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An Experimental Investigation of Autonomy Support Versus Thwart in an Exergaming Context

Amanda Joy Weathers-Meyer
Louisiana State University and Agricultural and Mechanical College

AN EXPERIMENTAL INVESTIGATION OF AUTONOMY SUPPORT VERSUS THWART IN AN EXERGAMING CONTEXT

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ABSTRACT

Considerable literature in self-determination theory (SDT) establishes satisfaction of basic psychological needs related to competence, autonomy, and relatedness as important determinants of well-being and motivation. Despite the abundance of SDT literature, few studies provide an investigation of autonomy support and autonomy thwart within an experimental design. Using SDT as a guiding framework, the effects of autonomy support (AS) versus autonomy thwart (AT) were examined within an exergaming context. Specifically, this study examined the impact of autonomy support / thwart on five variables: perceived autonomy need satisfaction and autonomy thwart, affect, game performance, and willingness to recommend the study to others. Students ($N = 75$) aged 18 to 25 years participated in lab sessions assessing study variables. One-way and factorial ANOVAs revealed that (a) participants in the AS condition reported higher levels of autonomy support and lower levels of autonomy thwart than the control and AT condition, (b) students in the AT group reported higher levels of autonomy thwart and lower levels of autonomy support than the control or AS condition, (c) AT students indicated greater negative affect from baseline to post-test compared to the AS and control participants, and (d) AS and control participants reported an increase in positive affect while the AT group demonstrated a slight decline in positive affect that was not significant. Results align with previous SDT research regarding social-contextual environments. Furthermore, findings suggest that leaders within a learning environment should consider pedagogical choices and contextual manipulations that elicit AS in order to promote optimal functioning from the subjects in their care.

INTRODUCTION

Self-determination theory (SDT; Deci & Ryan, 1985, 1991, 2000) provides a comprehensive framework that delineates the cultivation of self-motivation and eudaimonic well-being (Deci & Ryan, 2002). Ryan and Deci (2007) consider autonomous forms of motivation (i.e., self-determined) to be the basis of SDT's theoretical underpinnings, with the basic psychological needs of competence, autonomy, and relatedness operating as necessary antecedents to self-determination. The maintenance and enhancement of intrinsic motivation, considered the highest quality form of motivation in SDT, relates to multiple positive effects, including feelings of interest, enjoyment, competence, and self-determination (Deci & Ryan, 1985). Self-determination also serves as an important basis of intrinsic motivation (Zuckerman, Porac, Lathin, Smith, & Deci, 1978), therefore a fundamental agenda of SDT is to examine the conditions that elicit and nourish self-determined behavior (Ryan & Deci, 2000a). In order to facilitate autonomous motivation (e.g. intrinsic motivation) satisfaction of needs must occur (Ryan & Deci, 2002; Vlachopoulos, Ntoumanis, & Smith, 2010). Deci and Ryan (2000) operationalize basic psychological needs as:

> …fundamental needs: (a) to engage optimal challenges and experience mastery of effectance in the physical and social worlds [competence]; (b) to seek attachments and experience feelings of security, belongingness, and intimacy with others [relatedness]; and (c) to self-organize and regulate one's own behavior [autonomy]….These three basic psychological needs serve, under appropriate conditions to guide people toward more competent, vital, and socially integrated forms of behavior (pp. 252).

While satisfaction of basic psychological needs fosters optimal motivational function (Ryan & Deci, 2007), an inverse relationship exists when basic psychological needs are undermined in a process known as thwarting of needs. Need thwarting entails an active hindrance to need satisfaction that extends beyond mere depleted levels or the absence of need satisfaction (Bartholomew, Ntoumanis, Ryan & Thøgersen-Ntoumani, 2011; Bartholomew,

Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Gunnell, Crocker, Wilson, Mack, & Zumbo, 2013). Thwarting of needs results in multifarious aspects of ill-being that span the gamut of deleterious indices including: disordered eating, burnout, negative affect (Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011), and exhaustion (Bartholomew, Ntoumanis, Ryan, et al., 2011).

The Social-Contextual Environment

The mechanisms to support or thwart need satisfaction relate to social-contextual conditions. According to Ryan and Deci (2000a) social environments can facilitate or inhibit intrinsic motivation by either nourishing or diminishing competence, autonomy, and relatedness. In SDT social environments permitting satisfaction of the three basic psychological needs are predicted to support healthy functioning (Deci & Ryan, 2002) and self-regulation (Deci, Ryan, & Williams, 1996), operationalized as a range of outcomes including intrinsic motivation (Sheldon & Filak, 2008), mindfulness (Chang, Huang, & Lin, 2014), and well-being (Deci & Ryan, 2000).

Conversely, social environments that limit autonomy via surveillance, pressured evaluations, directives, and imposed goals work to diminish self-determination and undermine intrinsic motivation (Deci & Ryan, 1987; Deci, Ryan, & Williams, 1996; Deci, Koestner, & Ryan, 1999; Ryan & Deci, 2000b). Social agents (e.g. parents, coaches, instructors) play a crucial role in the frustration or satisfaction of needs. For instance, coaches who engage in controlling behaviors contribute to thwarting of needs (Bartholomew, Ntoumanis, Ryan et al., 2011). Deci, Koestner, et al. (1999) contend that, "although aspects of the social environment that tend to be controlling can be effective in producing behavior, they are quite ineffective in promoting self-regulation" (p. 658). Thus, it is of particular importance to examine the social-contextual factors that limit control and promote autonomy.

Autonomy support and performance. Various factors characterize an autonomy-supportive environment, including minimal use of pressure or demands (Black & Deci, 2000), providing opportunities for choice and self-direction (Zuckerman et al., 1978), and acknowledging the perspectives of others (Williams, Gagné, Ryan, & Deci, 2002). Autonomy-supportive climates in turn positively impact performance and mood. For example, Halvari, Ulstad, Bagøien, and Skjesol (2009) provide evidence of the link between autonomy support from teachers/coaches and competitive performance. Their findings highlight two important outcomes. First, participant perceptions of autonomy support are positively correlates with perceived competence. Second, perceived competence acts as a mediator of the indirect link between autonomy support and competitive performance.

Results from Gillet, Vallerand, Amoura, and Baldes (2010) also support the link between autonomy support and sport performance through a motivational sequence. The authors found that greater autonomy support relates to increased contextual motivation. In turn, contextual motivation positively correlates with situational motivation. Finally, situational motivation predicts higher levels of competitive sport performance. Additional research findings within and beyond the arena of competitive sport expound upon the link between autonomy-supportive environments and performance (e.g. Mallet, 2005; Soenens & Vansteenkiste, 2005; Williams, McGregor, Zeldman, Freedman, & Deci, 2004; Wong 2008).

Autonomy support and mood. Results from Gagné, Ryan, and Bargmann (2003) elucidate the associations among perceived autonomy support, autonomous motivation, and affect. Specifically, Gagné et al. (2003) examined a) the relations between gymnasts' perceived autonomy-support and different motivational styles (amotivation, external regulation, introjection identification, and intrinsic motivation), and b) the relationships between

motivational styles and well-being outcomes (operationalized as affect, self-esteem, and subjective vitality). Their findings underscore the importance of an autonomy-supportive environment in three ways. First, perceived parent autonomy was positively related to identified and intrinsic motivation (i.e. autonomous motivation styles). Second, coach autonomy support linked to higher identified motivation. Third, autonomous motivation styles indicated a positive correlation with well-being outcomes, including positive affect. These findings are robust with other research (e.g. Lynch, La Guardia, & Ryan, 2009), thereby emphasizing the importance of autonomy-support on greater well-being.

Manipulating Autonomy in an Exergaming Context

Intrinsic motivation research has long employed the use of virtual game-learning contexts as an investigational platform (e.g. Malone, 1981). Virtual games utilized in the 1980's have evolved from computer games to complex video games of the present. Recent studies use such technology to investigate motivation (e.g. Ryan, Ribgy, & Pryzbylski, 2006). Moreover, technological advances allow for active gaming (i.e. exergame), which offers yet another virtual avenue to investigate need satisfaction (e.g. Peng, Lin, Pfeiffer, & Winn, 2012). Given the above, the utility and applicability of an exergame platform provides a context well suited for the investigation of SDT constructs, specifically the basic need of autonomy in relation to performance.

The Present Study

The purpose of the present experiment was to investigate the impact of autonomy support versus autonomy thwart conditions in an exergaming context. The following hypotheses were tested:

Hypothesis One (H1): Participants experiencing the autonomy support condition will report higher levels of autonomy need satisfaction and lower levels of autonomy thwart compared to participants in the autonomy thwart and control conditions.

Hypothesis Two (H2): Participants experiencing the autonomy thwart condition will report higher levels of autonomy thwart and lower levels of autonomy need satisfaction compared to participants in the autonomy support and control conditions.

Hypothesis 3 (H3): Participants experiencing the autonomy support condition will demonstrate greater improvement of exergaming performance from pre-to-post experiment compared to participants in the autonomy thwart and control conditions.

Hypothesis 4 (H4): Participants experiencing the autonomy support condition will report more optimal changes in mood valance and activation from pre-to-post experiment compared to participants in the autonomy thwart and control conditions.

Hypothesis 5 (H5): Participants experiencing the autonomy support condition will be more likely to recommend others to participate in the experiment compared to participants in the autonomy thwart and control conditions.

This study makes contributions to the current SDT based research in numerous ways. First, a majority of SDT studies examining autonomy support / thwart rely on correlational research designs (e.g. Bartholomew, Ntoumanis, Ryan et al., 2011; Edmunds, Ntoumanis, & Duda, 2007; Pelletier, Fortier, Vallerand, & Brière, 2001; Reeve et al., 2014; Rouse, Ntoumanis, Duda, Jolly, & Williams, 2011) whereas this study employed an experimental research design. Second, few studies to date have manipulated an autonomy thwart condition within an experimental design (e.g. Reeve, Jang, Carrell, Jeon, & Barch, 2004). Third, researchers have examined autonomy support and mood from a categorical approach (positive / negative affect;

Gagné et al., 2003; Quested & Duda, 2010; Lynch et al., 2009; Sheldon, Kasser, Houser-Marko, Jones, & Turban, 2005) whereas this study investigated mood through the affective circumplex framework that includes mood valance (positive/negative) and mood activation (high/low) (Ekkekakis & Petruzzello, 1999, 2002; Russell, 1980, 1997).

METHODS

Participants

Female (n = 42) and male (n = 33) kinesiology undergraduate students were recruited from a university located in Southeastern United States (N = 75). The age of students ranged from 18 to 25 years (M = 21, SD = 1.4). In terms of race/ethnicity, 73.3 % identified themselves as Caucasian, 16% as Black/African American, 4% as Asian/Asian American, 4% from multiple races, and 2.7% as Hispanic/Mexican/Mexican-American. Regarding academic level classification, 43 (57.3%) students were classified as sophomores, 12 (16%) as freshman, 10 (13.3%) as seniors, and 10 (13.3%) as juniors.

Measures

Exergaming performance task. The use of DDR (Konami Digital Entertainment Inc.) as a novel, physical activity performance task allowed for assessment of performance variation among conditions. DDR is a Nintendo Wii (Nintendo Co. Ltd.) interactive video game that integrates physical dancing with visuals, requiring the participant to match a variety of step patterns to song beats. Participants completed each song (henceforth indicated as 'song/tasks') by standing on a mat or "dance platform" and aligning their footwork with visual cues displayed upon a television. Footwork consists of stepping on the dance platform arrows, arranged in a cross pattern. Players were judged by how well they were able to time their footwork to the visual patterns presented; a numerical score assigned by the game upon completion of each song indicated and quantified final performance skill. The numerical score assigned by the game consequent to song completion allowed for comparison of performance between pre- and post-test measures of each participant. In order to make scores more interpretable, all scores were rescaled into a 0-1 metric using the following formula:

Performance scaled = (Individual Performance – Performance Minimum) /

(Performance Maximum – Performance Minimum)

Mood. The Emotion Sampler developed by Hogan, Mata, and Carstensen (2013) consisted of 13 items divided into four subscales, with two items to evaluate negative affect/high activation (e.g., "Right now I feel angry"), four items to gauge negative affect/low activation (e.g., "Right now I feel fatigued"), four items to determine positive affect/high activation (e.g., "Right now I feel excited"), and three items to assess positive affect/low activation (e.g., "Right now I feel content"). In total, the affect assessment encompassed thirteen emotion words (angry, anxious/worried, sad, fatigued, bored, quiet, activated, enthusiastic, excited, calm, content, relaxed, happy), thus addressing both high- and low-activation and positive and negative valance states. Responses were provided on a 5-point Likert scale (1: very little/not at all to 5: extremely).

Autonomy support. A total of three items were used as a manipulation check for participants' feelings of autonomy support (Sheldon, Elliot, Kim, & Kasser, 2001). The items were: 'I felt like I had options and choices while playing DDR'; 'I felt like I could learn DDR in a way that I wanted to'; and 'I felt pressured to learn DDR in a specific way' (reverse code). Participants indicated their response to each statement on a five-point scale (1: strongly disagree to 5: strongly agree). Previous experimental tasks testing autonomy support utilized similar items (Sheldon & Filak, 2008).

Autonomy need satisfaction. Three items comprised the assessment of autonomy need satisfaction, which were based upon scales used by Sheldon and Filak (2008). Students evaluated the following statements and indicated the degree to which he/she perceived autonomy satisfaction: 'I felt like I had choices in the way I learned how to play dance dance revolution,

'I felt like I had choices about the music I got to listen to when playing dance dance revolution, and 'My teacher provided me with choices and options while playing dance dance revolution'. Responses were provided on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Autonomy need thwart. To assess perceptions of autonomy thwart, students completed an adapted version of the Psychological Need Thwarting Scale (PNTS; Bartholomew, Ntoumanis, Ryan, et al., 2011). The questionnaire included the autonomy thwart subscale of the PNTS, which contained four items: 'I was prevented from making choices while playing DDR, 'I felt forced to follow directions while playing DDR, 'I felt pushed to learn DDR in a certain way', and 'I felt under pressure to agree with the learning regiment I was provided'. Parallel to the measure of autonomy satisfaction, responses were provided on a 5-point Likert scale (1: strongly disagree to 5: strongly agree). Evidence of reliability and validity of the PNTS in a sport context has been demonstrated in previous research (Bartholomew et al., 2011).

Recommendation. Students completed a brief assessment regarding their willingness to recommend the study to others. Three items, modeled after a questionnaire constructed and utilized by Sheldon and Filak (2008), provided an indication of a positive or negative overall learning experience. Participants evaluated the following three statements: 'I would recommend this experiment to a friend', 'I would recommend this teacher to a friend', and "I would recommend this activity to a friend'. Responses were captured on a 5-point Likert scale varying from 1 (strongly disagree) to 5 (strongly agree).

Procedure

The university institutional review board approved study protocols prior to data collection. Written consent forms were obtained from all participants subsequent to a briefing,

which explained the intent of the study. Prior to data collection participants were randomly assigned to one of three gender-stratified conditions: autonomy support (AS), autonomy thwart (AT), or control. Each condition consisted of fourteen females and eleven males. The three conditions differed in the social climate conveyed and fostered by the instructor. Specifically, each condition received different instructions for completing the lab session. In addition participants were exposed to different instructional styles dependent upon their group assignment. Scripts for each experimental condition can be found in Appendices A-C in addition to a detailed description of the different social climates outlined below.

Participants. Lab sessions for each participant lasted approximately one hour. Students completed the study in a single individual lab session although individual lab sessions were clustered. Each cluster consisted of representation from all three conditions (i.e. all clusters included an AS, AT, and control participant), for a grand total of 25 clusters. Regarding the sequence of lab sessions, AS participants completed their session prior to the AT and control students in their respective cluster to allow for choice in song selection, pace, and order. The song selection, pace, and order of the AT and control group were then yoked to the AS participant within her/his cluster (Zuckerman et al., 1978).

Instructors. Male (n = 1) and female (n = 4) student research assistants served as lab instructors and were responsible for facilitating lab sessions for the three conditions. One research assistant conducted AS lab sessions, three research assistants conducted the control lab sessions, and the remaining research assistant conducted AT lab sessions. All instructors remained exclusive to one condition (i.e. no cross-training occurred) and blind to their group assignment. Each instructor completed a minimum of five hours of training, which involved

script rehearsal and procedural direction. In addition, instructors received guidance on conveying a social climate consistent with their assigned group condition.

Experimental Conditions

Autonomy-support. Reeve and Jang (2006) identified multiple autonomy-supportive teaching behaviors including: praising mastery, allowing flexibility in learning, and communicating perspective-taking statements. Therefore, the social climate of the AS condition promoted choice and positive feedback, encouraged personal initiation in learning/performance tasks, and acknowledged the perspective of the participant.

Verbal and instructional techniques encouraged the desired autonomy-supportive environment. For example, verbal statements used to enhance autonomy included: "you are going to self-direct your learning because you know how you learn best" or "there's no pressure to be perfect or to achieve a certain score". Instructional techniques included allowing the participant to handle the game controller.

The instructions provided to participants further reinforced an autonomy-supportive climate. AS participants received instructions to self-direct their pace of learning and exercise freedom of song selection (e.g., "you will get to choose the music you like best and dictate your pace of learning").

Autonomy-thwart. Reeve and Jang (2006) also identified teaching behaviors that induce autonomy-thwart conditions such as using directives, making should/ought statements, and monopolizing learning materials (i.e. instructor physically in control of learning materials). Therefore, participants involved in the AT group experienced a social climate that restricted choice, promoted the use of commands, induced external pressure through specific language, and limited participant control over learning materials (e.g. Wii hand-held game controller). AT

participants received instructions to follow commands while the instructor dictated the songs to be performed at the pre-test, learning, and performance stage (e.g., “the goal is for you to do what you’re told to do throughout the experiment”).

Control. Control participants received minimal interaction from the instructor. Students were informed of the tasks to be completed, void of language or instructional techniques to induce an autonomy-supportive or controlling environment. Language conveyed to the control group remained neutral with regards to autonomy and choice. Lastly, control participants did not experience choice in song selection at any stage of the experiment. However, in contrast to the AT group, control participants did not receive any indication of autonomy restriction pertaining to song selection; the songs were merely pre-determined with no explicit recognition of autonomy obstruction expressed to the participant. For example, control participants were informed of the following: “In this phase, you are going to spend 20 minutes going through a learning progression that we’ve developed”. Comparatively, AT participants were informed of this same information in a different manner: “In this phase, you are going to spend 20 minutes going through a learning progression that we’ve developed as we know how individuals learn best. You don’t get to choose any of the music or the pace of your learning”. Table 1 provides examples of instructional behaviors/statements that support and exemplify the autonomy thwart and support conditions outlined in this section.

Experimental Phases

The experiment consisted of five phases: introduction, pre-test /orientation, learning, performance, and post-test.

Table 1. Examples of Instructional Behaviors/Statements

Instructional behavior	Example
AS: Promote choice	"You will have choices in the performance phase because it is important to us that you have options"
AS: Provide positive feedback	"Great job in the learning phase"
AS: Encourage personal initiation	"Pick the songs that you like the best and that complement your learning pace"
AS: Acknowledge participant perspective	"It's going to be challenging at first, but just do the best you can and try to enjoy yourself as much as possible"
AT: Restrict choice	"We've determined the best way for you to learn DDR so you will not have any choices today because we know best"
AT: Use commands	"You must complete three lessons in a pre-determined order that teach you the basics of DDR and then complete two real examples"
AT: Use should/ought statements	"If you followed our directions correctly and learned at a quick pace you should achieve a high score"
AT: Monopolize learning materials	"I'll hold the controller and pick the songs"

Introduction. Prior to interacting with the video game the instructor briefed the participant on experimental procedures. The exact nature of the overview varied depending upon the randomly assigned condition. AS students received a detailed itinerary of the lab session, complete with benefits of engaging in the active videogame Dance, Dance, Revolution (DDR; see Measures for description). The control and AT conditions received minimal information regarding lab session procedures. In addition to receiving an introductory overview, all students completed a computer-based survey to collect demographic data, and to assess baseline mood (Hogan et al., 2013).

Orientation/Pretest. The orientation/pretest phase consisted of two primary goals. First, all participants completed three training modules that imparted the basics of DDR. Second, the participants performed two pre-test tasks in order to obtain baseline DDR performance measures. Students completed two entire song/tasks (labeled as 110 or 126 beats per minute) as described in the measures section outlined below. Selection of both pre-test song/tasks depended upon the participant's assigned condition. Specifically, AS students were instructed to select two song/tasks designated as 'basic level' to complete as a baseline measure of performance. In contrast, AT and control group participants completed two predetermined 'basic level' song/tasks linked to the choice of the AS participant assigned to their respective cluster.

Learning. Participants engaged in 20 minutes of self-directed or pre-determined DDR practice in the learning phase, dependent upon the experimental condition to which the participant was randomly assigned. AS participants were instructed to determine their own song/task selection based upon their individual pace of learning and song preference without repeating songs performed during the pre-test phase. Comparatively, the AT and control groups completed pre-determined song/tasks linked to the choice of the AS participant in their respective cluster. In addition to learning and practice tasks, students completed a manipulation check to determine their perception of the learning environment (i.e. autonomy support; Sheldon et al., 2001).

Performance. The performance phase required the participant to repeat the two song/tasks completed at the orientation/pre-test stage, thus allowing pre and post-experiment comparisons of physical activity performance. Additionally, all participants completed one song designated as 139 or 140 beats per minute performed at the 'difficult level' as a second measure of post-test performance. AS participants selected a 'difficult level' song/task to complete,

whereas the AT and control group completed a pre-determined 'difficult level' song linked to the choice of the AS participant assigned to their respective cluster.

Post-test. Consequent to the physical activity portion of the experiment, all participants repeated the previously administered affect assessment (Hogan et al., 2013). In addition, the students completed measures of autonomy thwart (Bartholomew, Ntoumanis, Ryan, et al., 2011), autonomy satisfaction, and their willingness to recommend the study to others (Sheldon & Filak, 2008). Table 2 provides an overview of all five experimental phases in chronological order**.**

Table 2. General Overview of Experimental Sequence

Step	Task
Step 1	Recruit Participants (*N*= 75)
Step 2	Randomly Assign to Condition after Gender Stratification (25;25;25)
Step 3	Conduct Lab Sessions (25 clusters; one AS, AT, and control participant per cluster)
Step 4	Introduction: Explain Study and Obtain Informed Consent
Step 5	Complete Pre-tests (demographics; performance; mood)
Step 6	Orientation Phase (DDR Lesson 1, 2, 3 for all conditions)
Step 7	Learning Phase (20 minutes for all conditions)
Step 8	Complete Manipulation Check (autonomy support)
Step 9	Complete Performance Phase
Step 10	Complete Post-tests (ANS; AT; mood; recommendation)

Note. DDR= Dance, Dance Revolution; ANS= autonomy need satisfaction; AT= autonomy thwart.

Data Analysis

Data analysis was conducted using the Statistical Package of the Social Sciences, (SPSS 22.0, IBM) and proceeded in the following order. First, internal consistency estimates, descriptive statistics, and bivariate correlations were calculated for all variables.

Second, two separate one-way ANOVAs were utilized to test H1 and H2. Tukey *HSD* posthoc analyses (Tukey *HSD*) were used to identify significant mean differences. Partial eta-square values were examined to determine statistical effect size.

Third, a 3x2 repeated measure ANOVA was conducted to examine H3, with the between-participant independent variable designated as the condition (AS; AT; C), the within-participant independent variable designated as time (pre/post), and the dependent variable designated as DDR performance. Main effect and interaction values were used to explore statistical significance ($p < .05$) and dependent t-tests were used to follow-up the interaction. In addition to the 3x2 repeated measure ANOVA, a one-way ANOVA and posthoc tests were also used to assess differences in groups regarding the difficult performance task.

Fourth, a total of four 3x2 repeated measure ANOVAs were used to examine H4. The between- participant independent variable was designated as the condition (AS; AT; C), the within-participant independent variable was designated as time (pre/post) and the dependent variables included: (a) positive, high activation; (b) positive, low activation; (c) negative, high activation; and (d) negative, low activation. . Main effect and interaction values were used to explore statistical significance ($p< .05$) and dependent t-tests were used to follow-up the interaction.

Finally, a one-way ANOVA was performed to test H5, with the independent variable designated as the condition (three levels; AS, AT, C) and the dependent variable designated as the participants' willingness to recommend the experiment to others. Tukey *HSD* posthoc analysis was used to determine mean differences.

RESULTS

Measure Reliabilities

The majority of the scales employed in this study achieved adequate to high levels of internal reliability using Cronbach's alpha. However, internal consistency estimates for the four subscales of the emotion sampler (high activation/positive affect, high activation/negative affect, low activation/positive affect, low activation/negative affect) yielded poor results.

Due to the low internal consistency estimates across the four mood constructs, an exploratory factor analysis (EFA) with maximum likelihood estimation procedures was used to determine the number of valid factors represented in these data. Findings resulted in a total of two factors: (a) positive valance, which included the adjectives activated, enthusiastic, excited, happy; and (b) negative valance, which included the adjectives angry, anxious, sad. The overall chi-square (χ^2) value was 139.10 based on 53 degrees of freedom (i.e., χ^2/df ratio = 2.62). The loadings and (cross-loadings) for positive valance items were: (a) activated, .78 (-.20); (b) enthusiastic, .95 (-.16); (c) excited, .90 (-.02); and (d) happy, .56 (-.20). The loadings and (cross-loadings) for negative valance items were: (a) angry, .90 (-.03); (b) anxious, .43 (-.01); and (c) sad, .98 (.03). The average communalities scores for positive valance was .69 and for negative affect .66. Approximately 40% of the variance was accounted in the model with eigen values of 2.28 (18%) for positive valance and 2.83 (22%) for negative valance. The internal consistency estimate for positive valance was .88 while the estimate for negative valance was .61. See Table 3 for internal consistency estimates for all scales.

Table 3. Internal Consistency Estimates for Scales (Cronbach's Alpha).

Scale	Baseline	Post-test
Emotion Sampler		
Positive Affect (activated, enthusiastic, excited, happy)	.88	.88
Negative Affect (angry, anxious, sad)	.61	.83
Autonomy Support	n/a	.79
Autonomy Need Satisfaction	n/a	.96
Autonomy Need Thwart	n/a	.87
Recommendation	n/a	.92

Preliminary Analyses

Mean scores and standard deviations for study variables are presented in Table 4. The use of three separate one-way ANOVAs allowed for assessment of differences across groups regarding performance, positive affect, and negative affect at baseline. Results revealed no significant differences across groups in performance, $F(2, 72) = 2.29$, $p = .11$, ${}_p\eta^2$ (effect size) = .06. In addition, there were no significant differences in positive affect, $F(2, 72) = 1.23$, $p = .30$, ${}_p\eta^2$ (effect size) = .03, or in negative affect, $F(2, 72) = 0.77$, $p = .47$, ${}_p\eta^2$ (effect size) = .02, among the three conditions at baseline.

Manipulation Check

As a manipulation check, a one-way ANOVA was employed to determine the differences across conditions in perceptions of autonomy support, $F(2, 72) = 42.46$, $p < .01$, ${}_p\eta^2$ (effect size) = .54, 1-β (power) = 1.00. Post hoc tests revealed that students in the AS group reported higher levels of autonomy support than students in the AT and control groups. Students in the control group reported higher levels of autonomy support than students in the AT group.

Table 4. Mean Scores and Standard Deviation Estimates of Study Variables

Variable	Support (*n*=25) *M (SD)*	Thwart (*n*=25) *M (SD)*	Control (*n*=25) *M (SD)*	Total (*N*=75)	Scale
Pre-Experiment					
Performance	0.18 (.10)	0.15 (.09)	0.23 (.18)	.19 (.14)	0-1
Positive Affect	3.02 (.88)	2.63 (1.06)	2.90(.74)	2.85(.90)	1-5
Negative Affect	1.00 (.00)	1.02 (.10)	1.08 (.39)	1.03 (.24)	1-5
Post-Learning Phase					
Autonomy Support	4.43 (.60)	2.43 (.97)	3.20 (.70)	3.35 (1.12)	1-5
Post-Experiment					
Autonomy Satisfaction	4.52 (.56)	1.56 (.73)	2.39 (.75)	2.82 (1.43)	1-5
Autonomy Thwart	1.89 (.65)	4.00 (.69)	2.83 (.81)	2.91 (1.12)	1-5
Performance	.62 (.23)	.52 (.25)	.60 (.25)	.58 (.24)	0-1
Hard Performance	.16 (.26)	.09 (.20)	.10 (.19)	.12 (.22)	0-1
Positive Affect	3.49 (1.03)	2.49 (.96)	3.23 (.80)	3.07 (1.02)	1-5
Negative Affect	1.12 (.36)	1.56 (.86)	1.14 (.37)	1.27 (.60)	1-5
Recommendation	4.28 (.61)	3.65 (1.06)	4.33 (.63)	4.09 (.84)	1-5

Autonomy Need Satisfaction and Autonomy Need Thwart

In regards to H1 and H2, two separate one-way ANOVAs facilitated examination of the differences between groups in autonomy need satisfaction and autonomy need thwart. Results indicated that autonomy need satisfaction levels were significantly different among the three conditions, $F(2, 72) = 123.92$, $p < .01$, ${}_p\eta^2$ (effect size) = .78, 1-β (power) = 1.00. Post hoc tests revealed that students in the AS group reported higher levels of autonomy need satisfaction than students in the AT and control groups. Students in the control group reported higher levels of autonomy need satisfaction than students in the AT group. Autonomy need thwart levels were

also significantly different among the three conditions, $F(2, 72) = 53.15$, $p < .01$, $_p\eta^2$ (effect size) = .60, 1-β (power) = 1.00. Post hoc tests revealed that students in the AS group reported lower levels of autonomy thwart than students in the AT and control groups. Students in the control group reported lower levels of autonomy thwart than students in the AT group.

Performance

In order to examine H3, a 3 (condition: AS; AT; C) x 2 (time: pre/post) repeated measure ANOVA was employed to determine if changes in DDR performance from baseline to post-experiment differed by condition. The main effect for time $F(1, 72) = 241.83$, $p < .01$, $_p\eta^2 = .77$, 1-β (power) = 1.00 was significant. Participants in all three groups made significant gains in performance from baseline to post experiment (see Figure 1). The group x time interaction was not significant, $F(2, 72) = 0.72$, $p = .49$, $_p\eta^2 = .02$, 1-β (power) = .17.

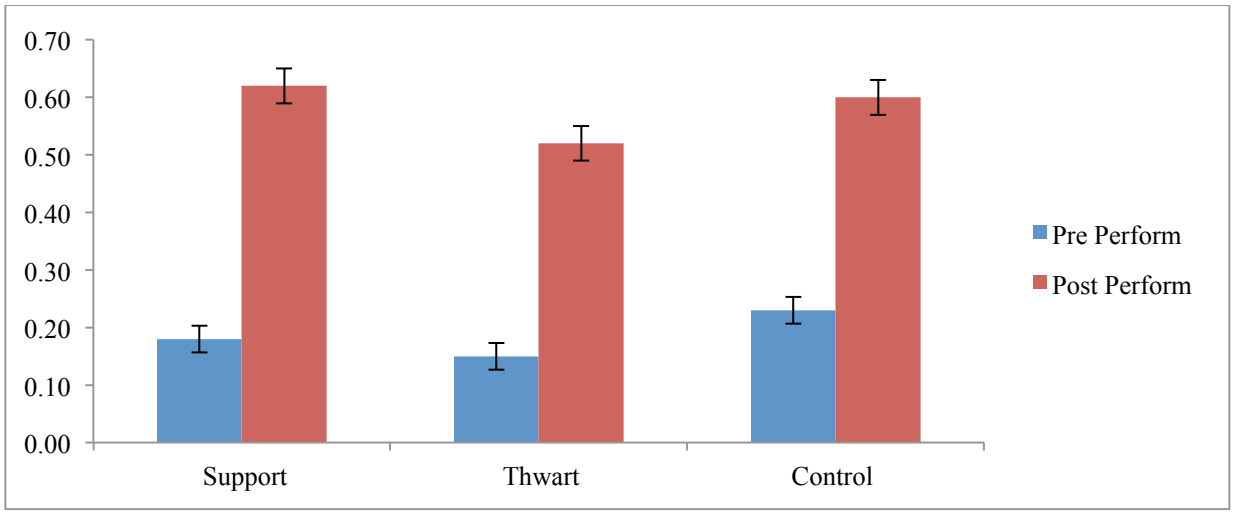

Figure 1. Gains in Performance.

In reference to the difficult performance task, a one-way ANOVA allowed for assessment of differences between groups. Results showed no significant differences between conditions on the difficult performance task at the close of the experiment, $F(2, 72) = 0.77$, $p = .47$, $_p\eta^2$ (effect size) = .02, 1-β (power) = .18.

Mood

The initial plan to employ a total of four 3x2 repeated measure ANOVAs (H4) altered after conducting an EFA. The EFA revealed two valid factors: positive and negative valence. To proceed, two separate 3 (condition: AS; AT; C) x 2 (time: pre/post) repeated measure ANOVAs were conducted to determine if changes in positive and negative mood states from baseline to post-experiment differed by treatment group.

Positive affect. Results revealed a main effect for time $F(1, 72) = 4.71$, $p < .05$, $p\eta^2 = .06$, 1-β (power) = .57 and a group x time interaction $F(2, 72) = 3.31$, $p < .05$, $p\eta^2 = .08$, 1-β (power) = .61. Dependent t-tests were used to follow-up the interaction. Both the autonomy support $t(24)=2.65$, $p = .014$ and the control $t(24)=2.31$, $p = .03$ groups demonstrated significant increases in positive affect while the autonomy thwart group demonstrated a slight decline in positive affect that was not significant $t(24)=.69$ $p = .49$. Figure 2 illustrates the interaction between groups over time.

Negative affect. Results pertaining to negative affect indicated a main effect for time $F(1, 72) = 13.37$, $p < .01$, $_p\eta^2 = .16$, 1-β (power) = .95. Participants reported increases in negative affect from baseline to post experiment. There was also a group x time interaction $F(2, 72) = 5.29$, $p < .01$, $_p\eta^2 = .13$, 1-β (power) = .82. Dependent t-tests were used to follow-up the interaction. Both the autonomy support [$t(24)=1.65$, $p = .11$] and the control [$t(24)=1.13$ $p = .266$] groups indicated stable negative affect while participants in the AT group reported increases in negative affect from baseline to post experiment. [$t(24)=.3.08$ $p = .005$]. Figure 3 illustrates this interaction between groups over time.

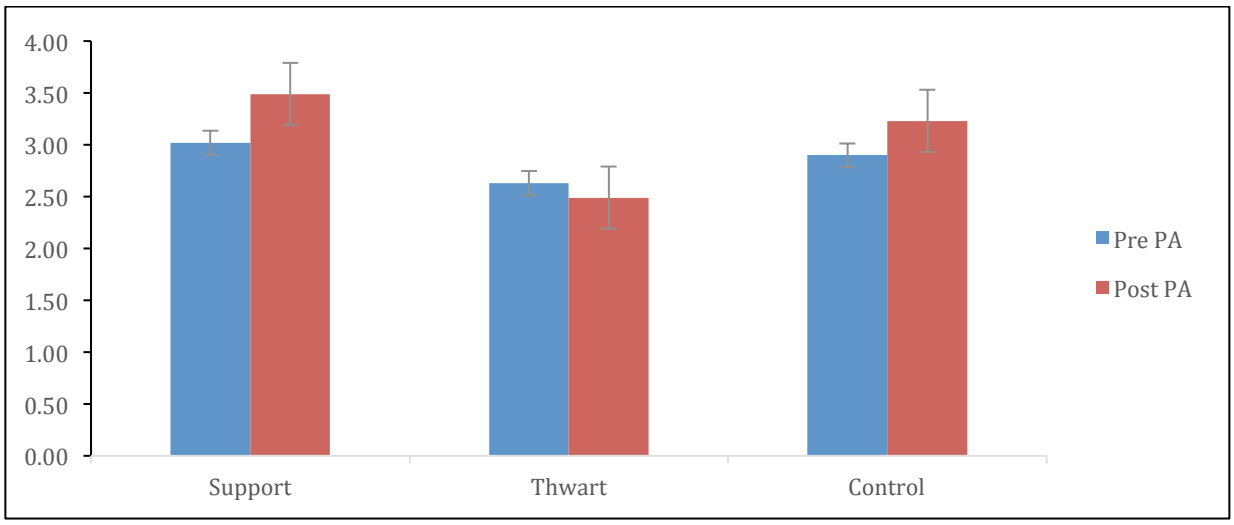

Figure 2. Positive Affect. The AS and control condition reported increases in positive affect while participants in the AT group reported slight decreases in positive affect from baseline to post experiment.

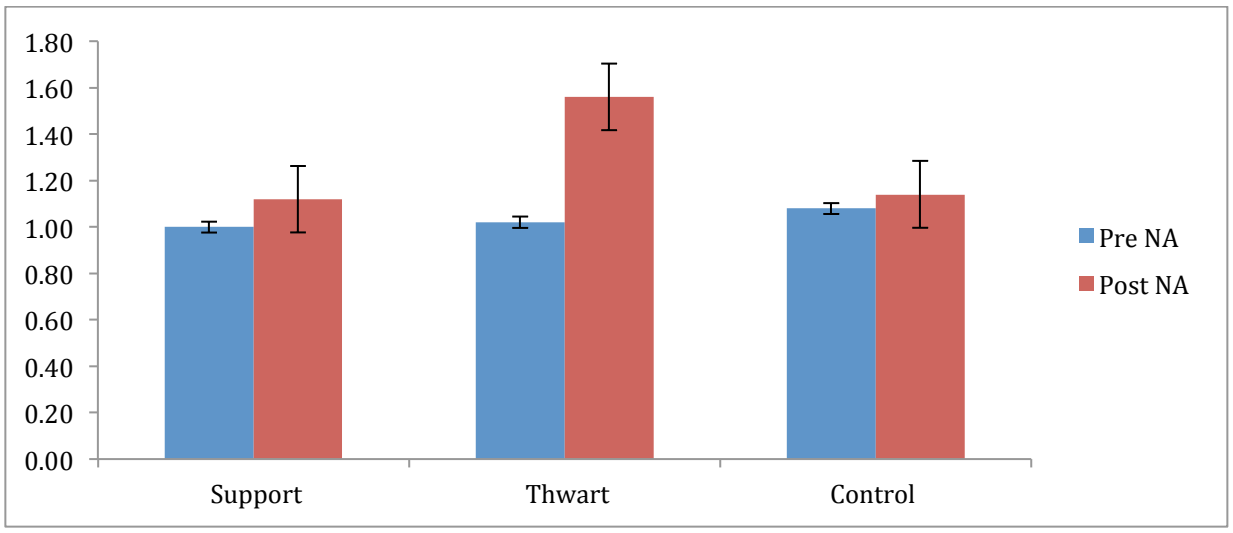

Figure 3. Negative Affect. AT group reported higher levels of negative affect from baseline to post experiment, while the AS and Control group reported stable negative affect over time.

Willingness to Recommend

A one-way ANOVA allowed for determination of differences in the participants' willingness to recommend the study to others (H5). Results indicated a significant difference among the conditions, $F(2, 72) = 5.65$, $p < .01$, ${}_p\eta^2$ (effect size) = .14, 1-β (power) = .85. Post hoc tests revealed that students in the AS group were more likely to recommend the study than students in the AT group. Students in the control group were more likely to recommend the study than students in the AT group. There were no significant differences between the AS and control group.

DISCUSSION

The goal of this investigation was to examine the influence of autonomy support versus autonomy thwart conditions in an exergaming context. Results generally supported the five hypotheses outlined above. AS participants reported significantly higher levels of autonomy need satisfaction and lower levels of autonomy thwart compared to the AT and control group. Conversely, the AT group reported significantly higher levels of autonomy thwart and lower levels of autonomy need satisfaction compared to the AS and control group.

These findings support H1 and H2 and are consistent with SDT literature regarding social contextual environments (Adie, Duda, & Ntoumanis, 2008; Reinboth, Duda, & Ntoumanis, 2004; Standage, Duda, & Ntoumanis, 2006; Gunnell et al., 2013). Reeve and Jang (2006) identified several autonomous and controlling instructional behaviors that relate to the satisfaction or frustration of autonomy. The use of identified behaviors as a guide to operationalize AS and AT conditions and the subsequent large effect sizes yielded in these analyses provide robust evidence that the conditions represented AS and AT, respectively. Establishing this basis provided validity for testing H3 – H5.

Previous research shows that autonomy-supportive conditions relate to increased levels of autonomy need satisfaction (Adie et al., 2008; Quested & Duda, 2010; Reinboth et al., 2004; Standage et al., 2006). The present investigation parallels these results and deepens the understanding of autonomy support. For instance, the experimental design of this study allows expansion beyond the knowledge base anchored in correlational research (e.g. Adie et al., 2008; Standage et al., 2006) and suggests that autonomy-supportive conditions not only relate to increased autonomy need satisfaction, but also directly induce (i.e. catalyze) the satisfaction of autonomy.

In regards to autonomy thwart, this study extends the work of Bartholomew, Ntoumanis, Ryan, et al. (2011) and Gunnell et al. (2013) twofold. First, this design distinguished between perceived need satisfaction and perceived need thwarting. Bartholomew, Ntoumanis, Ryan et al. suggest that low need satisfaction scores do not adequately capture the extent of psychological need thwarting; rather the two constructs should be examined as mutually exclusive concepts. The current approach examined an autonomy thwart condition in order to "adequately tap the intensity of need frustration" (p. 77) described by these authors. Thus, higher levels of autonomy thwart and lower levels of autonomy need satisfaction evidenced by the AT group represent a true outcome of need thwarting as opposed to an mere absence of need satisfaction. Second, few studies to date have manipulated an autonomy thwart condition within an experimental design (Reeve et al., 2004). Manipulating an autonomy thwart condition allows for attributing higher levels of autonomy thwart and lower levels of autonomy need satisfaction to the active hindrance of autonomy, thus highlighting the direct consequences of need thwarting described above.

Results moderately support the hypothesis regarding mood and activation (H4). Partial analysis resulted from the inability to assess mood activation in tandem with valence due to the low internal consistency estimates of the affect instrument. Despite the aforementioned limitation, results gleaned from examining valence alone support a portion of H4: the AS group reported increased positive affect over time, thus indicating more optimal changes in mood valence. Interestingly, the AS group also evidenced stable negative affect from baseline to post experiment. This may be attributable to the inherent nature of the task as dancing and video games are typically considered a fun and enjoyable activity.

Findings from this study enhance literature regarding basic psychological needs and affect in three ways. First, increased positive affect as an outcome of autonomy support

reinforces SDT's theoretical postulate that satisfaction of needs promotes well-being (Deci & Ryan, 2002). Furthermore, results of this study support and extend previous research, therefore deepening the available knowledge base (Gagné et al., 2003; Lynch et al., 2009; Quested & Duda, 2010; Sheldon et al., 2005) Second, the AT condition evidenced a pattern consistent with autonomy thwart literature such that participants reported increased negative affect over time (e.g. Bartholomew, Ntoumanis, Ryan, Bosch et al., 2011). This is of particular importance as empirical support for autonomy thwart and its manifestations of ill-being lack compared to investigations of autonomy support. Lastly, the present results further contribute to extant literature by providing a direct link between autonomy-supportive conditions and affect specifically. Positive affect is frequently grouped with other well-being indices (e.g. vitality, self-esteem, life-satisfaction), which may result in a convoluted understanding of autonomy-supportive environments and affect. The present study offers an experimental manipulation of autonomy support while examining affect as a sole construct; this is opposed to reporting an aggregate index under the canopy term of well-being.

Regarding H5, those who experienced an autonomy-supportive and neutral environment were more likely to recommend the study to others than students in the AT group. In this study willingness to recommend is conceptualized as an indirect index for participant enjoyment (Sheldon & Filak, 2008). Thus, a greater willingness to recommend represents a greater enjoyment of the task. Possible explanation for the aforementioned results involves a sequential chain of events. AT participants experienced an environment/instructor that restricted choice, promoted the use of commands, induced external pressure through specific language, and limited participant control over learning materials; in turn, these conditions induced higher levels of autonomy thwart and lower levels of autonomy need satisfaction compared to the AS and control

group. Whereas the AT students were exposed to frustration of autonomy, the AS and control groups were not. Thus, it is plausible to assume that greater perceived autonomy thwart impacted participants' enjoyment of the task, which is indicated by an unwillingness to recommend the experiment to others.

Findings from this experiment diverge from previous game-learning studies grounded in SDT, particularly Sheldon and Filak's (2008) examination of basic psychological needs in a game-learning context. Their work elucidated the effects of competence, autonomy, and relatedness on a variety of outcomes, including willingness to recommend their study to others. Results from their investigation did not indicate a main effect for autonomy support on willingness to recommend, however autonomy support moderated competence support effects upon the variable. In contrast, the present experiment supports a direct link between autonomy-supportive conditions and willingness to recommend such that AS participants were more likely to recommend the study than students in the AT group.

Of the five hypotheses presented in this study only one remained unsubstantiated (H3). Although participants in all three groups made significant gains in performance from baseline to post experiment, no discernible change in performance was observed across conditions. Furthermore, a significant difference between groups for the difficult performance task was not observed. Mean ratings were in the expected directions but did not reach statistical significance. A small sample size may have contributed to nonsignificant findings. While the observed trend provides encouraging results, increasing the sample size may be worth considering, as this may maximize the likelihood of uncovering a significant difference. An alternate explanation for nonsignificant findings involves the short nature of the treatment. Perhaps exposure to a condition for one hour is an insufficient amount of time to produce changes in physical

performance. Previous research has shown autonomy-supportive environments to increase performance in multiple arenas including sport competition (Cheon, Reeve, Lee, & Lee, 2015; Gillet et al., 2009; Halvari et al., 2009), academics (Soenens & Vansteenkiste, 2005; Wong, 2008), and self-management behaviors such as glycemic control (Williams et al., 2004). As it stands, results from this study are contrary to pertinent literature.

Limitations to this study involve the sample and instruments. As mentioned above, the current sample size was inadequate to ascertain a difference between groups in performance. Additionally, maintaining an even gender ratio proved to be unfeasible due to unforeseen challenges in recruiting male participants. Another limitation concerns the failure to detect mood valence and activation. Future research employing the use of an instrument specific to physical activity (e.g. physical activity affect scale; Lox, Jackson, Tuholski, Wasley, & Treasure, 2000) may be required to assess affect within a context similar to the DDR lab sessions.

Despite the aforementioned limitations, findings support SDT's theoretical postulates in addition to providing evidence pertaining to conditions of autonomy support and thwart. Specifically, autonomy-supportive conditions induce greater perceived autonomy need satisfaction and increased positive affect. Comparatively, conditions that encourage autonomy thwart induce perceptions of autonomy frustration and increased negative affect. These results suggest that social agents within a learning environment (i.e. instructors, coaches, teachers) should consider pedagogical choices and contextual manipulations that elicit AS in order to promote optimal functioning from the subjects in their care.

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APPENDIX A
AUTONOMY SUPPORT SCRIPT

Introduction

I'd like to start out by providing an overview so you have a clear idea of what you're going to be doing today. Dance, dance revolution is the game you're going to be involved in during this experiment. Dance, dance revolution or DDR is a dance video game that asks you to match a variety of step patterns to the beat of different songs. It's an activity that can get you physically active, improve your coordination, and most importantly be a lot of fun. Keep in mind if you haven't ever played DDR or haven't played recently, it is going to be challenging and you'll make mistakes. That's okay, you're going to make errors, but you will improve and catch on. The key is to learn from those errors and not get frustrated. The goal is to do the best you can and have fun! There are going to be three parts to this study. First, in the orientation phase, you will complete three scripted lessons that will help you learn the basics of the DDR game and then complete two 'real examples'. Second, in the learning phase, you will have 20 minutes where you will get to self-direct your own learning of DDR. During the learning phase you will get to choose the music you like best and dictate your pace of learning. It is important to us that you feel like you have choices in the way you learn DDR today. Finally, you will complete the performance phase of the experiment where the goal is to do the best you can at performing three different songs. Again, you will have choices in the performance phase because it is important to us that you have options. Any questions?

Orientation Phase

Let's get started with the orientation phase. Remember, this is where you will complete three lessons and two 'real examples' that will teach you the basics of DDR. This is the only part of the experiment where you will not have choices in your learning and we apologize for that. We just want to make sure that you learn the basic first. It's going to be challenging at first, but just do the best you can and try to enjoy yourself as much as possible. The goal is to match your step patterns to the beat. You will need to focus on the top left hand corner of the screen, which will show you the timing of your step patterns.

Learning Phase

You did a really nice job in the orientation phase. Now, you are going to complete the learning phase. In this phase, you are going to get to self-direct your learning for 20 minutes because you know how you learn best. You will get to choose what songs you want to listen to during this learning phase – so pick the songs that you like the best and that complement your learning pace. I'm going to show you how to pick songs and then we can go ahead and get started. I'll let you know when there are 15 minutes left, 10 minutes left, five minutes left, and one minute left. If you have any questions, feel free to ask. Remember, the goal is to learn DDR the best you can, at your own pace and by your own prerogative.

Performance Phase

Great job in the learning phase! Now it is time to complete the performance phase, which is the last DDR phase of the study. In this phase, you are going to perform three different DDR songs. The goal is to perform to the best of your abilities and enjoy your time. There's no pressure to be perfect or to achieve a certain score or anything like that. You will get to repeat two songs you completed earlier and select between a couple different songs for your final and third performance. Ready?

APPENDIX B
AUTONOMY THWART SCRIPT

Introduction

Dance, dance revolution or DDR is the game you're going to be involved in during this experiment. We've determined the best way for you to learn DDR so you will not have any choices today because we know best. Ideally, the goal is for you to do what you're told to do throughout the experiment and perform at a high level. Remember, we have determined the best learning environment for you so you must follow our directions and avoid making too many mistakes.

Orientation Phase

You must complete three lessons in a pre-determined order that teach you the basics of DDR and then complete two 'real examples'. You should follow along and you must match your step patterns to the beats in the top left hand corner of the screen. Follow the pre-determined order and lessons exactly as you are told.

Learning Phase

Now, you must complete the learning phase. In this phase, you are going to spend 20 minutes going through a learning progression that we've developed as we know how individuals learn best. You don't get to choose any of the music or the pace of your learning because we have a strict order already in place. I'll hold the controller and pick the songs. Remember, you must follow along exactly and don't make too many mistakes.

Performance Phase

Now it is time to complete the performance phase. In this phase, you must perform three different pre-determined DDR songs. Most people can perform pretty well at this point, so you should avoid making mistakes and poor performance because it will reflect badly on our system of teaching. If you followed our directions correctly and learned at a quick pace you should achieve a high score. I will get you started.

APPENDIX C
CONTROL SCRIPT

Introduction

Dance, dance revolution or DDR is the game you're going to be involved in during this experiment. You will complete an orientation phase where you learn the basics of DDR and complete two 'real examples', a learning phase where you will be guided through 20 minutes of practice, and a final stage where you will be focused on performing three DDR songs.

Orientation Phase

You're going to complete three lessons that teach you the basics of DDR. Try to match your step patterns to the beats in the top left hand corner of the screen. Lastly, you will complete two 'real examples'.

Learning Phase

Now, you are going to complete the learning phase. In this phase, you are going to spend 20 minutes going through a learning progression that we've developed.

Performance Phase

Now it is time to complete the performance phase. In this phase, you are going to perform three different DDR songs. I will get you started.

APPENDIX D
SURVEY

DDR Survey

1. Are you male or female?

- ○ Male
- ○ Female

2. What is your current age?

- ○ 18
- ○ 19
- ○ 20
- ○ 21
- ○ 22
- ○ 23
- ○ 24
- ○ Other (please specify)

3. What is your current classification in school?

- ○ freshman
- ○ sophomore
- ○ junior
- ○ senior
- ○ graduate student

4. Are you White, Black or African-American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific islander, or some other race?

- ○ White
- ○ Black or African-American
- ○ American Indian or Alaskan Native
- ○ Asian or Asian- American
- ○ Hispanic or Latino / Latina or Mexican / Mexican-American
- ○ Native Hawaiian or other Pacific Islander
- ○ From multiple races

Some other race (please specify)

DDR Survey

5. Describe your experience playing dance dance revolution.

6. Evaluate the following statements prior to taking part in the experiment

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I think that I am going to be pretty good at this dance, dance revoluation activity.	○	○	○	○	○
I think I will do pretty well at this dance, dance revoluation activity compared to other people.	○	○	○	○	○
I feel pretty confident about doing well at this dance, dance revolution activity.	○	○	○	○	○
I think I will be pretty satisfied with my performance in this dance, dance revolution activity.	○	○	○	○	○
I don't think I'll do very well at this dance, dance revolution activity.	○	○	○	○	○

7. Evaluate the following statements prior to the experiment.

	Very Little / Not at All	A Little	Somewhat	Mostly	Extremely
Right now I feel angry.	○	○	○	○	○
Right now I feel anxious / worried.	○	○	○	○	○
Right now I feel sad.	○	○	○	○	○
Right now I feel fatigued.	○	○	○	○	○
Right now I feel bored.	○	○	○	○	○
Right now I feel quiet.	○	○	○	○	○
Right now I feel activated.	○	○	○	○	○
Right now I feel enthusiastic.	○	○	○	○	○
Right now I feel excited.	○	○	○	○	○
Right now I feel calm.	○	○	○	○	○
Right now I feel content.	○	○	○	○	○
Right now I feel relaxed.	○	○	○	○	○
Right now I feel happy.	○	○	○	○	○

DDR Survey

8. Evaluate the following statements after the learning phase of the experiment.

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I felt like I had options and choices while learning dance dance revolution.	○	○	○	○	○
I felt like I could learn dance dance revolution the way I wanted to.	○	○	○	○	○
I felt pressured to learn dance dance revolution in a specific way.	○	○	○	○	○

9. Evaluate the following statements after the learning phase of the experiment.

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I was pretty good at dance dance revolution.	○	○	○	○	○
I think I did pretty well at dance dance revolution compared to others.	○	○	○	○	○
I'm confident that I did well at dance dance revolution.	○	○	○	○	○
I am satisfied with my performance in dance dance revolution.	○	○	○	○	○
I don't think I am very good at dance dance revolution.	○	○	○	○	○

DDR Survey

10. Evaluate the following statements after completing the experiment.

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I felt like I had choices in the way I learned how to play dance dance revolution.	○	○	○	○	○
I felt like I had choices about the music I got to listen to when playing dance dance revolution.	○	○	○	○	○
My teacher provided me with choices and options while playing dance dance revolution.	○	○	○	○	○
I was prevented from making choices when playing dance dance revolution.	○	○	○	○	○
I felt forced to follow directions while playing dance dance revolution.	○	○	○	○	○
I felt pushed to learn dance dance revolution in a certain way.	○	○	○	○	○
I felt under pressure to agree with the learning regiment I was provided.	○	○	○	○	○

11. Evaluate the following statements aftter completing the experiment.

	Very Little / Not at All	A Little	Somewhat	Mostly	Extremely
Right now I feel angry.	○	○	○	○	○
Right now I feel anxious / worried.	○	○	○	○	○
Right now I feel sad.	○	○	○	○	○
Right now I feel fatigued.	○	○	○	○	○
Right now I feel bored.	○	○	○	○	○
Right now I feel quiet.	○	○	○	○	○
Right now I feel activated.	○	○	○	○	○
Right now I feel enthusiastic.	○	○	○	○	○
Right now I feel excited.	○	○	○	○	○
Right now I feel calm.	○	○	○	○	○
Right now I feel content.	○	○	○	○	○
Right now I feel relaxed.	○	○	○	○	○
Right now I feel happy.	○	○	○	○	○

DDR Survey

12. Evaluate the following statements.

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I would recommend this experiment to a friend.	○	○	○	○	○
I would recommend this teacher to a friend.	○	○	○	○	○
I would recommend this activity to a friend.	○	○	○	○	○

APPENDIX E
IRB APPROVAL

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Robert Mathews, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

TO: Alex Garn
Kinesiology

FROM: Robert C. Mathews
Chair, Institutional Review Board

DATE: May 29, 2014
RE: **IRB#** E8805

TITLE: A Comparison of Teaching Styles in a Video Game Context

New Protocol/Modification/Continuation: New Protocol

Review Date: 5/29/2014

Approved X **Disapproved**_____

Approval Date: 5/29/2014 **Approval Expiration Date:** 5/28/2017

Exemption Category/Paragraph: 2

Signed Consent Waived?: No

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable): _____

Protocol Matches Scope of Work in Grant proposal: (if applicable) _____

By: Robert C. Mathews, Chairman _____

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. SPECIAL NOTE:

**All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

VITA

Amanda Weathers-Meyer began her educational expedition in her home state of Minnesota. She completed her bachelor's in psychology at Webster University in St. Louis, Missouri and continued her education at Louisiana State University where she studied the psychological determinants of exercise adherence. Her work with psychology and kinesiology will continue as she pursues her doctorate at Louisiana State University in hopes of translating her expertise and research to the realm of sport and military performance psychology.