

Dr. Carmen Russoniello Research: Benefits of FootGaming with Select PopCap Games:

Positive behaviours, improved mood and reduced stress

Every school invests an enormous amount of time, effort and budget in creating a campus where students and teachers can calmly and peacefully carry out learning endeavours without interruption or stress-induced challenges. Peer counsellors are trained, guidance counsellors stay busy and families hope we can impact their students in the most positive manner. The following study sponsored by PopCap provides solid evidence that casual games can deliver solution strategies for so many of our students. Not to neglect teachers, who can also receive exactly the stress relief and mood enhancement they need, often on a daily basis.

The following is a summary excerpt from the full press release available at <http://www.popcap.com/press/release.php?pid=393>

East Carolina University's Department of Recreation and Leisure Studies conducted a six-month long, randomized, controlled study that measured the stress-relieving and other mood-lifting effects of so-called "casual" video games.¹ The three puzzle and word games used in the study, Bejeweled® 2, Peggle™ and Bookworm™ Adventures, are all made by PopCap Games. The hypotheses were tested using state-of-the-art technologies and methodologies to measure heart-rate variability (HRV), electroencephalography (EEG) and subjects' mood states pre- and post-activity (POMS).

In all cases, the changes in stress levels and mood were measured in comparison to a control group that experienced a Web-based activity similar in physical and mental nature to the game-playing groups. High-level findings of the study are provided below. Additional data, including detailed charts, can be found at www.ecu.edu/biofeedback.

"I've conducted many clinical studies in the area of recreational therapy in the past, but this was the first one seeking to determine the potential therapeutic value of video games," stated Dr. Carmen Russoniello. "The results of this study are impressive and intriguing, given the extent of the effects of the games on subjects' stress levels and overall mood. When coupled with the very high degree of confidence we have in those results based on the methodology and technologies used, I believe there is a wide range of therapeutic applications of casual games in mood-related disorders such as depression and in stress-related disorders including diabetes and cardiovascular disease. Granted, this study was a first step and much more needs to be done before video games can be prescribed to treat medical conditions. However, these exciting results confirm anecdotal evidence that people are playing casual video games to improve their mood and decrease their stress, and herald casual games' potential in health promotion, disease prevention, and treatment of stress- and mood-related disorders."

¹ <http://www.popcap.com/press/release.php?pid=393> (accessed February, 2009)

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To compile the state of research on the association between physical activity among school-aged children and academic outcomes, the author reviewed published studies on this topic.

Stress Relief

With respect to stress relief, measured primarily through HRV which captures sympathetic (fight or flight) and para-sympathetic (relaxation) nervous system activity by assessing the variability in the heart's "beat-to-beat" interval, Bejeweled was found to reduce physical stress activity by 54% compared to the control group. There was no statistical difference between male and female subjects. Peggle and Bookworm Adventures did not reduce subjects' physical stress levels significantly but did affect psychological tension, depression and other aspects of mood, in some cases dramatically (see below).

Changes in Aspects of Mood

Mood was measured in six different categories: Psychological Tension, Anger, Depression, Vigor, Fatigue and Confusion. Cumulatively, these six aspects of mood are called "total mood disturbance," with a decrease in total mood disturbance being a positive change in mood. In terms of total mood disturbance, Peggle had the greatest effect, improving mood by 573% across all study subjects compared to the control group (which saw a modest improvement in mood). Bejeweled 2 (435%) and Bookworm Adventures (303%) also had significant positive effects on subjects' overall mood. Interestingly, among those subjects who played Bejeweled 2, male subjects showed a 10% greater increase in total mood than female subjects, while females who played Peggle experienced a 40% greater improvement in mood than males who played that game. "It's not surprising that Peggle had the greatest effect on overall mood, given the game's over-the-top celebration of players' success each time they complete a level," noted Dr. Russoniello. "The other games also provide positive feedback to players, but not to the same extent or in the same 'exhilarating' fashion."

Psychological Tension

Peggle had the greatest effect on psychological tension, with study subjects who played that game averaging a 66% reduction compared to 36% reduction among those who played Bejeweled 2 and 24% reduction among players of Bookworm Adventures. Specifically with respect to Peggle, female subjects accounted for two thirds of the overall reduction in tension after playing that game.

Anger

Bejeweled 2 and Peggle had similarly positive effects on subjects' anger levels, reducing anger by 65% and 63%, respectively. Bookworm Adventures had a more modest effect, reducing anger by 33%.

Depression

All three games had similar effects on depression, reducing subjects' depression levels by 45% (Peggle), 43% (Bookworm Adventures) and 37% (Bejeweled 2). Among men, however, Bookworm Adventures had the greatest depression-reducing effect, with male subjects accounting for 98% of depression reduction, on average, when playing that game.

Vigor

Vigor is the only positive variable reflected in the POMS and represents a state of increased mental energy. Bejeweled 2 increased vigor by an average of 210% among subjects who played that game. Bookworm (10%) and Peggle (24%) had modest affects on subjects' vigor levels. Among players of Bejeweled 2, females accounted for 59% of the overall increase in vigor.

Fatigue

Peggle had the most significant impact on fatigue, reducing it by an average of 61% among subjects who played that game. Bejeweled 2 (49%) and Bookworm Adventures (33%) also reduced fatigue. Peggle was nearly equally effective at reducing fatigue among male (52%) and female (48%) subjects.

Confusion

Compared to the control group surfing the Web for articles (which collectively experienced a modest decrease in confusion), all three games reduced confusion dramatically, suggesting that the rules, objectives and input controls for the game were very clearly understood by the subjects. Subjects playing Peggle saw confusion drop by an average of 486%, while those playing Bookworm Adventures (462%) and Bejeweled 2 (426%) also experienced sizable reductions in confusion. "These findings are especially intriguing as they present the possibility that casual games may be useful in ameliorating conditions such as attention deficit disorder, memory loss and general confusion attributed to dementia and Alzheimer's disease," said Dr. Russoniello.