Young Cancer Patients' Perceptions of a Video Game Used to Promote Self Care

Ivan L. Beale, PhD[1]; Verónica M. Marín-Bowling[2]; Nicole Guthrie, MS[2]; Pamela M. Kato, EdM PhD[2]

Author[1] is affiliated with the School of Psychology at the University of New South Wales. Authors[2] are affiliated with HopeLab, Palo Alto. **Contact Author:** Ivan L. Beale, School of Psychology, University of New South Wales, Sydney 2052, Australia; phone: +61 2 95183060; fax: +61 2 95183060; email: **ibeale@bigpond.com**

Abstract

A video game called 'Re-Mission' has recently been investigated with adolescent and young adult cancer patients enrolled in a multi-site randomized controlled evaluation of the game as a psycho-educational intervention. The main focus of the trial was to determine effects of the game on self-care and other health-related outcomes. It was also considered valuable to evaluate participants' perceptions of the game as (1) acceptable as a treatment-related activity for young cancer patients, and (2) credible as an intervention designed to change patients' knowledge, attitudes and self-care behaviors relating to treatment. Although the cancer–related content of the game is informed by surveys of cancer professionals and patients themselves, acceptability and credibility with end-users have been important factors influencing the usability and efficacy of a range of psychological interventions. As part of the multi-site trial, 197 patients with cancer, between the ages of 13 and 29, were assigned to the treatment group. Most patients (148) completed a 9-item acceptability/credibility rating scale following 3-months' access to Re-Mission. These 'completers' played Re-Mission more than the other patients, but did not differ from them on gender, age, or prior game experience. Responses to the questionnaire were analyzed as two factors representing acceptability and credibility. A mean rating for acceptability (4.1 on scale of 5) indicated a good level of acceptability, and mean rating for credibility (3.7 on scale of 5) indicated a moderate level of belief in the game as an effective intervention. Correlation analyses showed that whereas acceptability and credibility ratings were not significantly associated with educational level, both were significantly ($p < 0.01$) and positively correlated with amount of time spent playing the video game during treatment (acceptability: $r = 0.26$, credibility: $r = 0.25$). The findings indicate that the self-care intervention video game would be a useful addition to the psycho-educational resources available to treatment teams.

Key Words: *Cancer, Treatment, Psycho-education, Video Game, Acceptability, and Credibility*

Introduction

There have been several published reports describing the use of videogames as psycho-educational interventions for young people being treated for chronic illnesses, including asthma, diabetes and cancer.[1-3] The educational content of these games has been designed to increase illness-related knowledge and change attitudes and behaviors related to treatment adherence, based on the hope that these changes will lead to better health outcomes.[1] These published reports generally focused on analyses of effects of videogame use on relevant behavioral variables, including knowledge about illness and treatment, and adherence to prescribed treatment regimens.[1, 2] Less attention has been paid to the measurement or analysis of users' perceptions about the purpose or likely effects of the game they have been asked to play, however a few studies have elicited players' views about how much they enjoyed using the game or whether they would recommend it to a friend.[4-7] Also, previous studies of the use of health videogames have not collected accurate data on the amount of time users spent playing the videogame, although in one instance this was estimated from players' recollections.[7]

The lack of published data on patients' perceptions about health videogames, or their usage of these, may represent an important gap in knowledge about the potential value of health videogames as adjuvant psycho-educational interventions for chronic illnesses. Although there is evidence that health videogames could well play an important role in helping young people through treatment for chronic illnesses, it is unclear whether young patients regard health videogames as serious interventions which could help achieve treatment goals. Specifically, there has been no exploration of whether patients' use of health videogames is systematically related to their perceptions of the acceptability, credibility or efficacy of the videogame. The importance of this issue stems from the illness perception literature showing that patients' perceptions of interventions play a critical role in how those interventions impact the primary health outcomes, to the extent that patients' beliefs about some standard interventions are at least as important as both the intervention itself and adherence to it, in determining treatment outcomes.[8-11]

Reviews indicate that published studies of the efficacy of health videogames generally have not reported formal data on how patients actually used the videogame provided, although they generally were given some instruction about use (e.g., how often or for how long).[1, 2] Yet such data on usage can lead to a better understanding of the intervention. Where instructions are given, they represent a treatment regimen and therefore provide an opportunity to measure treatment adherence. Even where the treatment is just an adjunct to some primary therapy, as often is the case with psycho-educational therapies, adherence is still important. A measure of adherence might be helpful in understanding why some patients respond more than others to the videogame intervention. It would also allow exploration of possible associations between adherence and patients' perceptions of the value of the intervention. Finally, it provides a basic measure of treatment integrity which should be an essential component of any intervention evaluation.[12]

The research described in this report explores the self-reported perceptions of young users of a health-oriented videogame about the credibility and acceptability of the videogame used as an adjunct to standard treatment for cancer. The research investigates possible associations between patients' perceptions of the game and their use of the game during treatment, and whether game use or perceptions are related to patients' educational level or ethnicity.

The videogame 'Re-Mission' evaluated in this study is played on a mini-PC using commercial game-pad controllers. It is an action game in which the player can manipulate a humanoid robot character (nanobot) named "Roxxi" inside the 3-D virtual bodies of 19 different young patients with seven cancers common in the target population (e.g., ALL, AML, Hodgkin's disease, non-Hodgkin's lymphoma, osteosarcoma, Ewing's sarcoma, and brain tumors). "Roxxi" is accompanied by "Smitty," her mentor who delivers educational narrative over game play. The game consists of three tutorial missions, two 2-player missions and 20 single-player missions. The player can choose to play the game in English, Spanish, or French. Players win by destroying cancer cells and other enemies in the body (e.g., bacteria, mucositis lesions, stool jags) but need to be careful not to waste ammunition or cause secondary damage to the body. Players destroy enemies by using common treatments such as chemotherapy, radiation, and antibiotics. Enemies are also combated by prompting the patient to engage in positive self-care behaviors such as taking stool softeners to prevent colon tears, practicing good mouth care to combat mucositis, using relaxation techniques to reduce stress, taking their prescribed medicines, or eating for more energy.

The design of Re-Mission was based on surveys of the views of health professionals about the psycho-educational needs of young cancer patients undergoing treatment,[13, 14] and on reviews of literature on the relative efficacy of different psycho-education formats used with cancer patients.[1, 2] Although this background research indicates that a videogame such as Re-Mission could well be an effective intervention for young cancer patients, empirical evidence is needed on how young patients view the videogame, especially after they have been given the opportunity to use it. An opportunity to collect this evidence has been provided by a recent multi-site evaluation of the efficacy of Re-Mission, which included a rating scale designed to measure patients' perceptions of the credibility and acceptability of Re-Mission as a useful intervention.

Credibility refers to perceived value of the videogame as an intervention capable of influencing knowledge, attitudes, or health outcomes.[15] Acceptability refers to ease, enjoyment, and harmlessness of use.[16] These constructs were chosen to reflect aspects of perception most applicable to the type of intervention being evaluated here: a videogame about cancer used by young patients being treated for cancer. To assess acceptability and credibility in this specific study, a 9-item rating scale was constructed using items based on those used in scales validated in the literature on measurement of user's perceptions regarding concepts such as acceptability and credibility of interventions for behavioral management, physical or mental illnesses.[15-18] In the present study, acceptability is measured by 4 items reflecting the extent to which a patient would use the videogame as an enjoyable activity or recommend it, while credibility is measured by 6 items (1 item in common) reflecting the strength of the patient's belief that playing the videogame could influence a patient's knowledge, attitudes, or behavior relevant to treatment. Because the scale was devised specifically for this study, there were at the outset of the study no data available on its validity or reliability. The face validity of the scale can be assessed by consideration of the items themselves (provided in the results section). The lack of psychometric information about the scale does limit the generality of findings, although some psychometric data were collected in the course of the study and are reported in the results section.

Methods

This report describes part of a larger randomized controlled evaluation of the efficacy of Re-Mission, relative to a control condition (a commercial videogame with no cancer content), as an intervention for several health related variables such as medication adherence, self care, and quality of life. Procedures and measures that were part of the larger study, but not relevant to the sub-study reported here, are not included in this report.

Participants

Approval to conduct the study was obtained from relevant research ethics authorities at 34 cancer treatment centers in the United States, Canada and Australia. Participants (N=375) were recruited from those meeting the following inclusion criteria: male or female patient 13 to 29 years of age with a cancer diagnosis; must be currently receiving treatment and is expected to remain on treatment for at least 4 - 6 months. Exclusion criteria were: history of seizures due to photosensitivity; unable to communicate effectively with study personnel in English, Spanish, or French; determined by the investigator to be incapable of following the study schedule or study directions for any reason. Of those recruited, 197 were randomly assigned to receive access to Re-Mission, and 195 actually received the intervention. There were 5 participants whose assigned condition was crossed over (n=3 treatment to control, n=2 control to treatment). One hundred seventy six patients received access only to an alternative videogame. Of the 375 participants enrolled, the data from 4 were excluded from analyses due to inadequate consent (n=2), ineligibility (n=1) and consent withdrawal prior to any data collection (n=1). This report is based only on data from those participants receiving access to Re-Mission.

Procedures

Participants were asked to complete questionnaires on three occasions: (Baseline) at the commencement of the study; (Follow-up) 1 month after Baseline; and (Long Term Follow-up) 3 months after Baseline. The only questionnaires relevant to this sub-study were a brief demographic questionnaire given at Baseline and a rating scale given at Long Term Follow-up (LTFU). At Baseline participants were provided with a mini-PC loaded with two different videogames that could be played using gamepads provided. One game was Re-Mission, the other a regular commercial adventure game called Indiana Jones and The Emperor's Tomb (Lucas Arts, CA). Participants were told they could play both games, but were asked to play for at least an hour a week for the next 3 months. The mini-PC recorded duration of play for both games as well as tracking other specifics of Re-Mission play, including number of missions played and mission completion. At LTFU, 148 of the

participants given access to both Re-Mission and Indiana Jones completed a 9-item rating scale designed to provide a measure of the participants' perceptions of the acceptability and credibility of Re-Mission as an intervention (Items are described in Table1). Participants were asked to respond to each item by reading the statement and then circling a rating value between 1 and 5 to indicate the extent to which they agreed (1 = strongly disagree, 5 = strongly agree).

Results

Data analysis
Associations between continuous variable were analyzed as correlations using Pearson's *r*. Associations between dichotomous or categorical variables and continuous variables were analyzed using independent-samples *t*-tests. Associations between categorical or dichotomous variables were tested as differences between proportions using chi-square. The alpha level for rejecting the null hypothesis was set at *p*=.05. Effect sizes were calculated where appropriate as the standardized mean difference (Cohen's *d*).

Completers vs. Noncompleters
Of the 196 participants given access to Re-Mission, 148 'completers' filled out the acceptability/credibility rating scale at Time 3. The remaining 48 'noncompleters' did not provide usable rating scale data at LTFU for the following reasons: completed study but didn't do the rating scale (16); inadequate consent (1); early withdrawals (31). Independent-samples *t*-tests conducted on Re-Mission usage data showed that completers played Re-Mission longer (*M*=4.39, *SD*=5.16) than noncompleters (*M*=1.21, *SD*=2.27)(*t*(192)= 4.05, *p*<.001). Completers also played more unique game 'missions' than noncompleters (completers, *M*=5.20, *SD* = 6.18; noncompleters, *M*=2.28, *SD*=4.09; *t*(192)=3.00, *p*<.01). Using *t*-tests for the continuous variables and Chi-square test for gender, completers and noncompleters were compared to see whether they differed significantly on age, gender, prior video game use, educational level, or the amount of time spent playing Indiana Jones. No significant differences were found (all values with *p* >.05). Based on self-reported ethnic identity, most participants identified themselves as White (65%), Hispanic (25%), or Black (11%). The percentage belonging to these ethnic groups who were completers was significantly greater for the Hispanic group (93%) than for either Black group (55%) or White group (74%) (χ^2=11.7, *p*<.01).

Responses to the Acceptability/Credibility Rating Scale
The frequencies of each rating given each statement in the scale are shown in Table1. Also shown are the frequencies of composite ratings for acceptability and credibility calculated by combining ratings for Items 1, 2, 4, & 7 (acceptability) and Items 2, 3, 5, 6, 8, & 9 (credibility). Responses to all items were analyzed to assess internal consistency of the acceptability and credibility subscales using Chronbach's alpha.[19] In both instances, internal consistency was good (acceptability, alpha = .82; credibility, alpha = .91). For both subscales, internal consistency was reduced if the common item (Item 2: "I would recommend Re-Mission to another young person with cancer") was omitted (acceptability, .72; credibility, .90), indicated that the inclusion of this common item was not problematic for scale consistency.

Considering first the composite ratings, Table 1 shows that the majority of participants rated Re-Mission generally to be acceptable and credible as an intervention, composite ratings of 4 & 5 being more frequent than ratings in the categories 1-3. The mean rating for acceptability was 4.11 (*SD*=.87) and for credibility it was 3.72 (*SD*=.97). Appropriate tests of associations between variables (*t*-test, Pearson's *r*) showed that ratings of acceptability and credibility were not significantly associated with participants' gender, age, or prior video game experience (all *p* values >.05). Ratings for the individual items in the scale generally followed this same pattern, except for item 8: "As a result of this game, I plan to make changes in how I manage my cancer treatment". In the case of item 8, twice as many participants gave a rating of 'neutral' (3) as gave any rating either in agreement or disagreement. Those who didn't use the 'neutral' rating were fairly equally divided between agreement and disagreement with the item.

Playing Time
Total time (hours) spent playing Re-Mission (not including pauses in play) over the 3-month access period (playing time) varied widely across completers (range 0 – 30.24, *M*=4.29) and noncompleters (range 0 – 9.57, *M*=.59). Number of unique missions completed also varied widely (range: completers, 0-24; noncompleters, 0-23). Distributions of playing times for completers and noncompleters are shown in Fig. 1. It can be seen that both distributions are negatively skewed, with the modal playing time for both distributions 0-3 hours. The median playing time was 2.74 hours for completers and 0.13 hours for noncompleters.

Hours spent playing Indiana Jones was similar for completers (*M*=4.92, *SD*=14.01) and noncompleters (*M*=5.86, *SD*=10.66) (*t* (192) = .80 ns). Across all participants with access to both Re-Mission and Indiana Jones, total playing times on the two games were significantly positively correlated (*r*(194) = .23, *p*<.001). However, the absolute times for the two games are not strictly equivalent, as the total times for Indiana Jones include pauses in play, whereas the Re-Mission times do not.

Appropriate statistical tests of association between variables (*t*-test, Pearson's *r*) showed that playing times both for Re-Mission and Indiana Jones were not significantly associated with age, gender, or previous game experience (all *p* values >.05).

Associations Between Playing Time and Rating Scale Responses

Correlational analysis showed a significant association between Re-Mission playing time and both composite acceptability rating (*r* (148) =.26, *p*<.01) and composite credibility rating (*r* (148) =.25, *p*<.01). These associations are illustrated in Fig. 2, where higher composite acceptability and credibility ratings are seen to be associated with longer usage times. Indiana Jones playing times were not significantly correlated with either acceptability (*r* (148) =.08) or credibility *r* (148) =.12) ratings.

The association between playing time and responses to individual items on the rating scale was further explored using the median-split procedure to classify completers either as high users (above median user time) or low users (below median user time), then comparing the ratings of high and low users on each item. Mean ratings on composite acceptability were significantly higher for high users (*M*=4.39, *SD*=.73) than for low users (*M*=3.85, *SD*=.91) (*t* (146) =4.00, *p*<.01). Mean ratings on composite credibility were significantly higher for high users (*M*=3.94, *SD*=.81 than for low users (*M*=3.50, *SD*=.1.06) (*t* (146) =2.90, *p*<.01). Further *t*-tests showed that differences between high and low users' mean ratings on individual items were also significant (*p*<.01) for all items except item 8: "As a result of this game, I plan to make changes in how I manage my cancer treatment". A typical distribution of ratings for high and low users on most items is shown in Fig. 3, which illustrates the distributions for item 7: "Overall, I liked playing Re-Mission", the item showing the largest effect size for this difference between means (Cohen's *d*=.67).

As seen in Fig. 3, the distributions of ratings by high users, compared with those of low users, were more positively skewed toward strong agreement with the item statement. That is, high users rated Re-Mission more positively than low users on most items. However, the distribution of ratings for Item 8, shown in Table 1, is unlike the distributions for the other items, in that the frequencies are more equally distributed across the continuum from 1-5, and the modal rating is at the neutral point (3) rather than at the positive end of the scale (4 or 5). It is notable that the statement being rated in item 8 differs from the other items in that it refers to the patient's perceived control over treatment.

Discussion

Most of the participants given access to Re-Mission (76%) also completed the acceptability/credibility rating scale at LTFU. Because those who did complete the scale tended to have played Re-Mission more than those who did not complete the scale, the question arises as to what extent the responses of those completing the scale can be taken to fairly represent the whole sample given access to the game. However, the range of playing times for the completers was larger than for the noncompleters and contained both ends of the range for the noncompleters, indicating that the difference between the mean playing times of the completers and noncompleters does not represent a serious restriction on generalizations about the whole sample on the basis of data from completers only. Also, the analysis of demographic variables indicates that there would be no bias based on age, gender, prior game experience or educational level, but some possibility of bias based on ethnicity, to the extent that any differences found between ethnic groups on their responses to the rating scale might not be validly generalized to the whole sample. Accordingly, no analysis of differences between ethnic groups was undertaken.

A major finding was that there was wide variation in the time spent by participants playing Re-Mission, and the amount of time they played was significantly associated with their perceptions of Re-Mission as an acceptable and credible intervention. Analysis of the composite ratings for acceptability and credibility indicate that, in general, players considered Re-Mission to be a quite acceptable and moderately credible intervention. However, those players who spent more time playing Re-Mission were generally more positive about Re-Mission than those who used it less. The simplest alternative interpretations of these findings are: (1) More-extensive play with Re-Mission results in higher perceived acceptability and

credibility; (2) Higher perceived acceptability and credibility results in greater interest in playing Re-Mission; or (3) Some interaction between both of these processes. Of course, acceptability and credibility might be related to playing time by different processes. For example, acceptability might drive playing time, but playing time in turn drives credibility. It is possible that both acceptability and credibility might change over the course of experience with an intervention, as has been shown previously.[20] In the case of Re-Mission, it seems likely that its perceived credibility, in particular, could be affected significantly as continued play experience brought a better understanding of what the game was about. As measured in this study, acceptability and credibility were highly correlated (r=.80, p<001), but both might contribute uniquely to intervention 'adherence', as measured by Re-Mission playing time.

The atypical distribution of ratings for item 8 clearly indicates that this item was perceived differently from the other items, possibly because it referred to how the participant would manage her/his own treatment. Perhaps many considered that the management of their cancer treatment was not within their control, and therefore were not inclined to agree with any statement about how they would manage their own treatment.

Turning now to a general consideration of the utility of Re-Mission as an adjuvant therapy for young cancer patients, it is notable that only 17% of completers (and 2.4% of noncompleters) played Re-Mission for more than one hour per week on average. Also, although the game includes 20 regular missions, as well as 3 tutorial missions and 2 two-player missions, the mean number of unique missions played was only 4.5 (*SD*=5.88) and the median number was 2 (reflecting the marked skewing of the distribution). Perhaps this indicates that play is difficult or tiring to maintain, given that many patients are struggling with a serious illness and debilitating side-effects of treatment. Since longer playing time is associated with higher acceptability and credibility, it may be valuable to find a way of encouraging players to engage with the game for longer periods of time. This might be accomplished, for example, by making missions shorter and easier to perform successfully. However, it is precisely because most patients did not play Re-Mission for long periods that the generally positive perceptions of acceptability and credibility of Re-Mission are so encouraging. Also, it may be that the short playing times owe less to the characteristics of Re-Mission

than to a general indisposition to engage in any demanding activity by patients who are tired and ill.

Young cancer patients' views about the credibility and acceptability of alternative concepts of a hypothetical game such as Re-Mission were previously explored in a study intended to inform the feasibility and design of Re-Mission.[21] In that study ratings of acceptability or credibility were not found to be associated significantly with any of a range of demographic or personality variables measured in the study. At this time there is little hard evidence on which to base attempts to improve the credibility of Re-Mission as a cancer intervention. To this end it may be useful to conduct interviews with young patients who have played Re-Mission, to explore with them in more detail the reasons for any reservations about both the acceptability and credibility of the game.

The current study indicates that Re-Mission is perceived by most young patients as quite acceptable and moderately credible, and by a smaller proportion, also perceived as an activity worth persevering with for at least several hours. It will be important to discover to what extent duration of play is associated with desired health-related outcomes. In the meantime, the current results indicate that there is sufficient interest in Re-Mission by young cancer patients that it can be regarded as a promising addition to the psychoeducation resources available to treatment teams.

References

1. Beale IL, Bradlyn AS, Kato PM. Psychoeducational interventions with pediatric cancer patients: Part II. Effects of information and skills training on health-related outcomes. *Journal of Child and Family Studies* 2003; 12: 385-97.
2. Bradlyn AS, Beale IL, Kato PM. Psychoeducational interventions with pediatric cancer patients: Part I. Patient information and knowledge. *Journal of Child and Family Studies* 2003; 12: 257-77.
3. Lieberman DA. Management of chronic pediatric diseases with interactive health games: Theory and research findings. *Journal of Ambulatory Care Management* 2001; 24: 26-38.
4. Huss K, Winkelstein M, Nanda J, Naumann PL, Sloand ED, Huss RW. Computer game for inner-city children does not improve

asthma outcomes. *Journal of Pediatric Health Care* 2003; 17: 72-8.

5. Homer C, Susskind O, Hillel RA, Owusu C, Schneider L, et al. An evaluation of an innovative multimedia educational software program for asthma management: report of a randomized, controlled trial. *Pediatrics* 2000; 106: 210-5.

6. Dragone MA, Bush PJ, Jones JK, Bearison DJ, Kamani S. Development and evaluation of an interactive CD-ROM for children with leukemia and their families. *Patient Education and Counseling* 2002; 46: 297-307.

7. Brown SJ, Lieberman DA, Gemeny BA, Fan YC, Wilson DM, Pasta DJ. Educational video game for juvenile diabetes: results of a controlled trial. *Medical Informatics* 1997; 22: 77-89.

8. Kemp R, Hayward P, Applewhaite G, Everitt B, David A. Compliance therapy in psychotic patients: randomised controlled trial. *BMJ* 1996; 312: 345-9.

9. Granger BB, Swedberg K, Ekman I, Granger CB. Adherence to candesartan and placebo and outcomes in chronic heart failure in the CHARM program: double-blind, randomised, controlled clinical trial. *The Lancet* 2005; 366: 9502.

10. Horwitz RI, Viscoli CM, Berkman L, Donaldson RMH. Treatment adherence and risk of death after a myocardial infarction. *The Lancet* 1990; 336: 8714.

11. Horne R. Patients' beliefs about treatment: The hidden determinant of treatment outcome? *Journal of Psychosomatic Research* 1999; 47: 491-5.

12. Beale IL. An evaluation model for psychoeducational interventions using interactive multimedia. *Cyberpsychology & Behavior* 2002; 5: 565-80.

13. Bradlyn AS, Kato PM, Beale IL, Cole S. Pediatric oncology professionals' perceptions of information needs of adolescent patients with cancer. *Journal of Pediatric Oncology Nursing* 2004; 22: 1-8.

14. Baggott C, Beale IL, Dodd MJ, Kato PM. A survey of self-care and dependent-care advice given by pediatric oncology nurses. *Journal of Pediatric Oncology Nursing* 2003; 21: 1-9.

15. Borkovec TD, Nau SD. Credibility of analogue therapy rationales. *Journal of Behaviour Therapy and Experimental Psychiatry* 1972; 3: 257-60.

16. Kelley ML, Heffer RW, Gresham FM, Elliot SM. Development of a modified Treatment Evaluation Inventory. *Journal of Psychpathology and Behavioral Assessment* 1989; 11: 235-47.

17. Dennehy EB, Webb A, Suppes T. Assessment of beliefs in the effectiveness of acupuncture for treatment of psychiatric symptoms. *Journal of Alternative and Complementary Medicine* 2002; 8: 421-5.

18. Devilly GJ, Borkovec TD. Psychometric properties of the credibility/expectancy questionnaire. *Journal of Behaviour Therapy and Experimental Psychiatry* 2000; 31: 73-86.

19. Rosenthal R, Rosnow RL. (1991). *Essentials of behavioral research: methods and data analysis*. New York: McGraw-Hill.

20. Stein D, Brent DA, Bridge J, Kolko D, Birmaher B, Baugher M. Predictors of parent-rated credibility in a clinical psychotherapy trial for adolescent depression. *Journal of Psychotherapy Practice and Research* 2001; 10: 1-7.

21. Kato PM, Beale IL. Factors affecting acceptability to young cancer patients of a psychoeducational video game about cancer. *Journal of Pediatric Oncology Nursing* 2006; 23: 269-75.

Table 1. Number of Participants Giving Each Rating (1-5) for Each Item on the Acceptability/Credibility Scale

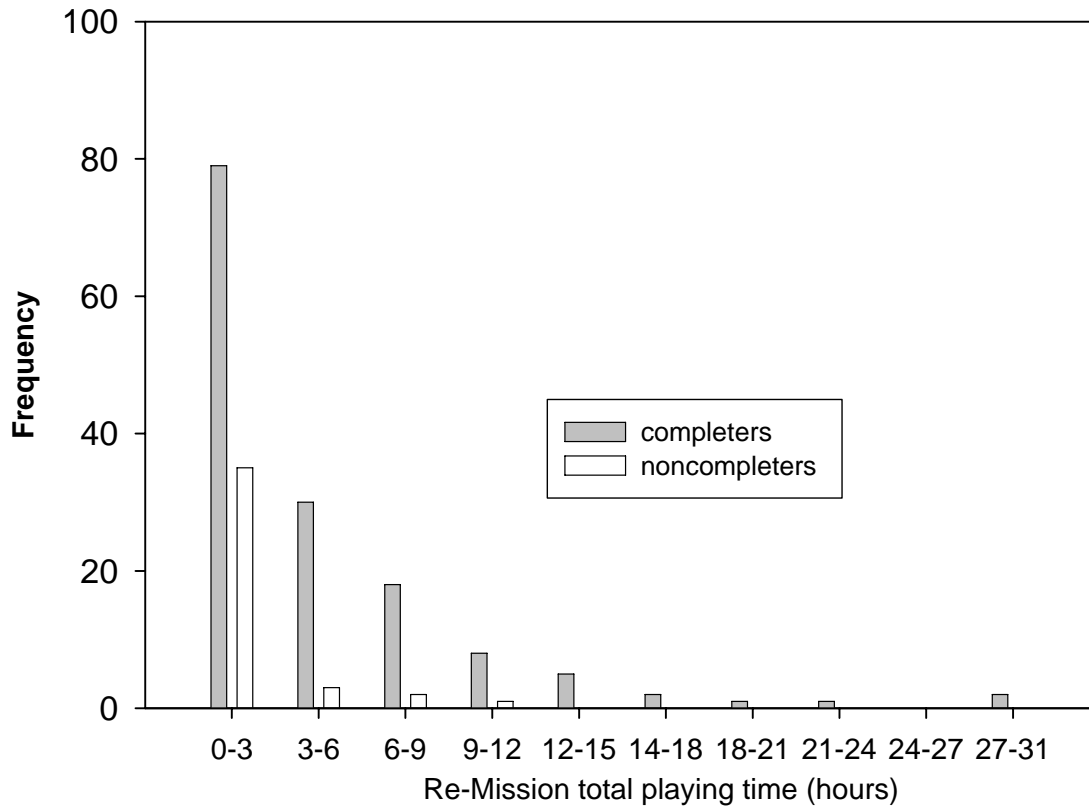| Item		Rating (1=strongly disagree, 5=strongly agree)				
		1	2	3	4	5
1	I think it is OK for cancer patients to play Re-Mission	4	2	7	46	89
2	I would recommend Re-Mission to another young person with cancer	5	7	27	2	67
3	I think Re-Mission would help other people with cancer	4	8	28	45	63
4	I think that playing Re-Mission would not be harmful to a patient	5	6	11	44	81
5	I believe Re-Mission helped me understand cancer	8	14	21	53	52
6	I believe I benefited fro using Re-Mission	10	14	37	41	46
7	Overall, I liked playing Re-Mission	15	15	25	44	49
8	As a result of this game, I plan to make changes in how I manage my cancer treatment	16	29	55	25	23
9	As a result of playing this game, I am more likely to take my medicine the way my doctor prescribed it	14	15	37	30	52
Acceptability	(composite)	3	4	28	58	55
Credibility	(composite)	3	19	35	55	36

Fig. 1. The distribution of total playing times is shown for all participants who completed (gray) or did not complete (white) the acceptability/credibility rating scale.
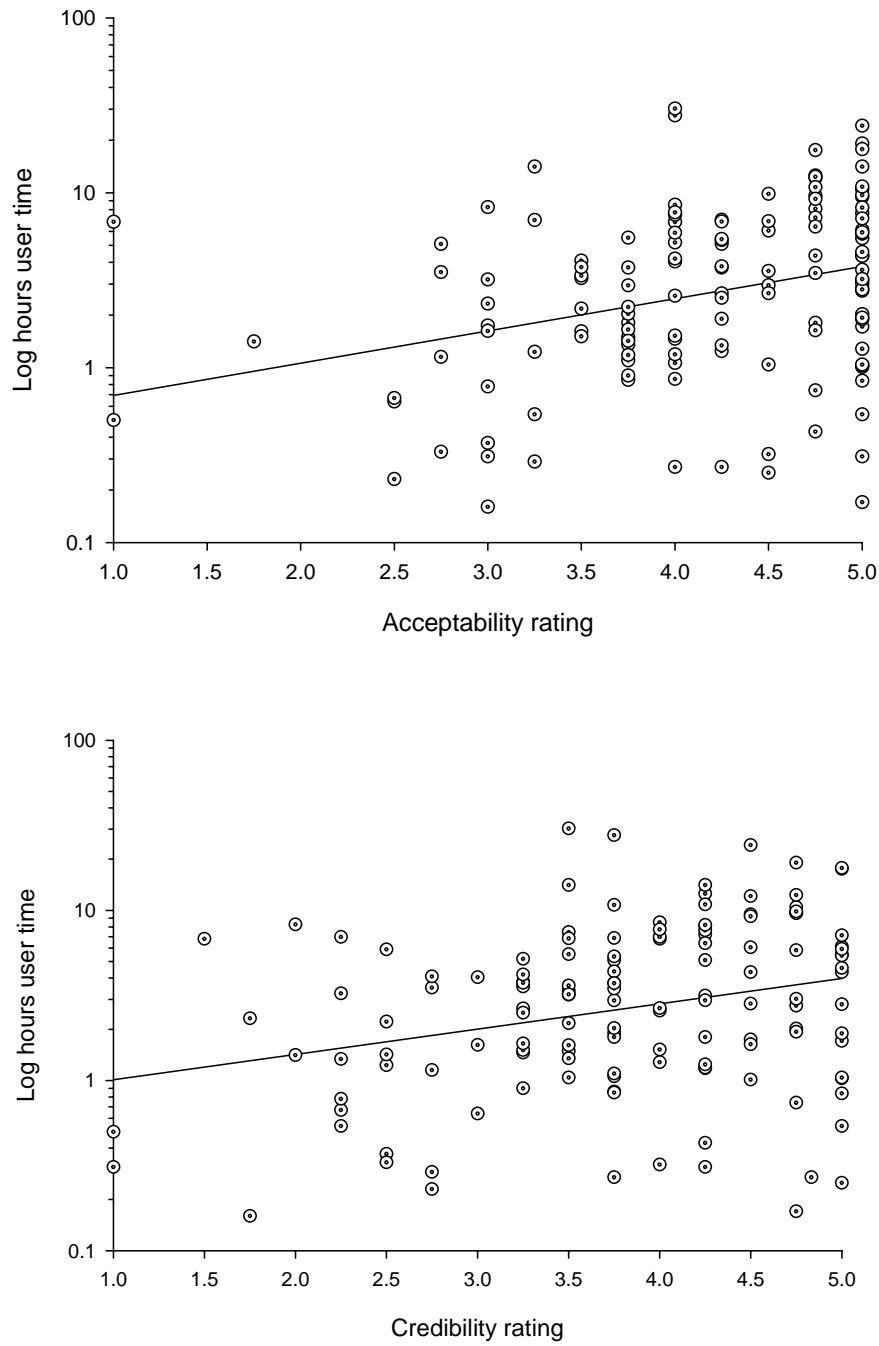
Fig. 2. Regressions on log transformed total playing time (log hours user time) are shown for composite ratings of acceptability (upper panel) and credibility (lower panel).
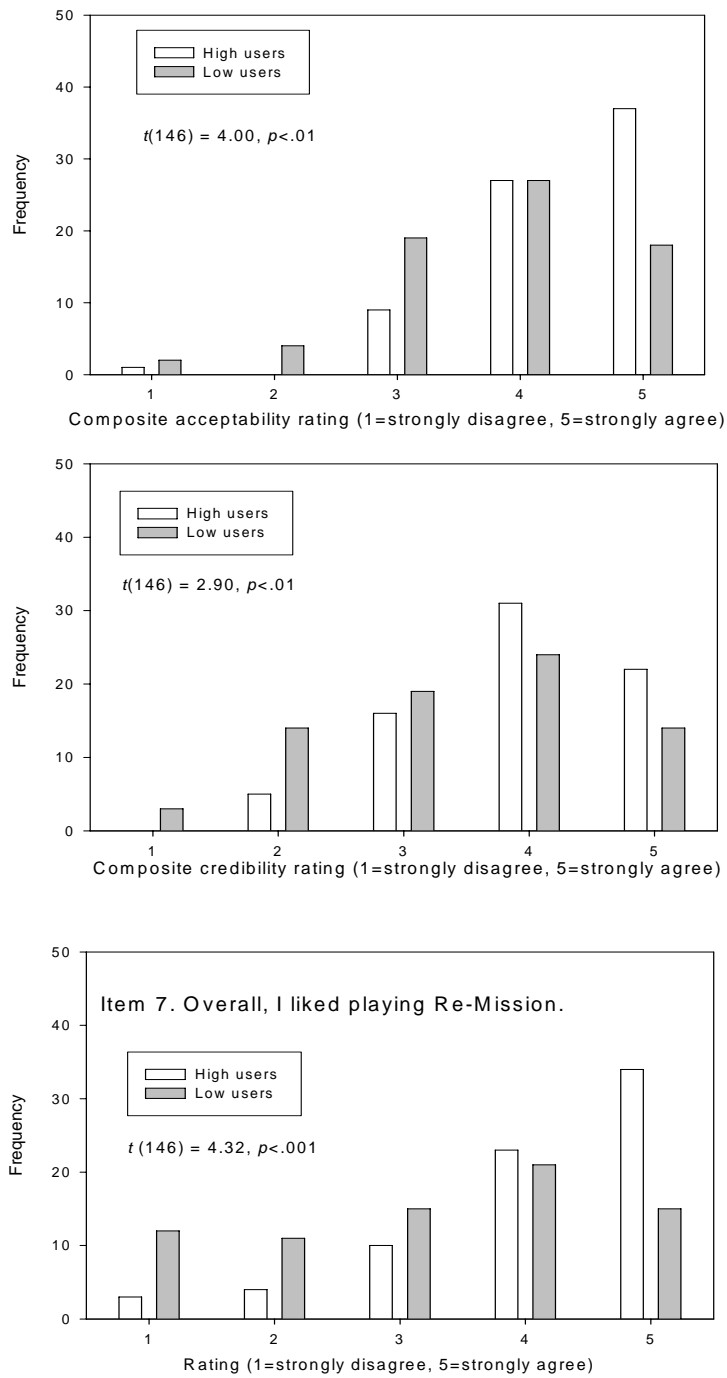
Fig. 3. Distributions of ratings for composite acceptability, composite credibility and Item 7 are shown for high users (white) and low users (gray).