Indicators of wellbeing in recreational video game players

Kellie Vella
Queensland University of Technology (QUT)
Brisbane, Australia
kellie.vella@qut.edu.au

Daniel Johnson
Queensland University of Technology (QUT)
Brisbane, Australia
dm.johnson@qut.edu.au

Leanne Hides
Queensland University of Technology (QUT)
Brisbane, Australia
leanne.hides@qut.edu.au

ABSTRACT
Video game play is a popular entertainment choice, yet we have a limited understanding of the potential wellbeing benefits associated with recreational play. An online survey (final sample, n = 297) addresses this by investigating how the player experience related to wellbeing. The impact of amount of play, game genre, mode of play (social or solitary play) and the psychological experience of play (flow and need satisfaction) on a multi-dimensional measure of wellbeing (emotional, psychological and social) was examined via hierarchical regression. Age, gender, the play of casual games compared to shooters, and in-game experiences of flow, autonomy and relatedness were associated with increases in dimensions of wellbeing.

Author Keywords
Self-determination theory; wellbeing; video game; flow

ACM Classification Keywords
K.8.0; H.1.2

INTRODUCTION

Video games are an extremely popular form of entertainment (Brand, Lorentz, & Mathew, 2014; Entertainment Software Association, 2015), and current research into recreational video games suggests that they have their own direct links to player wellbeing. For example, low to moderate levels of gameplay have been associated with lower levels of anxiety, depression and psychological distress (Allahverdipour, Bazargan, Farhadinasab, & Moeini, 2010), as well as closer family relationships and greater self-esteem (Durkin & Barber, 2002) compared to no play or large amounts of gameplay. Similarly, online games can host meaningful relationships (Yee, 2006), and casual gameplay has been shown to positively change mood (Russoniello, O'Brien, & Parks, 2009). While these studies support the notion that gameplay facilitates some aspects of wellbeing, they do not address whether gameplay impacts on an aggregate conception of wellbeing, or how this interacts with the player experience.

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Player experience and wellbeing

Conceiving wellbeing, in a way that is greater than the sum of its parts, indicates overall quality of life. Thus diverse indicators are resolved into the concepts of emotional wellbeing (positive affect and life satisfaction), psychological wellbeing (positive psychological functioning) and social wellbeing (functioning within society) (Keyes, 1998; Ryff & Keyes, 1995). While the following report connections between elements of wellbeing and gameplay, the potential for links between gameplay and broader conceptions is still being explored.

Self-determination theory (SDT), posits that the satisfaction of the psychological need for experiences of autonomy, competence and relatedness facilitates wellbeing (Ryan & Deci, 2000). Experiences of autonomy and competence in gameplay have been found to account for positive changes in mood, vitality and self-esteem, and relatedness associated with game enjoyment and the intention for future play (Ryan, Rigby, & Przybylski, 2006). Of interest is whether there are associations between the satisfaction of these needs in gameplay and broader conceptions of wellbeing, or if constructs such as flow, better describe that link.

Flow describes the experience of deep engagement, signaling an optimal experience of task demand matched to an individual's level of skill (Csikszentmihalyi, 1990). It is typically understood to impact on wellbeing via its association with positive affect and other forms of emotional wellbeing (Collins, Sarkisian, & Winner, 2009). This is supported by research finding flow in gameplay associated with positive affect and harmonious passion for play (Wang, Khoo, Liu, & Divaharan, 2008).

Mode of play (social context) provides another link to player wellbeing. Play with pre-existing social ties can mitigate some of the losses of psychosocial wellbeing (Shen & Williams, 2011) - though it should be noted that this study found extroversion to be a stronger predictor. Similarly online play with familiar others can generate offline social support (Trepte, Reinecke, & Juechems, 2012). Differences in social and solitary player experiences also indicate the potential for differences in wellbeing, e.g. when players believed they were playing against a human as opposed to a computer, they experienced greater presence (Cairns, Cox, Day, Martin, & Perryman, 2013; Lim & Reeves, 2010; Ravaja et al., 2006), engagement and physiological arousal (Ravaja, et al., 2006). However, contrasts of social and solitary play on measures of wellbeing still require further exploration.

The current research

While the authors have previously reported the predictors of player wellbeing on a measure of total wellbeing

(Vella, Johnson, & Hides, 2013), the current study extends the scope of our previous research by considering how game play may impact on the dimensions of player emotional, psychological, and social wellbeing. Additionally, the current study focusses on a narrower range of players than previously - specifically, those who have played the target game for five or more hours. This minimum exposure time ensured that players had a minimum level of experience with the game and increased the likelihood that the game was in line with the players' preferences.

METHOD

Recruitment and procedure

Approval was granted by a university ethical review board. Individuals who played recreational electronic games on any device, aged 12 and above, were recruited to complete an online survey. Participants were recruited from a university video game studies course, the general public via gaming forums, social media, and a participant research database. Snowball sampling techniques were also used. Data collection ran from December 2012 to April 2013. After providing informed consent, respondents were asked about their experiences playing the 'most recently purchased video game that they had played at least once', referred to herein as the target game. A guided recall was used to prime respondents before the game experience questions. Participants had the opportunity to win one of ten $100 gift vouchers.

Measures

Amount of play was measured as the total reported number of hours spent playing the target game.

Genre was indicated from a list, or text box if not listed. Responses were checked for consistency by the first author, and in some cases changed (e.g. *Angry Birds* was recoded as a casual game instead of a strategy game). To avoid having a large number of categories, conceptually similar meta-genres were created: Action-Adventure (action-adventure, action-roleplaying, text-adventure), Casual (board/card game, casual, dance, music, puzzle, platform), Role-Playing Games (MMORPG, role-playing game), Shooters (first- and third-person), Sports & Simulation (fighting, flight, racing, simulation non-flight and sports), and Strategy (real-time and turn-based).

Mode of play referred to whether the participants played the target game mostly on their own or with others.

The Player Experience of Need Satisfaction Scale (PENS, Ryan, et al., 2006), is a validated measure of the player experience, with autonomy, competence, relatedness, presence and intuitive controls (not used) subscales. It consists of 21 items, (7-point scale), e.g. "I feel very capable and effective when playing".

The Flow State Scale (FSS-2, Susan A. Jackson, Martin, & Eklund, 2008) is a validated measure for assessing the experience of flow in a given activity. It consists of 36 items (5-point scale), e.g. "I did things spontaneously and automatically without having to think." Only the total score was used.

The Mental Health Continuum Short Form (MHC-SF, Keyes, 2002) is a validated measure of wellbeing with both a total and emotional, social and psychological wellbeing scores. It consists of 14 items (6-point scale), asking respondents how often they have felt, for example "satisfied with life", over the past month.

Data preparation and analysis

A total of 460 participants aged 10 to 52 years attempted the online survey. Cases who didn't provide responses on the demographic measures, the PENS, FSS-2 or MHC were removed (n = 106), as were two cases under the age of 12, 49 cases who hadn't recently played the target games for 5 or more hours, three cases that provided impossible values that led us to doubt the credibility of their other responses (e.g. reporting greater average hours of play per week than is in a week), and three univariate outliers in the amount of play measure. The final sample was based upon data provided by 297 participants aged 12 to 52 years (M=25.6, SD=8.0), 84.2% male, 15.8% female, 29% university students, 93.6% Australian. Table 1 displays the wellbeing means and standard deviations of categorical variables. Table 2 displays the frequencies, means, standard deviations, Pearson's correlations and Cronbach's alphas of continuous variables.

Genre and mode of play were dummy coded into discrete variables. Each genre was compared to 'shooters', while mode of play compared 'social play' to 'playing on your own'. Amount of play showed a strong positive skew, so a logarithmic transformation was applied and the new variable was entered into the regression. The final sample size was sufficient for the planned multiple regression analyses (Tabachnick & Fidell, 2007) and all assumptions for hierarchical regression were met. Missing values were excluded listwise.

Three hierarchical multiple regression analyses were conducted using SPSS 21.0 to determine if social context and the psychological experience of play (PENS, FSS-2) predicted emotional, psychological or social wellbeing (MHC-SF). The effects of demographics, amount of play and game genre were controlled for and entered on separate steps. To determine if mode of play and the psychological experience of play (PENS, FSS-2) would have independent effects, they were also entered

		Emotional Wellbeing		**Psychological Wellbeing**		**Social Wellbeing**	
Gender	*N*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Female	47	9.62	3.53	19.66	6.29	12.77	5.64
Male	250	10.59	3.15	20.10	5.74	13.64	5.35
Mode of play							
Social play	124	10.73	3.14	20.84	5.64	14.22	5.29
Solitary play	173	10.21	3.28	19.45	5.89	12.99	5.43
Genre							
Action-Adv.	82	10.50	3.10	20.01	5.57	13.11	5.62
Casual	20	11.60	2.56	22.05	4.37	15.95	4.41
Role-playing	27	9.74	2.97	19.56	4.78	12.67	5.52
Shooters	108	10.56	3.49	20.17	6.35	13.78	5.43
Sport&Sim.	26	10.12	3.06	18.92	5.47	11.58	4.85
Strategy	34	9.97	3.33	19.65	6.45	14.26	5.24

Table 1. Wellbeing descriptives for categorical variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
N	297	297	297	297	297	297	297	297	297	294
M	10.43	20.03	13.50	25.60	110.72	35.51	5.17	5.56	4.04	3.70
SD	3.23	5.82	5.40	7.99	258.03	3.97	1.24	1.00	1.35	1.48
α	.84	.81	.76			.92	.80	.76	.90	.66
1. Emotional Wbg	-									
2. Psychological Wbg	.733**	-								
3. Social Wbg	.655**	.701**	-							
4. Age	-.009	.141*	.071	-						
5. Amount of play	.030	.038	.013	.086	-					
6. Flow	.148*	.162**	.157**	-.184**	.052	-				
7. Autonomy	.148*	.171**	.093	-.142*	.130*	.398**	-			
8. Competence	.169**	.105	.064	-.292**	.187	.543**	.469**	-		
9. Presence	.083	.027	.097	-.255**	.027	.417**	.484**	.398**	-	
10. Relatedness	.198**	.156**	.180**	-.171**	.198**	.226**	.365**	.255**	.511**	-

Table 2. Pearson's correlations two-tailed and descriptive data for continuous variables $^*p < .05$, $^{**}p < .01$

separately. Thus age and gender were entered at Step 1, game genre at Step 2, amount of play at Step 3, mode of play at Step 4, and the PENS and FSS-2 at Step 5.

RESULTS

Emotional wellbeing

The full model was statistically significant, $R^2 = .110$, $F(14, 279) = 2.455$, $p < .01$ (Table 3). The adjusted R^2 value of .065 at Step 5 suggests that 6.5% of the variability in emotional wellbeing was predicted by the final model. The *R* became significant at the end of step 5 with the addition of flow and the PENS, (R^2 change = .065). In the final step, only gender (being male compared to female), and in-game relatedness positively predicted emotional wellbeing.

Psychological wellbeing

The full model was statistically significant, $R^2 = .133$, $F(14, 279) = 3.051$, $p < .001$ (Table 3). The adjusted R^2 value of .089 at Step 5 suggests that 8.9% of the variability in player psychological wellbeing is predicted by this final model. The *R* became significant at the end of step 5, (R^2 change = .077). At this level, only older age and the experiences of autonomy, relatedness and flow in gameplay significantly predicted a positive relationship to psychological wellbeing.

Social wellbeing

The full model was statistically significant, $R^2 = .117$, $F(14, 279) = 2.646$, $p < .01$ (Table 3). The adjusted R^2 value of .073 at Step 5 suggests that 7.3% of the variability in player social wellbeing is predicted by the final model. The *R* became significant at the end of Step 4 with the introduction of mode of play (R^2 change = .013), while at Step 5 the addition of flow and the PENS subscales produced an R^2 change of .059. In the final model only older age, casual games compared to shooters, and in-game relatedness and flow were shown to significantly and positively predict social wellbeing.

DISCUSSION

PENS and flow were predictive of player wellbeing irrespective of demographics, genre, amount and mode of play, highlighting the importance of the player experience for player wellbeing. Mode of play was predictive of social wellbeing regardless of the effect of demographics, genre and amount of play, but did not present as a significant coefficient in the final model. This suggests that relatedness may be mediating mode's impact, and a more nuanced measure of mode is required.

		Emotional Wellbeing				**Psychological Wellbeing**				**Social Wellbeing**			
Step	Variable	*B*	*SE B*	*β*	sr^2	*B*	*SE B*	*β*	sr^2	*B*	*SE B*	*β*	sr^2
1	Age	.030	.025	.075	.005	**.157**	**.045**	**.215****	**.038**	**.098**	**.042**	**.145***	**.017**
	Gender	**1.300**	**.516**	**.147***	**.020**	.857	.918	.054	.003	1.455	.859	.099	.009
2	Genre: Action-Adv.	.154	.499	.021	.000	.644	.888	.049	.002	-.011	.830	-.001	.000
	Genre: Casual Games	1.513	.795	.118	.012	2.447	1.414	.106	.009	**2.890**	**1.323**	**.135***	**.015**
	Genre: RPG	-1.051	.701	-.094	.007	-1.029	1.247	-.051	.002	-1.381	1.167	-.074	.004
	Genre: Strategy	-.431	.634	-.042	.001	.111	1.129	.006	.000	1.013	1.056	.059	.003
	Genre: Sport&Sim.	-.207	.702	-.018	.000	-1.083	1.249	-.053	.002	-1.998	1.168	-.105	.009
3	Amount of play	-.297	.374	-.051	.002	-1.215	.665	-.116	.010	-.879	.622	-.090	.006
4	Mode: Social play	.304	.439	.046	.002	1.443	.780	.122	.011	1.055	.730	.096	.007
5	PENS: Autonomy	.189	.187	.072	.003	**.765**	**.333**	**.163***	**.016**	.147	.311	.034	.001
	PENS: Competence	.353	.244	.109	.007	.213	.435	.036	.001	-.195	.407	-.036	.001
	PENS: Presence	-.185	.187	-.077	.003	-.584	.333	-.135	.010	.022	.311	.005	.000
	PENS: Relatedness	**.446**	**.157**	**.204****	**.026**	**.647**	**.280**	**.164***	**.017**	**.631**	**.262**	**.172***	**.018**
	Flow	.047	.058	.058	.002	**.209**	**.103**	**.142***	**.013**	**.214**	**.097**	**.157***	**.016**

Table 3. Coefficients of emotional, psychological and social wellbeing regressions $^*p < .05$, $^{**}p < .01$

Though not variables of concern, it is interesting that older players were found to have greater psychological and social wellbeing than younger players, and men were found to have greater emotional wellbeing than women. While the finding for gender is consistent with other research utilising an Australian sample, the finding for age is inconsistent (Eckermann, 2014).

Emotional wellbeing

The finding that feelings of relatedness predicted greater emotional wellbeing is intuitively supported. Feelings of connection with others in gameplay suggest it may be being used to create new friendships or maintain pre-existing ones, and that this brings emotional satisfaction. Alternatively, it may be that happier people are more likely to feel connected to others in play. While previous research (Ryan, et al., 2006) found no connection between relatedness and player wellbeing, this may be due to that study being limited to MMO communities and not a broader range of game play experiences, as well as differences in the wellbeing measures being used.

Psychological wellbeing

Autonomy in gameplay predicted psychological wellbeing, suggesting that choice of activity within gameplay facilitates a sense of agency, which in turn may account for its links to improvements in mood, vitality and self-esteem (Ryan, et al., 2006). It may also be that individuals already high in psychological wellbeing are more likely to engage with games in a way that heightens their sense of autonomy, and less likely to feel pressured to play in a way that lessens it. This is supported by experimental data showing that in-game autonomy produced increased self-esteem and positive affect (Ryan, et al., 2006). In turn, while flow may enhance psychological wellbeing via the creation of a stronger sense of self (Csikszentmihalyi, 1990), it seems more likely that those high in psychological wellbeing are more likely to experience flow, supported by research finding worry negatively associated with state flow (S. A. Jackson, Ford, Kimiecik, & Marsh, 1998)

Relatedness predicting psychological wellbeing suggests that players are gaining social support via social play, or that players with pre-existing high levels of wellbeing are more likely to feel connected to the people they play with. Whether this is due to play with pre-existing ties or because players high in social confidence are more likely to seek out interactions is unknown, however it seems likely that both are positively impacting on player wellbeing (Shen & Williams, 2011). Gauging familiarity between players would be useful in future research.

Social wellbeing

The positive association between casual gameplay (compared to playing shooters) with social wellbeing could be due to the use of casual games to connect with others. Alternatively, it may be due to casual game players being more actively engaged in non-game activities that generate a stronger sense of social agency. Finding relatedness in gameplay to predict greater social wellbeing however is intuitively supported. Whether this is due to socially confident players being more likely to have enjoyable social gameplay experiences, or because some forms of social play facilitate meaningful relationships (Yee, 2006) requires further exploration.

Finally, the strong sense of self associated with experiences of flow (Csikszentmihalyi, 1990) may lead to greater confidence to negotiate the social world, and hence social wellbeing. Alternatively, this may be explained by flow's links to harmonious gameplay (Wang, et al., 2008), in that players who have integrated gaming into their life are more likely to experience flow.

Limitations

The limitations of this study include its cross sectional nature (with associated limitations regarding the direction of causality) and the moderate effect sizes found. That wellbeing was assessed over the past month and the timeframe over which the game-related measures were taken varied, would have weakened effects, however the associations between aspects of gameplay and multidimensional aspects of player wellbeing were significant. Moreover, the practical repercussions are meaningful when these effects accumulate over time, or when large populations are exposed. In these instances, smaller effect sizes grow in importance (Anderson et al., 2010). Further research is required to determine if greater effect sizes would be found if measures of wellbeing directly proximal to actual gameplay are examined.

The absence of any effect of amount of play on wellbeing may have been due to the large cohort of university-level games design students making up our sample, who were uniquely positioned to benefit from time spent playing. Conversely, the findings for genre may be an artifact of the artificial groupings into metagenres, and as such should be approached with caution.

The strong findings for experiences of relatedness in gameplay being positively associated with player wellbeing highlights the value of examining the social components of play, which in turn suggests the need for a more nuanced measure of mode of play. However, its modest level of internal reliability may reflect that social and solitary players are interpreting relatedness differently (supported by differing alphas: solo players $\alpha = .531$; social players $\alpha = .747$). In parallel, capturing the social components of play in a way that remains distinct from PENS relatedness may be accomplished by expanding mode of play to include a measure of the quality of interaction (e.g., play with known and unknown others; competitive vs. cooperative).

CONCLUSION

Overall, our results suggest that in terms of player wellbeing, your experience while playing is of greatest impact, with the experiences of autonomy, relatedness and flow in gameplay positively associated with player wellbeing. Future research in this area would also benefit from a more nuanced approach to mode of play and an exploration of interactions between it and wellbeing.

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