12-2010

Enhancing brand equity through flow: Comparison of 2D versus 3D virtual world

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Citation

NAH, Fiona Fui-hoon; ESCHENBRENNER, Brenda; and DEWESTER, David. Enhancing brand equity through flow: Comparison of 2D versus 3D virtual world. (2010). *MIS Quarterly*. 35, (3), 731-747.
Available at: https://ink.library.smu.edu.sg/sis_research/9476

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Article *in* MIS Quarterly · September 2011

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SPECIAL ISSUE

ENHANCING BRAND EQUITY THROUGH FLOW AND TELEPRESENCE: A COMPARISON OF 2D AND 3D VIRTUAL WORLDS

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Appendix A

Summary of Literature on Flow and Telepresence in Online Environments

Reference/ Authors	Antecedents	Online Experience	Direct Consequences	Indirect Consequences	Research Setting	Research Method
Steuer (1992)	Vividness, Interactivity	Telepresence			Virtual Reality	Conceptual
Trevino and Webster (1992)	Tech. Type, Tech. Characteristic (Ease of Use), Ind. Diff. (Computer Skill)	Flow – Control, Attention Focus, Curiosity, Intrinsic Interest	Attitude, Effectiveness, Quantity, Barrier Reduction		Computer-mediated Communication (E-mail, Voice Mail)	Survey
Webster et al. (1993)	Software Characteristics (Flexibility, Modifiability)	Flow – Control, Attention Focus, Cognitive Enjoyment (Curiosity and Intrinsic Interest)	Exploratory Behavior (Experimentation), System Use, Perceived Comm. Quantity, Perceived Comm. Effectiveness		Software Usage in Work Setting	Survey
Ghani and Deshpande (1994)	Control, Challenge	Flow – Enjoyment, Concentration	Exploratory Use	Extent of Use	Computer Use in Workplace	Survey

Reference/ Authors	Antecedents	Online Experience	Direct Consequences	Indirect Consequences	Research Setting	Research Method
Hoffman and Novak (1996)	Control Char. (Skills, Challenges), Content Char. (Interactivity, Vividness), Process Char. (Goal-Directed, Experiential), Involvement, Focused Attention, Telepresence	Flow	Consumer Learning, Perceived Behavioral Control, Exploratory Behavior, Positive Subjective Experience		Hypermedia Computer-mediated Environment	Conceptual
Lombard and Ditton (1997)	Media Form (Vividness or Sensory Richness), Media Content (e.g., Task or Activity), Media User Variables	Presence (or Telepresence)	Arousal, Enjoyment, Involvement, Task Performance, Skills Training, Desensitization, Persuasion, Memory, Social Judgment, Parasocial Interaction/ Relationships		Virtual Environment	Conceptual
Chen et al. (1999)	Clear Goals, Immediate Feedback, Matched Skills and Challenges	Flow – Merger of Action and Awareness, Concentration, Sense of Control	Self-consciousness, Time Distortion, Autotelic Experience		Web Navigation	Survey
Nel et al. (1999)	Web Site Type (Content, Audience Focus)	Flow – Control, Attention Focus, Curiosity, Intrinsic Interest	Website Revisit		Web Sites	Experiment
Agarwal and Karahanna (2000)	Personal Innovativeness, Playfulness	Cognitive Absorption/Flow – Curiosity, Control, Temporal Dissociation, Focused Immersion, Heightened Enjoyment	Perceived Ease of Use, Perceived Usefulness, Behavioral Intention		IT (World Wide Web) Usage	Survey
Chen et al. (2000)		Flow – Merger of Action and Awareness, Concentration, Loss of Self Consciousness, Time Distortion, Sense of Control, Telepresence, Enjoyment, Perceived Challenges			Web Navigation	Survey

Reference/ Authors	Antecedents	Online Experience	Direct Consequences	Indirect Consequences	Research Setting	Research Method
Novak et al. (2000)	Skill/Control, Interactive Speed, Importance, Challenge/Arousal, Focused Attention, Telepresence/Time Distortion	Flow			Online Shopping	Survey
Rettie (2001)	Goals, Feedback, Skills, Challenge	Flow – Merging of Action and Awareness, Focused Concentration, Sense of Control, Loss of Self Consciousness, Time Distortion, Autotelic Experience			Internet Use	Focused groups
Koufaris (2002)	Product Involvement, Web Skills, Value-Added Search Mechanisms, Challenges	Flow – Shopping Enjoyment, Concentration	Intention to Return		Online Shopping	Survey
Luna et al. (2002)	Balance of Challenges/Skills, Perceived Control, Unambiguous Demands, Focused Attention, Attitude toward Site	Flow	Revisit Intent, Purchase Intent	Purchase	Online Shopping	Experiment
Huang (2003)	Complexity, Novelty, Interactivity	Flow – Control, Attention, Curiosity, Interest	Utilitarian Performance, Hedonic Performance		Web Sites	Survey
Klein (2003)	Media Richness, User Control	Telepresence	Persuasion (Belief Strength, Attitude Intensity)		Computer–mediated Environment	Experiment
Korzaan (2003)		Flow	Exploratory Behavior, Attitude	Intention to Purchase	Online Shopping	Survey
Luna et al. (2003)	Attention, Challenge, Interactivity, Attitude toward Site	Flow	Purchase Intent, Revisit Intent		Online Shopping	Survey
Novak et al. (2003)	Goal-directed vs. Experiential Activities, Skill, Challenge, Novelty, Importance	Flow			Online Shopping	Survey

Reference/ Authors	Antecedents	Online Experience	Direct Consequences	Indirect Consequences	Research Setting	Research Method
Hsu and Lu (2004)	Perceived Ease of Use	Flow	Intention		Online Games	Survey
Jiang and Benbasat (2004)	Visual Control, Functional Control	Flow – Control, Attention Focus, Cognitive Enjoyment			E-commerce Websites	Experiment
Pace (2004)	Goals and Navigation Behavior, Challenge and Skills, Attention	Flow – Joy of Discovery, Reduced Awareness of Irrelevant Factors, Distorted Sense of Time, Merging of Action and Awareness, Sense of Control, Mental Alertness, Telepresence			Web Browsing	Grounded Theory (Theoretical Sampling, Semi-Structured Interviews)
Pilke (2004)	Immediate Feedback, Clear Rules/Goals, Complexity, Dynamic Challenges	Flow			World Wide Web	Interviews
Reid (2004)	Cognitive Ability, Volitional Control, Self-efficacy	Flow and Playfulness	Competence, Creativity, User Satisfaction		Virtual Reality	Interviews, Experiment, Observation
Skadberg and Kimmel (2004)	Speed, Ease of Use, Attractiveness, Interactivity, Domain Knowledge/Skill, Information in the Web Site/Challenge	Flow – Enjoyment, Time Distortion, Telepresence	Increased Learning	Change of Attitude and Behavior	Web Browsing	Survey
Kim et al. (2005)	Skills, Challenges, Focused Attention	Flow			Online Games	Survey
Saade and Bahli (2005)		Cognitive Absorption/Flow – Temporal Dissociation, Focused Immersion, Heightened Enjoyment	Perceived Ease of Use, Perceived Usefulness	Intention to Use	Internet Learning	Survey
Siekpe (2005)		Flow – Challenges, Concentration, Curiosity, Control	Intention to Purchase, Intention to Return		Online Shopping	Survey
Suh and Lee (2005)	(Virtually High versus Low) Experiential Products	Telepresence	Product Knowledge, Attitude, Purchase Intentions		Virtual Reality	Experiment

Reference/ Authors	Antecedents	Online Experience	Direct Consequences	Indirect Consequences	Research Setting	Research Method
Chen (2006)	Clear Goal, Potential Control, Immediate Feedback, Merger of Action and Awareness	Flow – Telepresence, Time Distortion, Concentration, Loss of Self-consciousness	Positivity of Affects, Enjoyable Feeling		Web Browsing	Survey (Digitalized Experience Sampling Method)
Li and Browne (2006)	Need for Cognition, Mood	Flow – Focused Attention, Control, Curiosity, Temporal Dissociation			Online Experience	Survey
Shin (2006)	Skill, Challenge, Individual Differences	Flow – Enjoyment, Telepresence, Focused Attention, Engagement, Time Distortion	Achievement, Satisfaction		Virtual Learning Environment	Survey
Tung et al. (2006)	Product Involvement	Flow – Control, Attention, Curiosity, Interest	Mood, Attitude		Web Site Advertising	Experiment
Choi et al. (2007)	Learning Interface, Interaction, Instructor Attitude, Content	Flow	Attitude Toward E-learning, Learning Outcomes (Tech. Self-efficacy)		E-learning	Survey
Chang and Wang (2008)	Interactivity, Perceived Ease of Use	Flow	Perceived Usefulness, Attitude toward Use, Behavioral Intention		Computer-mediated Communication	Survey
Chen et al. (2008)		Flow – Control, Attention Focus, Curiosity and Interest	Communication Outcome – Effectiveness, Quality, Volume		Computer-mediated Communication	Experiment
Park et al. (2008)	Control Char. (Skills, Challenges), Content Char. (Interactivity, Vividness), Process Char. (Extrinsic/Intrinsic Motivation)	Flow	Brand Equity		Virtual Worlds	Conceptual
Guo and Poole (2009)	Website Complexity, Clear Goal, Immediate Feedback, Congruence of Challenge and Skill	Flow – Concen-tration, Control, Mergence of Action and Awareness, Transformation of Time, Transcendence of Self, Autotelic Experience			Web Sites	Experiment

Reference/ Authors	Antecedents	Online Experience	Direct Consequences	Indirect Consequences	Research Setting	Research Method
Hoffman and Novak (2009)	Skill, Challenge, Interactivity, Telepresence, Attractiveness, Novelty, Playfulness, Personal Innovativeness, Content/Interface, Ease of Use, Positive Subjective Experience/Attitude	Flow	Learning, Control/Perceived Behavioral Control, Exploratory Behavior/Curiosity/ Discovery, Positive Subjective Experience/Attitude, Ease of Use, Perceived Usefulness, Purchase/ Behavioral Intention, Addictive Behavior	Purchase/Use	Internet	Conceptual
Shin (2009)	Perceived Synchronicity	Flow	Intention		Virtual Worlds	Survey
Ho and Kuo (2010)	Computer Attitudes	Flow – Control, Focused Attention, Intrinsic Interest, Curiosity	Learning Outcomes – Adaptation, Replication, Innovation		E-learning	Survey
Lee and Chen (2010)		Flow – Concentration, Enjoyment, Time Distortion, Telepresence	Attitude, Controllability, Self-efficacy, Perceived Ease of Use	Perceived Behavioral Control, Intention, Behavior, Perceived Usefulness	Online Shopping	Survey
Nah et al (2010)	Balance of Skills and Challenges	Flow	Brand Equity	Behavioral Intention	3D Virtual World	Survey
Zaman et al (2010)	Telepresence, Perceived Control	Flow – Enjoyment, Concentration	Positive Affect, Exploratory Behavior	Perceived Expected Creativity	Instant Messaging	Survey

Appendix B

Items for Measures

Item	Construct and Measurement Items
	Telepresence (7-point Likert scale)
TP1	I forgot about my immediate surroundings when I was navigating the <hospital brand name> virtual tour.
TP2	When the virtual tour ended, I felt like I came back to the "real world" after a journey.
TP3	During the virtual tour, I forgot that I was in the middle of an experiment.
TP4	The computer-generated world seemed to be "somewhere I visited" rather than "something I saw."
	Enjoyment (7-point Likert scale)
ENJ1	I found my virtual tour of <hospital brand name> enjoyable.
ENJ2	I found my virtual tour of <hospital brand name> boring. (Reverse coded)
ENJ3	I found my virtual tour of <hospital brand name> interesting.
ENJ4	I found my virtual tour of <hospital brand name> fun.
	Brand Equity (7-point Likert scale)
BE1	Even if another hospital offers the same quality of services as <hospital brand name>, I would prefer to use the services of <hospital brand name>.
BE2	If there is another hospital as good as <hospital brand name>, I prefer to go to <hospital brand name>.
BE3	It makes sense to use the services of <hospital brand name> instead of services of any other hospitals even if they are the same.
	Behavioral Intention (i.e., intention to visit hospital) (7-point Likert scale) The header for the three intention items read: "Assuming that <hospital brand name> is available in your area…"
INT1	…I would consider <hospital brand name> the next time I need a hospital service.
INT2	…I would recommend <hospital brand name> if a friend calls me to get my advice in his/her search for a hospital.
INT3	…it is likely that I will visit <hospital brand name>.

Appendix C

Descriptive Statistics, Reliability, Validity, and Common Method Variance

Descriptive Statistics

Table C1. Descriptive Statistics of Indicators

	Aggregate Data		2D Condition		3D Condition	
Items	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
INT1	4.45	1.65	4.30	1.66	4.56	1.64
INT2	4.42	1.61	4.22	1.65	4.58	1.57
INT3	4.03	1.69	3.73	1.70	4.26	1.66
BE1	4.30	1.35	4.32	1.29	4.30	1.39
BE2	4.24	1.31	4.13	1.21	4.31	1.37
BE3	4.46	1.38	4.39	1.32	4.50	1.42
ENJ1	4.78	1.30	4.36	1.41	5.05	1.14
ENJ2	4.29	1.59	3.68	1.50	4.69	1.53
ENJ3	5.00	1.30	4.66	1.47	5.21	1.13
ENJ4	4.52	1.39	4.02	1.44	4.84	1.25
TP1	3.48	1.67	3.01	1.58	3.79	1.65
TP2	3.37	1.66	2.95	1.53	3.64	1.69
TP3	3.27	1.61	3.12	1.66	3.36	1.58
TP4	3.69	1.61	3.31	1.59	3.94	1.57

INT: Behavioral Intention; BE: Brand Equity; ENJ: Enjoyment; TP: Telepresence

Skewness and Kurtosis

Based on Kline (2005), we examined the ratio of the unstandardized skewness and kurtosis indices divided by their standard error. Kline suggests that values less than 10 indicate no serious skewness or kurtosis problem. ENJ3 is the only item with skewness of -10.3 that exceeds this threshold. Although ENJ3's kurtosis value was below 10, it was higher than any other item and so, as an extra check on whether or not skewness and kurtosis were affecting our results, we reestimated our model after deleting ENJ3 and found that it did not result in any significant change to the fit indices (i.e., CFI went from 0.978 to 0.982, resulting in a change of only 0.004). The paths and R^2s also did not change much. Therefore, skewness and kurtosis problems were not deemed to be significant problems in our data.

Convergent and Discriminant Validity

Convergent validity was assessed using several methods. First, a general rule states that in the SEM model, the loading of each indicator on its construct should have a path weight of at least 0.7 (see Hulland 1999). The weights in our measurement model range from 0.75 to 0.96. Second, to assess reliability, we used Omega coefficients in Mplus (see Raykov and Marcoulides 2010). This model-based reliability statistic is very similar to Cronbach's Alpha and is interpreted similarly (e.g., greater than 0.8 as recommended by Cohen 1988), but is computed using model parameters—specifically the loadings for the indicators on their corresponding latent constructs as well as the indicators' residual variances—in order to give a model-specific measure of reliability. Table C2 shows the Omega coefficient for each of the latent constructs. Third, Fornell and Larcker (1981) recommend that all average variance extracted (AVE) be greater than 0.5; our model's smallest AVE is 0.65, which is shown in Table C3 as its square root of 0.80. Hence, the statistics show that there is strong convergent validity in the data.

Table C2. Omega Coefficients for Constructs	
Construct	**Omega**
Behavioral Intention	0.95
Brand Equity	0.99
Enjoyment	0.99
Telepresence	0.88

Table C3. Correlations of Constructs and Average Variances Extracted				
Construct	**INT**	**BE**	**ENJ**	**TP**
Behavioral Intention	**0.92**			
Brand Equity	0.49	**0.88**		
Enjoyment	0.54	0.43	**0.88**	
Telepresence	0.50	0.40	0.65	**0.80**

(***Diagonal** represents **Square Root of Average Variance Extracted**)

Discriminant validity is demonstrated in two ways. First, the AVE rule from Chin et al. (2003) states that the square root of the AVE for each of the constructs should be greater than that construct's correlations with the other constructs. As shown in Table C3, the smallest square root of AVE is 0.80, which is larger than any of the interconstruct correlations. In addition, discriminant validity can be shown through pairwise factor analysis. To conduct this test, items are taken from each pair of constructs and placed in an EFA in Mplus. The same items are then placed in a CFA with one factor. If there is a significant chi-square difference, then the items do not load on one factor, which implies that the two constructs are not actually a single construct. The chi-square difference for each test is significant at the .001 level, which implies that each pair of two constructs is distinct from one another.

Common Method Variance Test

Common method variance is a phenomenon that occurs when items are artificially correlated with each other (Podsakoff et al. 2003; Podsakoff and Organ 1986). One method to detect common method variance is to conduct a series of confirmatory factor analyses on the items and force the number of factors to be one, and then iteratively adding a factor until reaching four factors. If common method variance is present, we would expect items from different constructs to be more highly correlated with each other and load together. If the result is fewer than the four factors we expect to obtain, it suggests common method variance. Four CFAs were carried out in Mplus in the following order: one-factor, two-factor, three-factor, and four-factor. Each model had better fit statistics than the previous model and the chi-square difference test was significant between each pair of models. This implies that the data loads on four factors, which suggests that the items are not artificially correlated with each other.

Straub et al. (2004) suggest that reliability coefficients that are *too high* are just as problematic as reliability coefficients that are *too low* when items are presented in blocks (as in this case). In spite of scale item blocking potentially creating common method variance, it was not sufficient to fail the common method variance test.

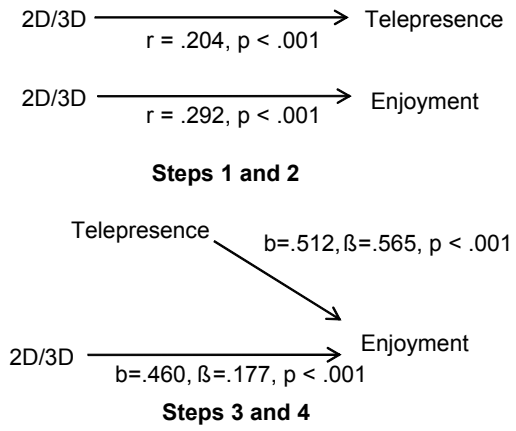
Appendix D

Mediator Tests

We carried out six mediator tests using Baron and Kenney's (1986) four-step procedures to assess the mediating effects in Figure 2.

(1) Telepresence as a mediator of the relationship between 2D/3D and Enjoyment
(2) Enjoyment as a mediator of the relationship between Telepresence and Brand Equity
(3) Brand Equity as a mediator of the relationship between Enjoyment and Behavioral Intention
(4) Enjoyment as a mediator of the relationship between Telepresence and Behavioral Intention
(5) Brand Equity as a mediator of the relationship between Telepresence and Behavioral Intention
(6) Telepresence and Enjoyment as mediators of the relationship between 2D/3D and Brand Equity

Telepresence as a Mediator of the Relationship Between 2D/3D and Enjoyment

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
Satisfied The bivariate relationships are significant: (i) 2D/3D and Telepresence (r = .204, p < .001) and (ii) 2D/3D and Enjoyment (r = .292, p < .001).	**Satisfied** Enjoyment = $b_0 + b_1 \times$ (2D/3D) + $b_2 \times$ Telepresence + e Step 3 is satisfied with b_2 = .512 (beta = .565, p < .001) and step 4 is satisfied with b_1 = .460 (beta = .177, p < .001).	

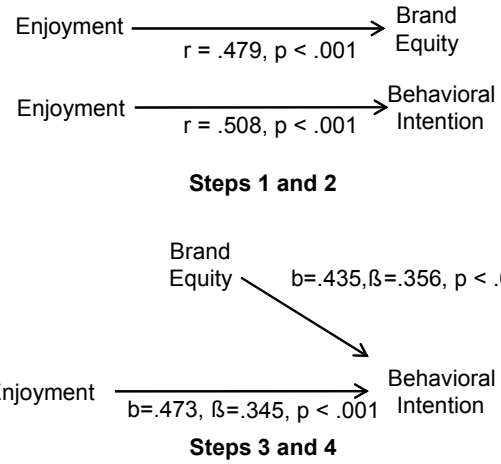
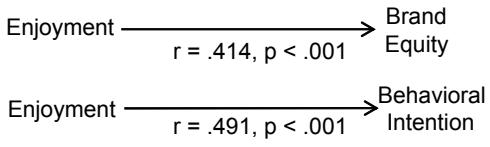
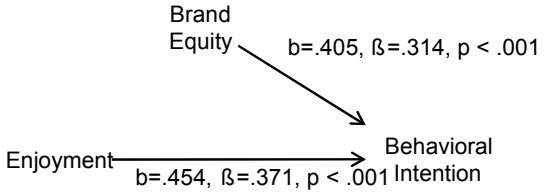
Enjoyment as a Mediator of the Relationship Between Telepresence and Brand Equity

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
Satisfied **2D Condition – Satisfied** The bivariate relationships are significant: (i) Telepresence and Enjoyment ($r = .659$, $p < .001$) and (ii) Telepresence and Brand Equity ($r = .373$, $p < .001$).	**Satisfied** Brand Equity = $b_0 + b_1 \times$ Telepresence + $b_2 \times$ Enjoyment + e **2D Condition – Satisfied** For step 3, Enjoyment is correlated with Brand Equity, with $b_2 = .156$ (beta = .180, $p = .056$). Enjoyment is a mediator because it is still (marginally) correlated with Brand Equity even when Telepresence is in the model. For step 4, the correlation between Telepresence and Brand Equity is such that $b_1 = .212$ (beta = .255, $p < .01$), which implies that Telepresence and Brand Equity are still correlated even when Enjoyment is in the model.	**2D Condition** Telepresence → Enjoyment: $r = .659$, $p < .001$ Telepresence → Brand Equity: $r = .373$, $p < .001$ **Steps 1 and 2** Enjoyment → Brand Equity: $b = .156$, ß = .180, $p = .056$ Telepresence → Brand Equity: $b = .212$, ß = .255, $p < .01$ **Steps 3 and 4**
3D Condition – Satisfied The bivariate relationships are significant: (i) Telepresence and Enjoyment ($r = .520$, $p < .001$) and (ii) Telepresence and Brand Equity ($r = .394$, $p < .001$).	**3D Condition – Satisfied** Step 3 is satisfied with $b_2 = .424$ (beta = .375, $p < .001$) and step 4 is satisfied with $b_1 = .187$ (beta = .199, $p < .01$), which implies that Telepresence and Brand Equity are still correlated even when Enjoyment is in the model.	**3D Condition** Telepresence → Enjoyment: $r = .520$, $p < .001$ Telepresence → Brand Equity: $r = .394$, $p < .001$ **Steps 1 and 2** Enjoyment → Brand Equity: $b = .424$, ß = .375, $p < .001$ Telepresence → Brand Equity: $b = .187$, ß = .199, $p < .01$ **Steps 3 and 4**

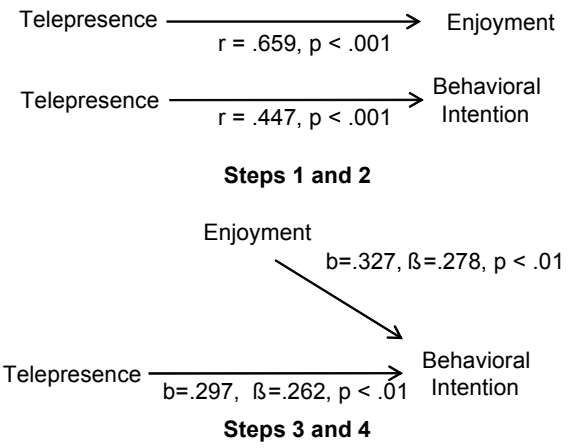
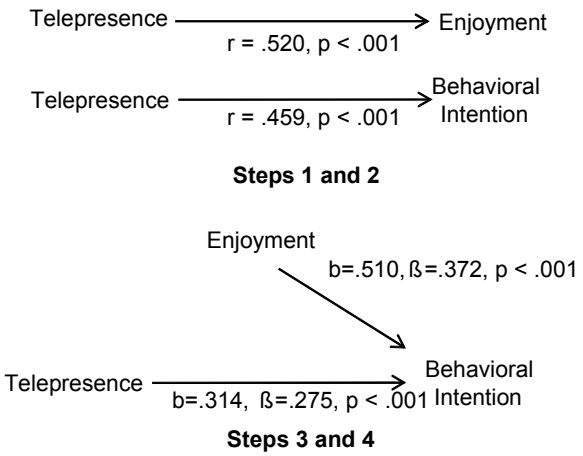
Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
2D and 3D – Satisfied The bivariate relationships are significant: (i) Telepresence and Enjoyment (r = .601, p < .001) and (ii) Telepresence and Brand Equity (r = .384, p < .001).	**2D and 3D – Satisfied** Step 3 is satisfied with b_2 = .279 (beta = .287, p < .001) and step 4 is satisfied with b_1 = .187 (beta = .212, p < .001), which implies that Telepresence and Brand Equity are still correlated even when Enjoyment is in the model.	**2D and 3D Combined** Telepresence → Enjoyment r = .601, p < .001 Telepresence → Brand Equity r = .384, p < .001 **Steps 1 and 2** Enjoyment b=.279, ß=.287, p < .001 Telepresence → Brand Equity b=.187, ß=.212, p < .001 **Steps 3 and 4** Therefore, Enjoyment partially mediates the relationship between Telepresence and Brand Equity, and this holds true for both the 2D and 3D conditions separately as well as 2D and 3D combined. This result corresponds with the results in Figure 2 in the paper, which also shows that Enjoyment partially mediates the relationship between Telepresence and Brand Equity.

Brand Equity as a Mediator of the Relationship Between Enjoyment and Behavioral Intention

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
Satisfied **2D Condition – Satisfied** The bivariate relationships are significant: (i) Enjoyment and Brand Equity (r = .348, p < .001) and (ii) Enjoyment and Behavioral Intention (r = .452, p < .001).	**Satisfied** Behavioral Intention = $b_0 + b_1 \times$ Enjoyment + $b_2 \times$ (Brand Equity) + e **2D Condition – Satisfied** For step 3, Brand Equity is correlated with Behavioral Intention with b_2 = .354 (beta = .257, p < .001). Therefore, Brand Equity is a mediator because it is still correlated with Behavioral Intention even when Enjoyment is in the model. For step 4, the correlation between Enjoyment and Behavioral Intention is such that b_1 = .431 (beta = .366, p < .001), which implies that Enjoyment and Behavioral Intention are still correlated even when Brand Equity is in the model.	**2D Condition** Enjoyment → Brand Equity r = .348, p < .001 Enjoyment → Behavioral Intention r = .452, p < .001 **Steps 1 and 2** Brand Equity b=.354,ß=.257, p < .001 Enjoyment → Behavioral Intention b=.431,ß=.366, p < .001 **Steps 3 and 4**

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
3D Condition – Satisfied The bivariate relationships are significant: (i) Enjoyment and Brand Equity (r = .479, p < .001) and (i) Enjoyment and Behavioral Intention (r = .508, p < .001).	**3D Condition – Satisfied** Step 3 is satisfied with b_2 = .435 (beta = .356, p < .001) and step 4 is satisfied with b_1 = .473 (beta = .345, p < .001), which implies that Enjoyment and Behavioral Intention are still correlated even when Brand Equity is in the model.	**3D Condition**  **Steps 1 and 2** **Steps 3 and 4**
2D and 3D – Satisfied The bivariate relationships are significant: (i) Enjoyment and Brand Equity (r = .414, p < .001) and (ii) Enjoyment and Behavioral Intention (r = .491, p < .001).	**2D and 3D – Satisfied** Step 3 is satisfied with b_2 = .405 (beta = .314, p < .001) and step 4 is satisfied with b_1 = .454 (beta = .371, p < .001), which implies that Enjoyment and Behavioral Intention are still correlated even when Brand Equity is in the model.	**2D and 3D Combined**  **Steps 1 and 2**  **Steps 3 and 4** Therefore, Brand Equity partially mediates the relationship between Enjoyment and Behavioral Intention, and this holds true for both the 2D and 3D conditions separately as well as 2D and 3D combined. This result corresponds with the results in Figure 2 in the paper, which also shows that Brand Equity partially mediates the relationship between Enjoyment and Behavioral Intention.

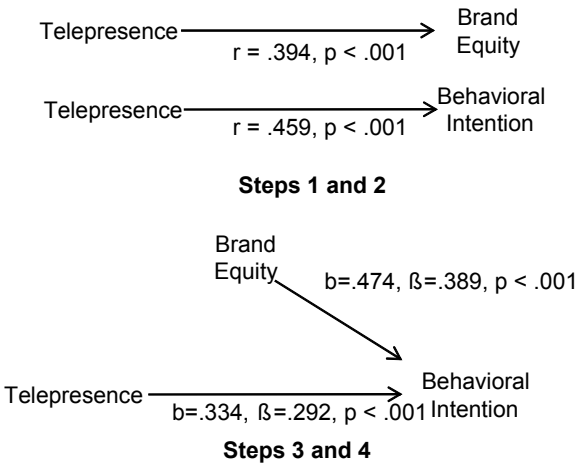
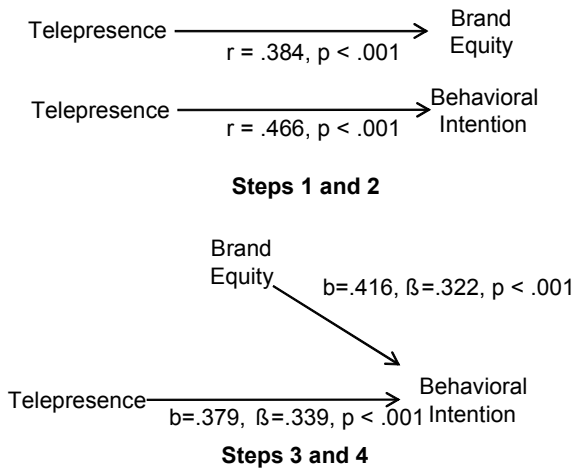
Enjoyment as a Mediator of the Relationship Between Telepresence and Behavioral Intention

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
Satisfied **2D Condition – Satisfied** The bivariate relationships are significant: (i) Telepresence and Enjoyment (r = .659, p < .001) and (ii) Telepresence and Behavioral Intention (r = .447, p < .001).	**Satisfied** Behavioral Intention = b_0 + b_1 × Telepresence + b_2 × Enjoyment + e **2D Condition – Satisfied** For step 3, Enjoyment is correlated with Behavioral Intention with b_2 = .327 (beta = .278, p < .01). Therefore, Enjoyment is a mediator because it is still correlated with Behavioral Intention even when Telepresence is in the model. For step 4, the correlation between Telepresence and Behavioral Intention is such that b_1 = .297 (beta = .262, p < .01), which implies that Telepresence and Behavioral Intention are still correlated even when Enjoyment is in the model.	**2D Condition** 
3D Condition – Satisfied The bivariate relationships are significant: (i) Telepresence and Enjoyment (r = .520, p < .001) and (ii) Telepresence and Behavioral Intention (r = .459, p < .001).	**3D Condition – Satisfied** Step 3 is satisfied with b_2 = .510 (beta = .372, p < .001) and step 4 is satisfied with b_1 = .314 (beta = .275, p < .001), which implies that Telepresence and Behavioral Intention are still correlated even when Enjoyment is in the model.	**3D Condition** 

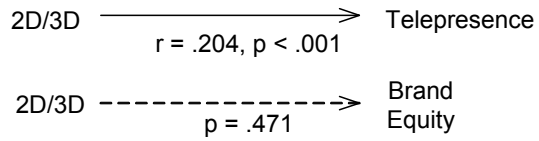
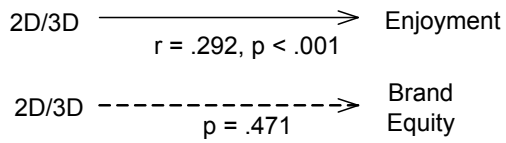
Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
2D and 3D – Satisfied The bivariate relationships are significant: (i) Telepresence and Enjoyment ($r = .601$, $p < .001$) and (ii) Telepresence and Behavioral Intention ($r = .466$, $p < .001$).	**2D and 3D – Satisfied** Step 3 is satisfied with $b_2 = .404$ (beta = .330, $p < .001$) and step 4 is satisfied with $b_1 = .299$ (beta = .268, $p < .001$), which implies that Telepresence and Behavioral Intention are still correlated even when Enjoyment is in the model.	**2D and 3D Combined** Telepresence → Enjoyment $r = .601$, $p < .001$ Telepresence → Behavioral Intention $r = .466$, $p < .001$ **Steps 1 and 2** Enjoyment $b=.404$, ß$=.330$, $p < .001$ Telepresence → Behavioral Intention $b=.299$, ß$=.268$, $p < .001$ **Steps 3 and 4** Therefore, Enjoyment partially mediates the relationship between Telepresence and Behavioral Intention, and this holds true for both the 2D and 3D conditions separately as well as 2D and 3D combined. This result corresponds with the results in Figure 2 in the paper, which also shows that Enjoyment partially mediates the relationship between Telepresence and Behavioral Intention.

Brand Equity as a Mediator of the Relationship Between Telepresence and Behavioral Intention

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
Satisfied **2D Condition – Satisfied** The bivariate relationships are significant: (i) Telepresence and Brand Equity ($r = .373$, $p < .001$) and (ii) Telepresence and Behavioral Intention ($r = .447$, $p < .001$).	**Satisfied** Behavioral Intention = $b_0 + b_1 \times$ Telepresence + $b_2 \times$ (Brand Equity) + e **2D Condition – Satisfied** For step 3, Brand Equity is correlated with Behavioral Intention with $b_2 = .344$ (beta = .250, $p < .01$). Therefore, Brand Equity is a mediator because it is still correlated with Behavioral Intention even when Telepresence is in the model. For step 4, the correlation between Telepresence and Behavioral Intention is such that $b_1 = .403$ (beta = .356, $p < .001$), which implies that Telepresence and Behavioral Intention are still correlated even when Brand Equity is in the model.	**2D Condition** Telepresence → Brand Equity $r = .373$, $p < .001$ Telepresence → Behavioral Intention $r = .447$, $p < .001$ **Steps 1 and 2** Brand Equity $b=.344$, ß$=.250$, $p < .01$ Telepresence → Behavioral Intention $b=.403$, ß$=.356$, $p < .001$ **Steps 3 and 4**

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
3D Condition – Satisfied The bivariate relationships are significant: (i) Telepresence and Brand Equity (r = .394, p < .001) and (ii) Telepresence and Behavioral Intention (r = .459, p < .001).	**3D Condition – Satisfied** Step 3 is satisfied with b_2 = .474 (beta = .389, p < .001) and step 4 is satisfied with b_1 = .334 (beta = .292, p < .001), which implies that Telepresence and Behavioral Intention are still correlated even when Brand Equity is in the model.	**3D Condition** 
2D and 3D – Satisfied The bivariate relationships are significant: (i) Telepresence and Brand Equity (r = .384, p < .001) and (ii) Telepresence and Behavioral Intention (r = .466, p < .001).	**2D and 3D – Satisfied** Step 3 is satisfied with b_2 = .416 (beta = .322, p < .001) and step 4 is satisfied with b_1 = .379 (beta = .339, p < .001), which implies that Telepresence and Behavioral Intention are still correlated even when Brand Equity is in the model.	**2D and 3D Combined**  Therefore, Brand Equity partially mediates the relationship between Telepresence and Behavioral Intention, and this holds true for both the 2D and 3D conditions separately as well as 2D and 3D combined. This result corresponds with the results in Figure 2 in the paper, which also shows that Brand Equity partially mediates the relationship between Telepresence and Behavioral Intention.

Telepresence and Enjoyment as Mediators of the Relationship Between 2D/3D and Brand Equity

Results from Steps 1 and 2	Results from Steps 3 and 4	Overall Results
Not Satisfied Although the bivariate relationship between 2D/3D and Telepresence is significant (r = .204, p < .001) and between 2D/3D and Enjoyment is also significant, (r = .292, p < .001), the bivariate relationship between 2D/3D and Brand Equity is not (p = .471).		 **Steps 1 and 2 – Telepresence as Mediator**  **Steps 1 and 2 – Enjoyment as Mediator** The reason for the non-significant relationship between 2D/3D and Brand Equity is due to opposing or counteracting forces taking place between 2D/3D and Brand Equity. Since the first and second mediator tests support positive mediating effects of Telepresence and Enjoyment in the model, the non-significant relationship between 2D/3D and Brand Equity is likely caused by a counteracting, negative effect of 2D/3D on Brand Equity which we attribute to distraction-conflict theory.

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