonstrations, boycotting, and so on.

The life simulation genre may be especially effective at engaging students in global issues by fostering identification with one's character and empathy for other characters. Bachen et al. (2012) found that *Real Lives* was successful at developing empathy in players and that character identification was strongly correlated with empathy. Other studies of simulations, including Struppert's (2010) research on *Real Lives*, find that developing empathy increases students' enjoyment of DG&S (Egenfeldt-Nielsen, 2007). The role of these psychological processes in stimulating interest in learning merits further research.

Some caution is needed when attempting to generalize these findings. This study was conducted in three schools that were not chosen at random, but rather were selected based on the voluntary participation of the four teachers and the students in their 12 classrooms. Future researchers should consider the feasibility of random selection of a variety of schools, of classrooms within schools, and random assignment of students within classrooms to the treatment or control condition. It is important to examine how factors such as the school environment, the teacher, and topic of the course can interact with or complement game-based learning. Other factors that can deepen our understanding of how students respond to civic DG&S, such the socio-economic and ethnic backgrounds of students, should also be considered.

Future research that directly contrasts the effects of playing bottom-up and top-down DG&S on equity is important, especially to test the hypothesis that a biographical perspective could be more effective than a top-down point of view at cultivating real-world civic and political interests among girls and low-achieving students. This research could also disentangle the effects of different aspects of these two perspectives, including playing as a citizen or civic leader, experiencing the consequences of one's decisions for one's personal life versus one's

career, an interface that foregrounds biographical rather than collective information, and that emphasizes local rather than national or global forces.

Our findings cannot distinguish the effects of taking the bottom-up biographical approach to learning about civic life in other countries from the use of a digital simulation game because our control activity did not involve a grassroots, life-simulation approach. Learning from the perspective of an individual biography might be equally successful without being dramatized in DG&S. However, this limitation would be a greater concern in a study of whether games can teach better than other methods, rather than the current study, which focuses on whether students can learn equitably from games, and employed a control group only to determine whether equitable game-based learning was *less* effective than a traditional computer-based research project. Future research could test the biographical approach in DG&S and in other media.

While interest is an important precursor to learning and civic learning predicts civic participation, future research on equity should also directly test the effects of DG&S on civic knowledge, skills, and participation, which we could not do in this study. Longitudinal studies of DG&S play, with more than one game or simulation, and its relationship to civic participation would be especially helpful. Brief periods of game play, such as the three sessions used in this study, may be enough to increase interest in civic issues but not to develop more sophisticated political norms. It is important to consider the type of DG&S play that can support complex civic learning goals, such as developing justice-oriented citizenship. It may be that longer immersion in a more complex game than *Real Lives*, or embedding the game in a curriculum focused more fully on questions of justice, could further enhance the kind of political sophistication typical of justice-oriented citizens.

However, the fact that civic DG&S play boosted some civic orientations after just three class meetings, even though much of the content of the simulation game focused on other aspects of life, suggests the potential of simulation games like *Real Lives* for increasing interest in civic learning. This resonates with the recent recommendation by the Commission on Youth Voting and Civic Knowledge (CIRCLE, 2013) for educators and civic leaders to improve how civics are taught in schools by implementing multi-player simulations and games as tools for civic education. While further research that looks at a broader range of outcomes is still needed, incorporating life simulation games such as *Real Lives* into instruction might allow females and underperforming students to engage with civic learning in a way that gives them a better chance to be more engaged and active citizens in society.

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TABLE 1. Descriptive Data and Significant Pairwise Comparison Results on Treatment Condition, Academic Performance (GPA), and News Media Exposure as Predictors of Political Interest

Linear combinations of predictors: Treatment condition × GPA × news media exposure				
	B	SE		
(1) Play × low GPA × low exp.	.545	.120		
(2) Play × low GPA × high exp.	-.025	.157		
(3) Play × high GPA × low exp.	-.101	.118		
(4) Play × high GPA × high exp.	-.010	.092		
(5) Control × high GPA × low exp.	.075	.170		
(6) Control × high GPA × high exp.	-.275	.088		
(7) Control × low GPA × low exp.	-.280	.111		
(8) Control × low GPA × high exp.	-.073	.455		
Pairwise Comparisons	Contrast	SE	t	p
1 vs. 2	-.570	.259	-2.20	.050
1 vs. 3	.646	.179	3.61	.004
1 vs. 4	.644	.151	4.26	.001
1 vs. 5	.470	.208	2.26	.045
1 vs. 6	.820	.149	5.52	.000
1 vs. 7	.825	.163	5.06	.000

Notes. Dependent variable is the standardized difference score (T2 – T1) in political interest. Predictor variables are treatment condition (play/control), academic performance (GPA under 3 = low/GPA over 3 = high), news media exposure (low/high). Post-estimations followed OLS with robust standard errors adjusted for 12 clusters by classroom. Regression statistics: $N = 247$, $F(7,11) = 15.15$, $p = .0001$, $R^2 = .0650$.

TABLE 2. Descriptive Data and Significant Pairwise Comparison Results on Treatment Condition, Academic Performance (GPA), and Exposure to International Media Content as Predictors of Political Interest

Linear combinations of predictors:				
Treatment condition × GPA × exposure to international media content	B	SE		
(1) Play × low GPA × low exp.	.794	.317		
(2) Play × low GPA × high exp.	-.250	.188		
(3) Play × high GPA × low exp.	-.007	.127		
(4) Play × high GPA × high exp.	-.216	.090		
(5) Control × high GPA × low exp.	.075	.115		
(6) Control × high GPA × high exp.	-.296	.028		
(7) Control × low GPA × low exp.	-.219	.222		
(8) Control × low GPA × high exp.	-.214	.089		
Pairwise comparisons	Contrast	SE	t	p
1 vs. 2	-1.044	.460	-2.27	.044
1 vs. 3	.801	.312	2.57	.026
1 vs. 4	1.011	.262	3.86	.003
1 vs. 5	.719	.337	2.13	.056
1 vs. 6	1.090	.318	3.43	.006
1 vs. 7	1.013	.387	2.62	.024
3 vs. 6	.289	.130	2.22	.048
5 vs. 6	-.371	.140	-2.65	.023

Notes. Dependent variable is the standardized difference score (T2 – T1) in political interest. Predictor variables are treatment condition (play/control), academic performance (GPA under 3 = low/GPA over 3 = high), and exposure to international media content (low/high). Post-estimations followed OLS with robust standard errors adjusted for 12 clusters by classroom. Regression statistics: $N = 249$, $F(7,11) = 9.28$, $p = .0007$, $R^2 = .1201$.

Figure 1. Screenshot showing an event in the character's life at age 39.

The screenshot displays the 'real lives' simulation interface. At the top left, the character's profile is shown: **real lives 2010**, **File Help**, **Abel Aguilar**, **Male**, **Age: 39**, **Ahuachapán**, **Ahuachapán**, **El Salvador**. Below the profile is a bar chart of attributes:

Attribute	Value
Health	57
Resistance	58
Happiness	68
Intelligence	52
Artistic	43
Musical	32
Athletic	40
Strength	34
Endurance	44
Conscience	97
Wisdom	52
Religion	Roman Catholic
Language	Spanish

The central part of the screen features a world map with a notification box:

real lives 0:02
 You have run afoul of the government due to your political activism and have lost your job.
 [OK] [Less info]

According to Amnesty International, El Salvador had the following human rights violations in the year 2006:
 - intimidating or jailing human rights workers
 - gross violations of women's rights
 Source: Amnesty International Annual Report 2006, www.amnestyusa.org/annualreport/

At the bottom, a circular gauge indicates **Age 39**. On the right side, there is a vertical menu with icons for **Self**, **Family**, **Actions**, **Country**, and **Stats**.

The event log on the right side of the screen contains the following entries:

- 20 years old**
Diagnosed to a disease related to identity
- My father has been cured of an illness.**
- 21 years old**
Police.
- 22 years old**
- 23 years old**
A major earthquake has hit El Salvador, 287 people have died and 47,000 others have been injured.
- My family and I were not directly affected.**
- 24 years old**
My father has a brother.
- 25 years old**
- 26 years old**
San Alejandro born.
- 27 years old**
My father has suffered an epileptic seizure.
- San Bernardo born.**
- 28 years old**
- 29 years old**
Begin work as a restaurant service worker.

Figure 2

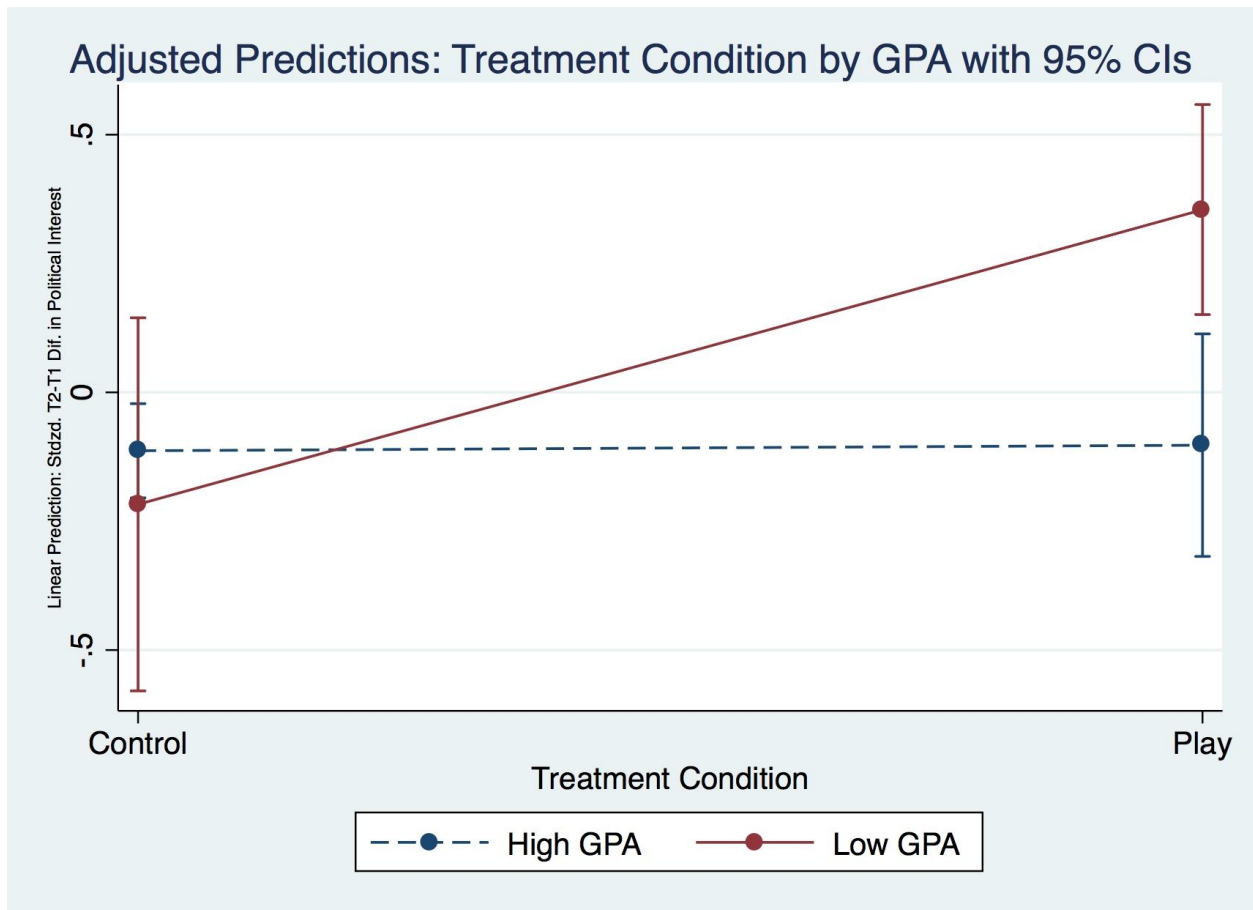


Figure 3

