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Escaping through exergames: Presence, enjoyment, and mood experience in predicting children's attitude toward exergames

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ABSTRACT

Exergaming has been discussed as a possible strategy to encourage children to engage in physical activity. This study explores presence as a mechanism through which exergames may be associated with positive mood experiences and game enjoyment among children. Structural equation modeling using survey data from children aged 9–12 in Singapore revealed that presence was positively correlated with mood experience and game enjoyment, while game enjoyment and mood experience were positively correlated with attitude toward exergaming. Attitude toward exergaming was positively correlated with preference for future game play. In addition, mood experience was found to be a partial mediator of the relationship between presence and game enjoyment. Conclusions regarding the impact of exergames on children and practical implications for digital health interventions and exergame design were discussed.

The sedentary lifestyles of children have been significantly growing in several countries over the years. For example, a majority of youths in the United States do not currently meet exercise guidelines as set out in the Physical Activity Guidelines for Americans (Landry & Driscoll, 2012). These results have also been noted in some Asian countries. In Singapore, where this study was conducted, more than half of the Singaporeans stated that they did not exercise in their leisure time (Ministry of Health, 2011). The lack of physical activity can lead to many physical and psychological health problems, and is associated with higher risks of developing chronic diseases such as diabetes, cardiovascular diseases, musculoskeletal disorders and cancer later on in adulthood.

As such, much attention have been paid to the use of exergames to increase physical activity among young people, as they spend significant amounts of time on game-related activities. Specifically, scholars have explored the use of video games which require active interaction with the game interface, or exergames, as one way to combat the increasing sedentary lifestyles among children (Biddiss & Irwin, 2010; O'Donovan, Hirsch, Holohan, McBride, McManus & Hussey, 2012). For example, Mills et al. (2013) demonstrated that high-intensity exergames could produce significant increases in heart rate and energy expenditure that were sufficient for benefits to arterial function. Likewise, Fawkner, Niven, Thin, MacDonald, and Oakes (2010) also found that regular exergame play may meet daily physical activity recommendations for adolescent girls.

Given that video games can provide intrinsic motivation by challenging players at different levels of expertise (Malone, 1981) and offer game enjoyment which can act as a strong motivation for children to exercise (Sun, 2012), exergames in general may be useful in reducing sedentary lifestyles among children. Despite this, empirical evidence on whether exergames can encourage children to engage in physical activity remains inconclusive to date (Daley, 2009; Foley & Maddison, 2010; Sun, 2013). Mhurchu et al. (2008) found in a 12-week intervention study that exergame play could have transfer effects to other sports and exercise, which increased children's overall physical activity level. Staiano, Abraham, and Calvert (2013) reported that obese youth who played exergames lost significantly more weight than control groups over 20 weeks. In a field study, Sun (2013) found that children's level of physical activity while playing exergames intensified as they mastered the games, although it was noted that their situational interest also faded over time as they became more acquainted with those games, which may lead to declined use in the future. Daley (2009) concluded in a review on children's exergame play that only specific types of exergames could encourage light to moderate

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intensity physical activity, and also called for scholars to go beyond descriptive studies for a more comprehensive understanding of exergaming as a form of physical activity. Indeed, much less is known about the socio-psychological mechanisms behind the engagement of players during gameplay and how this leads to sustained future use. One possible way in which exergames can promote future exercise is through the shifting of attitudes and beliefs about actual exercise and physical activity (Lwin & Malik, 2012, 2014). According to the theory of planned behavior (Ajzen, 1991), attitudes are a primary driver of actual behavior. In lieu of longitudinal data that tracks physical activity over time, attitude can serve as a reliable proxy for actual behavior in the future.

In this study, we propose a model in which children's subjective level of presence, game enjoyment, mood experience, and attitude towards exergames can serve as factors that influence their attitude toward exergames, which may in turn be associated with their preference for future game play. Fig. 1 shows the hypothesized relationships based on the literature review. The model can be broken down into six hypotheses. Game enjoyment and mood experience are expected to mediate the relationship between presence and attitude towards exergaming. Attitude towards exergaming is expected to be directly associated with preference for future gameplay. Potential theoretical contributions to presence theory and media enjoyment research are discussed, along with practical implications for designers of exergames and digital health interventions (see Fig. 2).

1. Barriers to physical activity

Childhood obesity is a preventable problem. Researchers have suggested that one way childhood obesity can be combated is through regular exercise routines (Fletcher, Cooper, Helms, Northington, & Winters, 2009; Mazzeo, Arens, Germeroth, & Hein, 2012; Taplin & Zeitler, 2009). Despite this, there are several reasons that hinder children from getting sufficient exercise.

One such reason may be overprotective parenting, where parents tend to limit their children's exposure to potential physical risks (Brussoni & Olsen, 2013) so as to minimize injury (Thomasgard & Metz, 1997). Similarly, Morawska and West (2013) posited that ineffective parenting styles with high permissiveness and coercion may not yield positive results in helping obese children lose weight. In addition, obese children tend to have a poor self-image of physical competence, which leads to little motivation to participate in physical activity programs, subsequently reduces their motor performance (Morano, Colella, Robazza, Bortoli, & Capranica, 2011).

2. Children and exergames

While performing repetitive and perceived boring exercises could resonate more with rehabilitative patients (Geurts et al., 2011), children need greater motivation in order to engage in regular exercise. One way to motivate children to exercise would be for routines to be fun. For example, Vernadakis, Zetou, Derri, Bebetsos, and Filippou (2014) discovered that running was the least enjoyable routine for 11-year-olds, whereas "Wii Bowling," an exergame, was the most enjoyable. The researchers also argued that enjoyment of exergames had little to do with weight status, therefore children would enjoy the activity whether they are obese or not. Indeed, exergames have been found to be appealing to children and is a promising alternative to promote exercise (Gao & Chen, 2014).

According to Bogost (2007), exergames can be defined as a "combination of exercise and videogames" (p. 294). Exergame players use body movements to control their characters' actions in-game (Staiano & Calvert, 2011). Children seem to be receptive to this new breed of games, such that integrating them into physical education (PE) curriculum can be more effective than regular PE lessons in improving beliefs toward physical activity and actual behaviors, especially so among younger children (Lwin & Malik, 2012; Lwin et al., 2016). In other words, exergaming has found its way into some aspects of formal education, where it is used as a pedagogic tool. Given the high quality entertainment afforded by technology and children's preference for fun activities, exergames have the potential to motivate children to play more and hence exercise more. Moreover, since exergames can be played in the comfort of one's home, this allows for parental supervision and eases concern about child safety issues.

3. Presence, enjoyment and mood as drivers of exergaming

A large amount of research has been dedicated to explore the effects of exergames, identifying benefits such as increased physical activity, improved physical health, and increased self-esteem (Daley, 2009; Foley & Maddison, 2010; Staiano & Calvert, 2011). These findings show that exergames do indeed have potential to be a tool to combat obesity. However, to better understand how exergames can modify attitude toward physical fitness, we must go beyond examining physiological effects of these games. Specifically, a deeper understanding of the psychological mechanisms through which exergames engage players can help provide a more holistic understanding of the medium (Bogost, 2007).

Our research investigates an important game variable in exergame design – presence – as the key mechanism through which players are engaged with exergames and develop positive attitudes toward them. By developing positive attitudes toward exergaming, players may eventually come to integrate physical activity as part of their daily lives.

Presence can be defined as "the perceptual illusion of non-mediation" (Lombard & Ditton, 1997), occurring when one perceives and responds to media content as if the medium did not

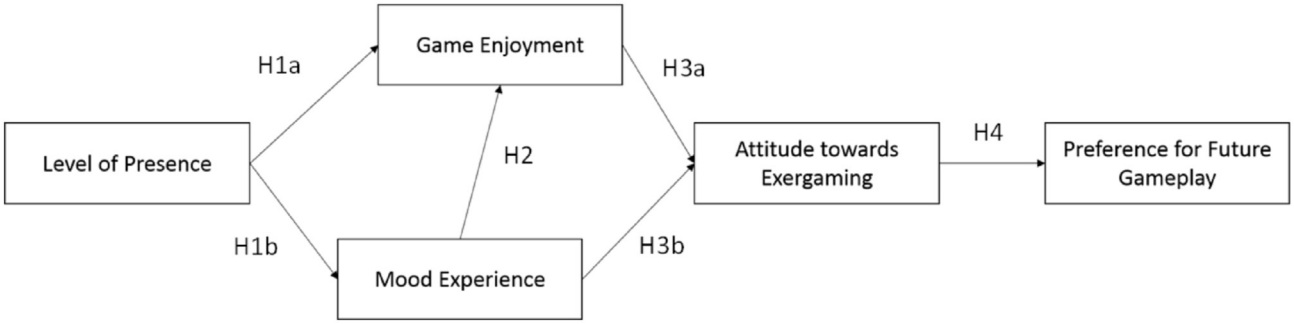

Fig. 1. Hypothesized conceptual model.

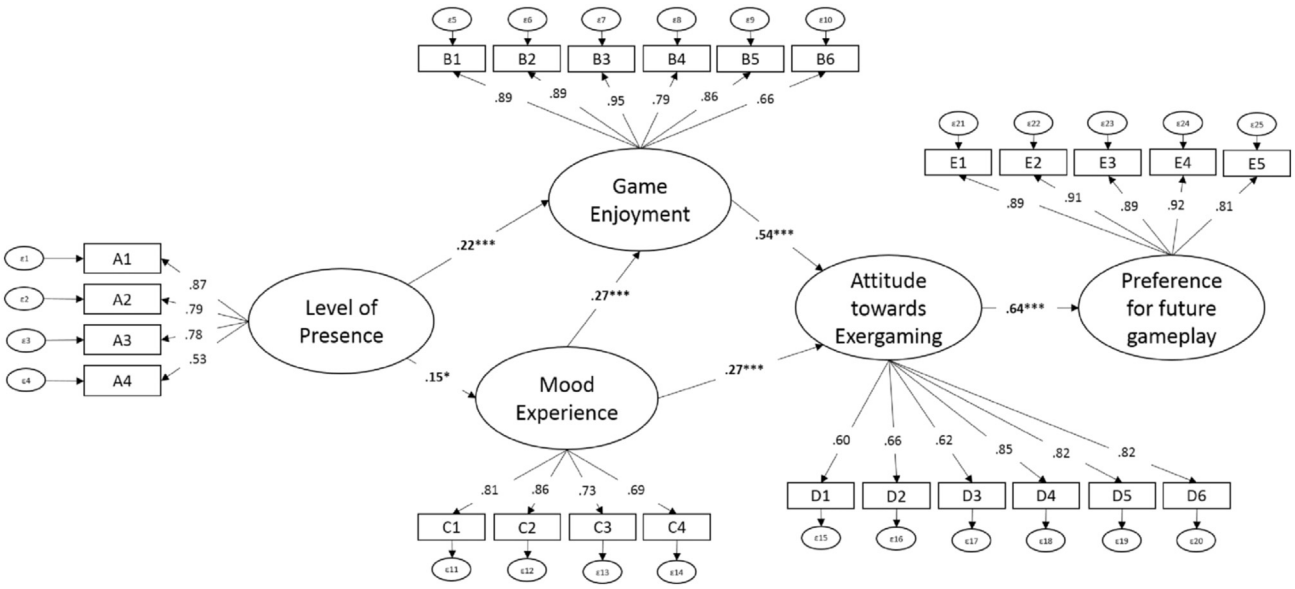

Fig. 2. SEM showing factors predicting preference for future game play among children. *Note*. Standardized estimates are shown for paths between latent variables. $^{*}p < 0.05$. $^{**}p < 0.01$. $^{***}p < 0.001$. $X^2(294) = 596.209$, $p < 0.000$; CFI = 0.95; TLI = 0.95; RMSEA = 0.06, SRMR = 0.07.

exist. In the context of game design, it can be used to measure the extent to which players feel that they are inside the game, rather than an external agent controlling the characters from outside the game world (Ryan, Rigby, & Przybylski, 2006). In other words, presence is related to the feeling of existing in another alternate reality offered by the game. Past research has shown that presence increases satisfaction of the gaming experience (Nunez & Blake, 2006), and is a strong predictor of game enjoyment (Horvath & Lombard, 2010; Shafer, Carbonara, & Popova, 2011). However, how presence is associated with media enjoyment, particularly in the context of exergames, has not been made clear.

Hartmann, Klimmt, and Vorderer (2010) suggest that the link between presence and enjoyment can be explained by psychological escapism, a term used by scholars to explain user motivation of consuming media that accurately simulates real-world situations and objects (Katz & Foulkes, 1962; Moskalenko & Heine, 2003). Katz and Foulkes (1962) first conceptualized media use as escape, proposing that people escape to fictional media content so as to forget about stressful life circumstances, or inadequacies of one's social roles. But contrary to other scholars of their time, they argued that escapist uses of the media did not necessarily lead to negative consequences such as withdrawal from reality and strained personal relationships. Instead, they pointed out that individuals operate at several levels, and it is possible for media exposure to "contribute functionally at one level and dysfunctionally at another" (p. 385).

Scholars have found that children use media for escape as well. Some studies have focused on the negative consequences of escapism. For example, Kuss, Louws, and Wiers (2012) found that escapism was a strong predictor of excessive gaming. Kwon, Chung, and Lee (2011) found that using video games to escape from the self could lead to gaming addiction. Evidently, digital games are often easily and comfortably linked with negative meanings of escapism, which only reveals an inadequate understanding of digital games, as well as the theoretical principles of escapism (Calleja, 2010).

But given the widespread adoption of technology and the inevitable contact with technology in our lives, there is a need to examine how digital games can have protective or enhancing effects for adolescents as well. Besides allowing children to take on alternate identities and learn how to make rational decisions (Hamlen, 2011), alternate fantasy game worlds may offer brief respite from the stresses of real life. Von Salisch, Oppl, and Kristen (2006) have suggested that children are attracted to electronic games that offer opportunities for escapism and mood management. Ohannessian (2009) explained that video games may help adolescents to temporarily disengage from their problems. This form of temporary escape can act as a potential coping mechanism for problems they may face in life (Klinger, 1975).

In discussing positive outcomes of media use as escape such as those mentioned above, Hartmann et al. (2010) put forth that escapism can be linked to presence and entertainment. According to them, people consume media in an attempt to distract themselves from reality. When the media are sufficiently engaging and people experience the feeling of presence, the distraction from negative moods and thoughts may in itself be a form of entertainment, leading to enjoyment (Zillmann, 1988).

The elimination of negative mood states can be achieved by merely distracting oneself from the real world. Yet Hartmann et al. (2010) argue that this is still not enough to induce the feeling of enjoyment. They propose that media enjoyment only occurs when players not only escape from unpleasant real life situations, but also move to alternate mediated realities that are more entertaining. Following this line of thought, presence should first be associated with a positive mood change, and subsequently enjoyment of the media consumed. This also means that enjoyment occurs at a higher level than mood change.

However, motivations for media consumption are varied, and the desire to escape from the real world may not be experienced all the time. The rich literature on uses and gratifications research has revealed that people also seek out media for solely entertainment purposes or to alleviate boredom, among other motivations (Ruggiero, 2000). In that case, the feeling of presence or being immersed in another mediated world may be linked directly to enjoyment and the mood change would not be a necessary precedent. In addition, there is also growing literature suggesting the correlation between presence and enjoyment of media, although specific causal relations have not yet been clearly established (Green, Garst, & Brock, 2004; Hartmann et al., 2010; Ravaja et al.,

2005; Tamborini & Skalski, 2006). Therefore, we propose the following hypotheses:

H1. Level of presence is positively associated with (a) game enjoyment and (b) mood experience.

H2. Mood experience is positively associated with game enjoyment.

RQ1. Does mood experience mediate the relationship between presence and game enjoyment?

4. Enjoyment, mood, and attitudes

The preceding literature has shown that it is necessary to differentiate between enjoyment and mood as separate constructs. Both have been shown to be correlated with improving attitude toward target objects. Game enjoyment has been found to be the most important motivation for game play (Sweetser & Wyeth, 2005). Empirical studies have demonstrated that enjoyment can predict attitude toward various types of games. A study on advertising games found that greater game enjoyment led to more positive attitude toward the brand of the games (Wise, Bolls, Kim, Venkataraman, & Meyer, 2008). Lee (2009) found that game enjoyment showed a significant effect on attitude toward online games among a survey sample in Taiwan. Likewise, Wu and Liu (2007) found in a sample in the United States that game enjoyment was positively related to attitude toward playing online games. The researchers explained that players who have enjoyable and pleasant gaming experiences would have better evaluations of game play, and hence expect benefits from playing the game. Consequently, they will develop better attitude toward the game.

As for how mood may enhance attitudes, the literature on mood management theory may shed some light. Mood management theory suggests that users select media products in order to maximize positive moods and minimize negative moods (Zillmann, 1988). This is based on hedonistic assumptions that individuals seek to maximize pleasurable moods and positive experiences. In the context of media entertainment studies, computer and video games are media that users can consume in order to induce positive moods (Vorderer, Hartmann, & Klimmt, 2003; Zillmann, 1988). Participants who report more positive mood experiences after game play would likely attribute the mood improvement to the game, based on classical conditioning or heuristic associations such as “I feel good so I like it” (Wood, 2000). Thus, they are likely to report better evaluations of the games in terms of utility and enjoyment. In other words, they would develop more positive attitudes towards exergames. As such, we hypothesize that:

H3a. Game enjoyment is positively correlated with attitude toward exergaming.

H3b. Mood experience is positively correlated with attitude toward exergaming.

5. Attitudes and preference for future game play

Finally, attitude theorists and researchers have long discussed the impact of attitude on behavior (Ajzen & Fishbein, 2005; Eagly & Chaiken, 1984; Fazio, 1986). Specifically, attitude has been postulated to affect behavior, through behavioral intentions, across a variety of contexts (Ajzen & Fishbein, 2005; Ajzen, 1991). In gaming, Lee (2009) found that attitude toward online gaming strongly predicted intention to play online games. Likewise, Poobalan, Aucott, Clarke, and Smith (2012) found that attitudes towards exercise strongly predicted intentions to exercise. More specifically, in the area of exergaming, Kari and Makkonen (2014) found that attitude toward exergames predicted intention to play exergames, suggesting that attitude toward exergaming play an important role in individuals' intentions to play exergames in the future. As such, we hypothesize that:

H4. Attitude toward exergaming is positively correlated with preference for future game play.

6. Method

In order to examine how presence, game enjoyment, mood experience and attitude toward exergames affect preference for future game play, we conducted a survey with children aged between 8 and 12. Child respondents were recruited from a total of three elementary schools in Singapore (see Table 1).

6.1. Participants and procedures

Prior to the survey, we obtained approval from the Singapore's Ministry of Education and the university's institutional review board to conduct a six-week intervention program in three elementary schools using exergames to promote children's physical activity levels. Informed and written parental consent were obtained before conducting the research. The exergames chosen for the intervention were from the Xbox Kinect platform, and consisted of the games *Volleyball*, *Pentathlon*, *Just Dance 3*, *Soccer*, and *Boxing*, with a different game being played each week (see Table 2 for detailed description of the games). The Xbox Kinect was chosen because previous researchers have found that players expended a greater amount of energy playing on the Xbox Kinect as compared to other devices such as the Nintendo Wii (O'Donovan et al., 2012). In addition, Xbox Kinect is a newer device, and players tend to be more motivated to engage with newer games (O'Donovan et al., 2012). Over the course of six weeks, participants played the exergames instead of having regular physical education lessons. During the intervention, around five or six Xbox Kinect devices were set up at each school, with four to six players assigned to each station at any given time. Each session lasted about an hour. At the end of the six-week intervention, participants ($n = 345$) filled out the survey on a voluntary basis and were informed that their decision to participate in the survey would not have subsequent impact on any potential relationship with the university in the future.

6.2. Measures

Our questionnaire consisted of measures for sense of presence, mood experience, game enjoyment, attitude toward exergame, and preference for future game play. Prior to running structural equation modeling, exploratory factor analyses (EFA) were conducted using principal components analysis on all latent variables. In order to select and retain items, we adopted three recommendations (Comrey, 1988; Floyd & Widaman, 1995; Worthington & Whittaker, 2006) – retaining items with factors loadings more than 0.40, removing items that cross-loaded, and retaining items that were conceptually consistent with the other items on the factor. Extraction was based on eigenvalues greater than 1 (Kaiser, 1960). As some correlations among factors were expected, an oblique (Promax) rotation was used for performing the EFA (Costello & Osborne, 2009). Following that, confirmatory factor analyses (CFA) revealed that all the scales consisted of items that had factor loadings above 0.50. Table 2 displays the descriptive statistics for the items and scales used in the study.

Level of presence was measured by asking children to rate their loss of self-awareness, loss of awareness of surroundings, altered

Table 1
Description of exergames used.

Game Title	Description
Volleyball	Volleyball is played between players by using upward and swinging hand motions when serving, followed by bump, set, and spike motions when returning or passing the ball.
Pentathlon	The sporting events included in this collection include sprinting, long jump, hurdles, discus, and javelin. Players must sprint on the spot, jump, or use throwing motions when playing the game.
Just Dance 3	Players are required to follow and mirror the dance moves being shown on screen.
Soccer	In soccer, attacking players use their legs to kick the ball on screen when passing or shooting. Meanwhile, defending players have to move around to try and block the shots using their full body.
Boxing	In boxing, players use their arms to punch or block.

Table 2
Descriptive statistics for key and background variables.

	Mean	SD	α
Self-Presence	**3.24**	**0.94**	**0.83**
1. I become less aware of my surroundings during my play	3.23	1.16	
2. I become less self-aware during my play	3.08	1.16	
3. I experience an altered sense of time during my play	3.26	1.16	
4. I feel emotionally involved in the game	3.39	1.24	
Mood Experience	**3.69**	**0.88**	**0.86**
Please indicate how you feel on the following words after each exercise session.			
1. Active	3.69	1.02	
2. Energetic	3.72	1.09	
3. Excited	3.70	1.07	
4. Lively	3.66	1.05	
Game Enjoyment	**4.10**	**0.87**	**0.93**
1. I enjoyed playing the game very much	4.13	0.97	
2. I found playing the game an entertaining experience	4.15	0.98	
3. The game was fun to play	4.19	0.95	
4. I thought this game was quite enjoyable	4.08	0.99	
5. I would describe this game is somewhat interesting	4.14	0.99	
6. While I was playing this game, I was thinking about how much I enjoyed it	3.93	1.10	
Attitude Toward Exergames	**3.85**	**0.81**	**0.89**
1. Playing X-Box Kinect helps me to relieve stress	3.72	1.04	
2. Playing X-Box Kinect is an enjoyable habit that I like doing	3.77	0.99	
3. Playing X-Box Kinect offers a pleasant way to fill time	3.72	1.00	
4. I have fun when I exercise with X-Box Kinect	4.04	1.02	
5. I feel mentally and spiritually better when I exercise with X-Box Kinect	3.84	1.04	
6. I look forward to playing X-Box Kinect	4.00	1.04	
Preference for Future Game Play	**3.82**	**0.98**	**0.95**
1. I intend to play the game in the near future	3.81	1.08	
2. I will try to play the game in the near future	3.79	1.09	
3. I will play the game in the near future	3.80	1.10	
4. I would like to play the game in the near future	3.86	1.04	
5. I plan to play the game in the near future	3.82	1.10	

Note: M = Construct mean, SD = Standard deviation, α = Cronbach's alpha.

sense of time, and emotional involvement during game play on four 5-point scales, anchored on “strongly disagree” (1) to “strongly agree” (5). The items were adapted from Ryan et al. (2006). In total, five items were initially used to measure the level of presence. The initial EFA yielded two factors. Following that, we deleted the cross-loaded items and examined the scree plot (Cattell, 1966). Using the four items listed in Table 2, the following EFA yielded one factor with no cross-loadings. The Cronbach's alpha for self-presence was 0.83.

Mood experience was measured using an inventory of four emotive responses toward exergames adapted from Diener and Emmons (1984). Children were asked to rate whether four adjectives (active, energetic, excited, and lively) described their experience on a 5-point scale, anchored on “does not describe” (1) to “accurately describes.” In total, six items were initially used to measure the level of presence. The initial EFA yielded two factors. Following that, we deleted the cross-loaded items and examined the scree plot. Using the four items listed in Table 2, the following EFA yielded one factor with no cross-loadings. The Cronbach's alpha for mood experience was 0.86.

Game enjoyment was measured by asking children to rate their enjoyment of the exergame on six 5-point scales, anchored on “strongly disagree” (1) to “strongly agree” (5). The items were adapted from (Ryan et al., 2006). In total, seven items were initially used to measure the level of presence. The initial EFA yielded two factors. Following that, we deleted the cross-loaded items and examined the scree plot. Using the six items listed in Table 2, the following EFA yielded one factor with no cross-loadings. The Cronbach's alpha for game enjoyment was 0.93.

Attitude toward exergames was measured by asking children to rate how much they agreed with attitudinal statements about their time spent playing exergames (e.g., Playing X-box Kinect helps me to relieve stress) on six 5-point scales, anchored on “strongly disagree” (1) to “strongly agree” (5). The six items were selected from a list of 24 items, based on its conceptual consistency with regards to general attitude towards exergames. EFA found that all six items loaded on one factor with no cross-loadings. The Cronbach's alpha for attitude towards exergame was 0.89.

Preference for future game play was measured by asking children to their intention to play exergames in the future (e.g., I would

like to play the game in near future) on five 5-point scales, anchored on "not at all" (1) to "very much" (5). EFA found that all five items loaded on one factor with no cross-loadings. The Cronbach's alpha for preference for future game play was 0.95.

Control Variables. The last section of the questionnaire included questions pertaining to the children's demographic profile. Gender and age were used as control variables for the analysis.

6.3. Analytical approach

To test our hypothesized model (see Fig. 1) in explaining variances in preference for future game play among children, we used *SPSS AMOS 22* to run structural equation modeling (SEM). The maximum likelihood procedure was used to estimate the unknown parameters in both models. The goodness of fit of each model was evaluated on the basis of a comparative fit index (CFI) of 0.90 or greater, a Tucker-Lewis index (TLI) of 0.90 or greater, root mean square error of approximation (RMSEA) less than 0.06, standardized root mean square residual (SRMR) less than 0.08, and the relative chi-square of 2 or lesser (Bentler & Bonett, 1980; Browne & Cudeck, 1993; Byrne, 1994; Hu & Bentler, 1999; Ullman, 2001). We chose to use relative chi-square as a measure of model fit as the chi-square of models with large sample sizes are usually statistically significant, indicating that the model fit is poor (Bentler & Bonett, 1980). Relative chi-square refers to the chi-square divided by the degrees of freedom, and model fit is deemed acceptable if the value is lower than 5.00 (Wheaton, Muthen, Alwin, & Summers, 1977).

SPSS 22 was used to perform the tests of indirect effects as assumed in the model and to answer RQ1. The mediation path was tested using the SPSS Macro INDIRECT (Preacher & Hayes, 2008). INDIRECT utilizes a product-of-coefficients strategy to examine the significance of indirect effects, which is argued to be a more powerful approach compared to the Baron and Kenny approach and the Sobel Test (Preacher & Hayes, 2008). Bootstrapped confidence intervals were estimated to avoid statistical power problems caused by asymmetric and nonnormal distributions. Bias-corrected bootstrapping was used, producing more accurate confidence intervals. Finally, 5000 bootstrapped samples were used.

7. Results

After controlling for age and gender, our model indicates an acceptable fit (CFI = 0.95, TLI = 0.95, RMSEA = 0.06, SRMR = 0.07, Relative X^2 = 2.03) as CFI, NNFI, RMSEA, SRMR and relative chi-square were within the acceptable threshold. In addition, all the factor loadings were acceptable and exceeded 0.5, indicating convergent validity (Field, 2005).

H1a posited that presence is positively associated with game enjoyment. This was supported, as there was a significant positive relationship between presence and game enjoyment (β = 0.22, $p < 0.001$). H1b posited a positive relationship between presence and mood experience. Likewise, this was supported in our model as presence was found to have a significant positive relationship with mood experience ($\beta = 0.15$, $p < 0.05$). RQ1 sought to understand the mediating effect of mood experience on the relationship between presence and game enjoyment. Using the INDIRECT macro by Preacher and Hayes (2008), we found that there was a significant indirect effect between presence and game enjoyment with mood experience as the mediator (bootstrap mean = 0.04, 95% CI = 0.01–0.09).

H3a and H3b posited that game enjoyment and mood experience are positively correlated with attitude toward exergaming. This was supported as both game enjoyment and mood experience were significantly and positively correlated to attitude toward exergaming (β = 0.54, $p < 0.001$; β = 0.27, $p < 0.001$). H4 posited that attitude toward exergaming is positively correlated to preference for future game play. This was supported as well, with attitude significantly and positively predicting preference for future game play (β = 0.64, $p < 0.001$).

All assumed indirect effects in the model were found to be significant using the INDIRECT macro. Enjoyment mediated the relationship between presence and attitude (bootstrap mean = 0.10, 95% CI = 0.05–0.17). Mood experience mediated the relationship between presence and attitude (bootstrap mean = 0.05, 95% CI = 0.01–0.11). Next, attitude mediated the relationship between enjoyment and preference for future game play (bootstrap mean = 0.25, 95% CI = 0.17–0.36). Finally, attitude mediated the relationship between mood experience and preference for future game play (bootstrap mean = 0.26, 95% CI = 0.19–0.36).

8. Discussion

This study presents an empirical assessment of the relationship between participants' level of presence, game enjoyment, mood experience, and attitude toward exergames and how these in turn influenced participants' preference for future game play. The results supported our study hypotheses. Our model results revealed that perceptions about the positive impacts of exergames were positively associated with expressed preferences for future game play. Positive attitudes were affirmed by higher levels of game enjoyment and positive mood attainment. In particular, a higher level of presence experienced when playing exergames was positively correlated with game enjoyment and mood experience.

Game enjoyment was found to be a strong motivating factor supporting the development of positive attitude toward game play. This supports past research on the impact of enjoyment on attitude toward brands of advertising games (Wise et al., 2008) and online gaming (Wu & Liu, 2007). Players derive pleasure when needs are gratified during game play. In our study, game enjoyment and mood although closely interrelated, were broken down into two separate constructs because players may seek out media not only for its functional role to satisfy the need for entertainment but also for the purpose of achieving positive mood states. Results highlight that each construct might be involved in different motivational processes with positive emotions or moods generated through immersion in game play found to be independently related to attitudes.

The sense of presence in the exergame was found to be positively related to game enjoyment, and mediated by mood experience. Past research has similarly found presence to increase satisfaction of the gaming experience (Nunez & Blake, 2006), and to be a strong predictor of game enjoyment (Horvath & Lombard, 2010; Shafer et al., 2011). Beyond this direct effect, sufficient presence in the virtual reality of games by escaping to a more entertaining reality can also distract participants from negative moods and thoughts. Mood experience therefore acted as a mediator, implying that presence was first associated with a positive mood change, and subsequently linked to enjoyment of the exergames. Therefore, enjoyment occurred at a higher level than mood change.

We would like to note that past studies have revealed escapism as a strong predictor of excessive gaming (Kuss et al., 2012; Kwon et al., 2011). As such, concerns may be raised over the possibility of escapism resulting in exergames addiction. But looking at the theoretical basis for this claim, we believe that our findings instead suggest the contrary. In particular, Kwon et al. (2011) reported in a survey study that internet gaming addiction was most strongly correlated with the tendency to escape, as well as with negative mood states. Baumeister's (1991) theory of escape from self was

used to explain how a greater tendency to escape leads to Internet game addiction. In their explanation, negative mood states, arising from the feeling of one's incompetency, was the key driver towards escapist behavior and reduced inhibitions toward destructive behavior such as addiction. They argue that the desire to eliminate negative mood states steers adolescents towards prolonged Internet gaming as a form of escapist behavior. Our study did not measure whether excessive gaming would be an outcome from a greater level of presence, mood experience, and enjoyment. However, we believe there are distinct differences between Internet games, as examined by Kwon et al. (2011), and exergames that might lead to qualitatively different types of outcomes. As noted, the focus by Kwon et al. (2011) was on Internet games which are sedentary in nature and do not encourage much physical activity (Lehtinen-Jacks, Koivusilta, Lintonen, Virtanen, & Rimpela, 2005). On the other hand, exergames are known to generate light to moderate caloric expenditure and heart rate increases (Staiano & Calvert, 2011). Exergame players have also been shown to exhibit more positive mood changes after as little as 30 min of gameplay as compared to the control group (Russell & Newton, 2008). This is consistent with the benefits of actual exercise which improves our moods (Plante, Coscarelli, & Ford, 2001). As such, our results suggest that instead of leading to addiction, playing exergames may actually help encourage positive mood changes and alleviate prior negative moods in a healthy constructive manner similar to actual exercise, rather than a less desired manner such as prolonged sedentary gaming, which may lead to addiction. In other words, exergames may serve as a healthy outlet for emotional relief and mood improvement to help children cope with various stresses. Despite this, we believe future studies should examine how exergames and other types of video games are different, and whether excessive gaming tend to arise from greater feelings of presence in exergames.

It is important to interpret the above findings within the context of several limitations present in this study. The current cross-sectional data sufficed for the examination of the correlations between the level of presence, game enjoyment, mood experience, and attitude toward exergames and how these in turn influenced participants' preference for future game play. Future research should consider a longitudinal design to establish causality between the variables.

Existing studies have also found that game features such as competition and individual differences such as competitiveness can impact motivation, mood and evaluation of exergames (Song, Kim, Tenzek, & Lee, 2013). Our findings should be read with the knowledge that game features and individual differences are likely to influence the drivers of presence, mood experience and enjoyment of an exergame. Future research should examine how game features and individual differences influence presence.

8.1. Theoretical contributions

Studies have proposed that media enjoyment occurs when players are immersed in alternate mediated realities, and individuals have different motivations for seeking out media, which can include efforts at mood enhancement. The explication and treatment of enjoyment and mood as two separate constructs in this study suggests that the feeling of presence can impact game enjoyment by means of two pathways. A higher degree of immersion in the alternate reality of the game was found to improve enjoyment of exergames directly. This is a commonly discussed pathway in the literature. In this study, our contribution lies in the examination of possible mediation of the relationship between media enjoyment and the feeling of presence by mood states. By considering the selection of media products to be driven by escapist or other motivations to enhance moods, we have some empirical evidence that greater immersion in the alternate reality of exergames was found to improve moods, which subsequently led to higher levels of enjoyment.

8.2. Practical implications

A systematic review of studies tracking obesity-related behaviors from childhood to adulthood found higher levels of physical activity during childhood to be associated with higher odds of engagement in physical activity in adulthood (Craigie, Lake, Kelly, Adamson, & Mathers, 2011). Health interventions focusing on modifying physical activity levels in children and adolescents is therefore an important policy lever that could significantly modify health risk factors and health outcomes in adulthood. In other settings, digital games have been employed for educational purposes to motivate children to learn difficult concepts and to master difficult tasks through play (Gee, 2003; Gros, 2007). The positive effects of game enjoyment and mood experience on attitude toward exergaming found in this study demonstrates that engagement in an activity for enjoyment and recreation (Garvey, 1990) can strengthen intrinsic motivations to exercise using exergames. This provides important implications for designers of digital health interventions.

Our study also has practical implications for exergame design. The level of presence was found to be positively associated with the intention for future exercise through exergaming while mood also mediates between the level of presence and game enjoyment. Total engagement in the exergame is equivalent to “being in the zone” in the sporting world (Sinclair, Hingston, & Masek, 2007). During exergaming, interactions can feel artificial, which may limit the feeling of existing in another alternate reality (Stach & Graham, 2011). Therefore, our findings imply that future interventional efforts that aim to leverage on the appeal of exergames for exercise could focus on improving game enjoyment and mood experience by enabling the player to experience a higher degree of presence.

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References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179–211.
Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. *The Handbook of Attitudes, 173*, 221.
Baumeister, R. F. (1991). *Escaping the self: Alcoholism, spirituality, masochism, and other flights from the burden of selfhood*. New York, NY: Harper Collins.
Bentler, P., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588.
Biddiss, E., & Irwin, J. (2010). Active video games to promote physical activity in children and youth: A systematic review. *Archives of Pediatrics & Adolescent Medicine, 164*(7), 664–672. http://dx.doi.org/10.1001/archpediatrics.2010.104.
Bogost, I. (2007). *Persuasive games: The expressive power of videogames*. MIT Press.
Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–192). Newbury Park, CA: Sage.
Brussoni, M., & Olsen, L. L. (2013). The perils of overprotective parenting: Fathers' perspectives explored. *Child: Care, Health & Development, 39*(2), 237–245.
Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows: Basic concepts, applications, and programming*. Sage.
Calleja, G. (2010). Digital games and escapism. *Games and Culture, 5*(4), 335–353.
Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*, 245–276.
Comrey, A. L. (1988). Factor-analytic methods of scale development in personality and clinical psychology. *Journal of Consulting and Clinical Psychology, 56*,

754–761.
Costello, A. B., & Osborne, J. (2009). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Pan-Pacific Management Review, 12*(2), 131–146.
Craigie, A. M., Lake, A. A., Kelly, S. A., Adamson, A. J., & Mathers, J. C. (2011). Tracking of obesity-related behaviours from childhood to adulthood: A systematic review. *Maturitas, 70*(3), 266–284.
Daley, A. J. (2009). Can exergaming contribute to improving physical activity levels and health outcomes in children? *Pediatrics, 124*(2), 763–771. http://dx.doi.org/10.1542/peds.2008-2357.
Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology, 47*, 1105–1117.
Eagly, A. H., & Chaiken, S. (1984). Cognitive theories of persuasion. *Advances in Experimental Social Psychology, 17*, 267–359.
Fawkner, S. G., Niven, A., Thin, A. G., MacDonald, M. J., & Oakes, J. R. (2010). Adolescent girls' energy expenditure during dance simulation active computer gaming. *Journal of Sports Sciences, 28*(1), 61–65. http://dx.doi.org/10.1080/02640410903369935.
Fazio, R. H. (1986). How do attitudes guide behavior. In R. M. Sorrentino, & E. T. Higgins (Eds.), *Handbook of motivation and Cognition: Foundations of social behavior* (pp. 204–243). New York: Guilford Press.
Field, A. (2005). *Discovering statistics using SPSS* (Second). Newbury Park, CA: Sage.
Fletcher, A., Cooper, J. R., Helms, P., Northington, L., & Winters, K. (2009). Stemming the tide of childhood obesity in an underserved urban African American population: A pilot study. *ABNF Journal, 20*(2), 44–48.
Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment, 7*(3), 286–299.
Foley, L., & Maddison, R. (2010). Use of active video games to increase physical activity in children: A virtual reality? *Pediatric Exercise Science, 22*, 7–20.
Gao, Z., & Chen, S. (2014). Are field-based exergames useful in preventing childhood obesity? A systematic review. *Obesity Reviews, 8*, 676.
Garvey, C. (1990). *Play*. Cambridge, MA: Harvard University Press.
Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in Entertainment, 1*(1), 1–4.
Geurts, L., Vanden Abeele, V., Husson, J., Windey, F., Van Overveldt, M., Annema, J. H., et al. (2011). Digital games for physical therapy: Fulfilling the need for calibration and adaptation. In *Proceedings of the fifth international conference on tangible, embedded, and embodied interaction* (pp. 117–124). ACM. http://dx.doi.org/10.1145/1935701.1935725.
Green, M. C., Garst, J., & Brock, T. C. (2004). The power of fiction: Determinants and boundaries. In L. J. Shum (Ed.), *The psychology of entertainment Media: Blurring the lines between entertainment and persuasion* (pp. 161–176). Mahwah, NJ: Lawrence Erlbaum Associates.
Gros, B. (2007). Digital games in education: The design of games-based learning environments. *Journal of Research on Technology in Education, 40*(1), 23–38.
Hamlen, K. R. (2011). Children's choices and strategies in video games. *Computers in Human Behavior, 27*(1), 532–539.
Hartmann, T., Klimmt, C., & Vorderer, P. (2010). Telepresence and media entertainment. In C. C. Bracken, & P. Skalski (Eds.), *Immersed in media: Telepresence in everyday life* (pp. 137–157). New York, NY: Routledge.
Horvath, K., & Lombard, M. (2010). Social and spatial presence: An application to optimize human-computer interaction. *PsychNology Journal, 8*(1), 85–114.
Hu, L. T., & Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55.
Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141–151.
Kari, T., & Makkonen, M. (2014). Explaining the usage intentions of exergames. In *Thirty fifth international conference on information systems, Auckland 2014*. Association for Information Systems (AIS).
Katz, E., & Foulkes, D. (1962). On the use of the mass media as "escape": Clarification of a concept. *Public Opinion Quarterly, 26*(3), 377–388.
Klinger, E. (1975). Consequences of commitment to and disengagement from incentives. *Psychological Review, 82*(1), 1.
Kuss, D. J., Louws, J., & Wiers, R. W. (2012). Online gaming addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. *Cyberpsychology, Behavior, and Social Networking, 15*(9), 480–485.
Kwon, J. H., Chung, C. S., & Lee, J. (2011). The effects of escape from self and interpersonal relationship on the pathological use of internet games. *Community Mental Health Journal, 47*(1), 113–121.
Landry, B. W., & Driscoll, S. W. (2012). Physical activity in children and adolescents. *PM&R, 4*(11), 826–832. http://dx.doi.org/10.1016/j.pmrj.2012.09.585.
Lee, M. C. (2009). Understanding the behavioural intention to play online games: An extension of the theory of planned behaviour. *Online Information Review, 33*(5), 849–872.
Lehtinen-Jacks, S., Koivusilta, L., Lintonen, T., Virtanen, S. M., & Rimpela, A. (2005). Use of information and communication technology and prevalence of overweight and obesity among adolescents. *International Journal of Obesity, 29*(8), 925–933. http://dx.doi.org/10.1038/sj.ijo.0802994.
Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. *Journal of Computer-Mediated Communication, 3*(2). http://dx.doi.org/10.1111/j.1083-6101.1997.tb00072.x, 0–0.
Lwin, M. O., Ho, S. S., Jung, Y., Leng, T. Y., Wardoyo, R. J., & Jung, K. H. (2016). Effects of exergaming and message framing in school environments on physical activity attitudes and intentions of children and adolescents. *Journal of Health Communication, 21*(9), 969–978. http://dx.doi.org/10.1080/10810730.2016.1153759.
Lwin, M. O., & Malik, S. (2012). The efficacy of exergames-incorporated physical education lessons in influencing drivers of physical activity: A comparison of children and pre-adolescents. *Psychology of Sport and Exercise, 13*(6), 756–760.
Lwin, M. O., & Malik, S. (2014). Can exergames impart health messages? Game play, framing, and drivers of physical activity among children. *Journal of Health Communication: International Perspectives, 19*(2), 136–151. http://dx.doi.org/10.1080/10810730.2013.798372.
Malone, T. (1981). Towards a theory of intrinsically motivating instruction. *Cognitive Science, 4*, 333–369.
Mazzeo, D., Arens, S. A., Germeroth, C., & Hein, H. (2012). Stopping childhood obesity before it begins. *Phi Delta Kappan, 93*(7), 10–15.
Mhurchu, C. N., Maddison, R., Jiang, Y., Jull, A., Prapavessis, H., & Rodgers, A. (2008). Couch potatoes to jumping beans: A pilot study of the effect of active video games on physical activity in children. *International Journal of Behavioral Nutrition and Physical Activity, 5*(1), 1. http://dx.doi.org/10.1186/1479-5868-5-8.
Mills, A., Rosenberg, M., Stratton, G., Carter, H. H., Spence, A. L., Pugh, C. A., et al. (2013). The effect of exergaming on vascular function in children. *Journal of Pediatrics, 163*(3), 806–810. http://dx.doi.org/10.1016/j.jpeds.2013.03.076.
Ministry of Health. (2011). National Health Survey 2010. Retrieved from https://www.moh.gov.sg/content/moh_web/home/Publications/Reports/2011/national_health_survey2010.html.
Morano, M., Colella, D., Robazza, C., Bortoli, L., & Capranica, L. (2011). Physical self-perception and motor performance in normal-weight, overweight and obese children. *Scandinavian Journal of Medicine & Science in Sports, 21*(3), 465–473.
Morawska, A., & West, F. (2013). Do parents of obese children use ineffective parenting strategies? *Journal of Child Health Care, 17*(4), 375–386.
Moskalenko, S., & Heine, S. J. (2003). Watching your troubles away: Television viewing as a stimulus for subjective self-awareness. *Personality and Social Psychology Bulletin, 29*(1), 76–85.
Nunez, D., & Blake, E. (2006). Learning, experience, and cognitive factors in the presence experiences of gamers: An exploratory relational study. *Presence: Teleoperators and Virtual Environments, 15*(4), 373–380. http://dx.doi.org/10.1162/pres.15.4.373.
O'Donovan, C., Hirsch, E., Holohan, E., McBride, I., McManus, R., & Hussey, J. (2012). Energy expended playing Xbox Kinect™ and Wii™ games: A preliminary study comparing single and multiplayer modes. *Physiotherapy, 98*(3), 224–229. http://dx.doi.org/10.1016/j.physio.2012.05.010.
Ohannessian, C. M. (2009). Media use and adolescent psychological adjustment: An examination of gender differences. *Journal of Child and Family Studies, 18*(5), 582–593.
Plante, T. G., Coscarelli, L., & Ford, M. (2001). Does exercising with another enhance the stress-reducing benefits of exercise? *International Journal of Stress Management, 8*(3), 201–213. http://dx.doi.org/10.1023/A:1011339025532.
Poobalan, A. S., Aucott, L. S., Clarke, A., & Smith, W. C. S. (2012). Physical activity attitudes, intentions and behaviour among 18–25 year olds: A mixed method study. *BMC Public Health, 12*(1), 640.
Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879–891.
Ravaja, N., Saari, T., Laarni, J., Kallinen, K., Salminen, M., Holopainen, J., et al. (2005). The psychophysiology of video gaming: Phasic emotional responses to game. In *DiGRA 2005 conference changing views - worlds in play* (pp. 1–13). http://dx.doi.org/10.1207/s1532785xmep0804_2.
Ruggiero, T. E. (2000). Uses and gratifications theory in the 21st century. *Mass Communication & Society, 3*, 3–37.
Russell, W. D., & Newton, M. (2008). Short-term psychological effects of interactive video game technology exercise on mood and attention. *Journal of Educational Technology & Society, 11*(2), 294–308.
Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30*, 347–363. http://dx.doi.org/10.1007/s11031-006-9051-8.
Shafer, D. M., Carbonara, C. P., & Popova, L. (2011). Spatial presence and perceived reality as predictors of motion-based video game enjoyment. *Presence: Teleoperators and Virtual Environments, 20*(6), 591–619. http://dx.doi.org/10.1162/PRES_a_00084.
Sinclair, J., Hingston, P., & Masek, M. (2007). Considerations for the design of exergames. In *Proceedings of the 5th international conference on computer graphics and interactive techniques in Australia and Southeast Asia* (pp. 289–295). ACM.
Song, H., Kim, J., Tenzek, K. E., & Lee, K. M. (2013). The effects of competition and competitiveness upon intrinsic motivation in exergames. *Computers in Human Behavior, 29*(4), 1702–1708. http://dx.doi.org/10.1016/j.chb.2013.01.042.
Stach, T., & Graham, T. C. N. (2011). Exploring haptic feedback in exergames. In *Proceedings of the 13th IFIP TC 13 international conference on Human-computer interaction* (pp. 18–35). Lisbon, Portugal: Springer-Verlag.
Staiano, A. E., Abraham, A. A., & Calvert, S. L. (2013). Adolescent exergame play for weight loss and psychosocial improvement: A controlled physical activity intervention. *Obesity, 21*(3), 598–601. http://dx.doi.org/10.1002/oby.20282.
Staiano, A. E., & Calvert, S. L. (2011). Exergames for physical education courses: Physical, social, and cognitive benefits. *Child Development Perspectives, 5*(2), 93–98. http://dx.doi.org/10.1111/j.1750-8606.2011.00162.x.Exergames.
Sun, H. (2012). Exergaming impact on physical activity and interest in elementary

school children. *Research Quarterly for Exercise and Sport, 83*(2), 212–220.
Sun, H. (2013). Impact of exergames on physical activity and motivation in elementary school students: A follow-up study. *Journal of Sport and Health Science, 2*(3), 138–145.
Sweetser, P., & Wyeth, P. (2005). GameFlow: A model for evaluating player enjoyment in games. *Computers in Entertainment, 3*(3), 3.
Tamborini, R., & Skalski, P. (2006). The role of presence in the experience of electronic games. In P. Vorderer, & J. Bryant (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 225–240). Mahwah, NJ: Lawrence Erlbaum Associates.
Taplin, C. E., & Zeitler, P. (2009). Exercise for the treatment of childhood obesity – is it simply too much to ask? *Acta Paediatrica, 98*(2), 214–216. http://dx.doi.org/10.1111/j.1651-2227.2008.01165.x.
Thomasgard, M., & Metz, W. P. (1997). Parental overprotection and its relation to perceived child vulnerability. *American Journal of Orthopsychiatry, 67*(2), 330–335. http://dx.doi.org/10.1037/h0080237.
Ullman, J. B. (2001). Structural equation modeling. In B. G. Tabachnick, & L. S. Fidell (Eds.), *Using multivariate statistics* (pp. 676–780). Needham Heights, MA: Allyn & Bacon.
Vernadakis, N., Zetou, E., Derri, V., Bebetsos, E., & Filippou, F. (2014). The differences between less fit and overweight children on enjoyment of exergames, other physical activity and sedentary behaviours. *Procedia - Social and Behavioral Sciences, 152*, 802–807. http://dx.doi.org/10.1016/j.sbspro.2014.09.324.
Von Salisch, M., Oppl, C., & Kristen, A. (2006). What attracts children? In P. Vorderer, & J. Bryant (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 147–163). Mahwah, NJ: Lawrence Erlbaum Associates.
Vorderer, P., Hartmann, T., & Klimmt, C. (2003). Explaining the enjoyment of playing video games: The role of competition. In *ICEC '03 proceedings of the second international conference on entertainment computing* (pp. 1–9). Carnegie Mellon University.
Wheaton, B., Muthen, B., Alwin, D. F., & Summers, G. (1977). Assessing reliability and stability in panel models. *Sociological Methodology, 8*(1), 84–136.
Wise, K., Bolls, P. D., Kim, H., Venkataraman, A., & Meyer, R. (2008). Enjoyment of advergames and brand attitudes: The impact of thematic relevance. *Journal of Interactive Advertising, 9*(1), 27–36. http://dx.doi.org/10.1080/15252019.2008.10722145.
Wood, W. (2000). Attitude change: Persuasion and social influence. *Annual Review of Psychology, 51*(1), 539–570.
Worthington, R. L., & Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist, 34*(6), 806–838.
Wu, J., & Liu, D. (2007). The effects of trust and enjoyment on intention to play online games. *Journal of Electronic Commerce Research, 8*(2), 128–140.
Zillmann, D. (1988). Mood management: Using entertainment to full advantage. In L. Donohew, H. E. Sypher, & E. T. Higgins (Eds.), *Communication, social cognition, and affect* (pp. 147–171). Hillsdale, NJ: Psychology Press.