

Online Appendix 1: psychometric analysis (Study 1)

Three psychometric inventories were factor-analysed. For factor extraction principal-axis factoring was used with an oblique rotation (direct oblimin). In addition, reliability analysis was conducted

Technology perception. Table A1 shows the factor structure of the abbreviated version [Hassenzahl and Monk, 2010] of the AttrakDiff2 [Hassenzahl et al. 2003] instrument. The two-factor solution explained 53% of variance. Simple structure was apparent, with the items for hedonic quality loading on Factor 1 and the items for pragmatic quality loading on Factor 2. Reliability of the subscales for hedonic quality (Cronbach's alpha = .81) and pragmatic quality (alpha = .80) was good. Given the good factor structure and reliability, average subscale scores were calculated for hedonic quality and pragmatic quality, and used in subsequent analysis.

Table A1

Pattern matrix for AttrakDiff2 (Study 1)

	Factor 1	Factor 2
unimaginative - creative	0.80	-0.05
tacky - stylish	0.78	-0.01
dull - captivating	0.66	0.10
cheap - premium	0.63	0.02
confusing - structured	0.03	0.86

Table A2

Pattern matrix for PANAS (Study 1)

	Factor 1	Factor 2
Afraid	0.87	0.17
Scared	0.83	0.19
Nervous	0.75	0.15
Upset	0.74	-0.36
Jittery	0.72	0.08
Irritable	0.70	-0.34
Distressed	0.65	-0.32
Ashamed	0.63	0.00
Guilty	0.63	0.01
Hostile	0.60	-0.27
Proud	-0.33	0.68
Strong	-0.09	0.68
Inspired	-0.24	0.67

Positive and negative affect (PANAS). Table A2 shows the factor structure of the PANAS [Watson et al. 1988] instrument. The two-factor solution explained 53% of variance. Simple structure was apparent, with the items for negative affect loading on Factor 1 and the items for positive affect loading on Factor 2. Reliability of the subscales for positive affect (Cronbach's alpha = .88) and negative affect (alpha = .92) was good. Given the good factor structure and reliability, average subscale scores were calculated for positive affect and negative affect, and used in subsequent analysis.

Need fulfilment. Table A3 shows the factor structure of the six of the subscales of need fulfilment inventory.¹ Overall, the intended factor structure was reproduced, with some exceptions. Factors for the constructs of self-actualization/meaning, relatedness, and popularity were clearly defined by three items. For each of the remaining constructs a factor was clearly defined by two of the three items. There were cross-loadings for stimulation (Item 3), security (Item 2) and competence (Item 3). After these three items were removed from this and any subsequent analyses, the six-factor solution explained 68% of variance. Reliability analysis showed that most scales met the cut-offs of .70 (good) or .60 (acceptable), with alpha equal to .70 for competence, .92 for relatedness, .79 for stimulation, .85 for self-actualization/meaning, .64 for security and .88 for popularity. Average subscale scores were calculated for each of the six analysed needs and used in subsequent analysis.

Table A3

Pattern matrix for need fulfilment (Study 1)

		F1	F2	F3	F4	F5	F6
MEA3	I did feel a deeper understanding of myself	0.77	0.03	0.08	-0.05	-0.05	-0.02
MEA1	I felt that I was becoming who I really am	0.67	-0.10	-0.01	-0.09	0.15	0.02
MEA2	I did feel a sense of deeper purpose	0.55	-0.16	0.17	-0.06	0.02	-0.05
REL1	I did feel close and connected with other people who are important to me	-0.06	-0.91	0.00	0.00	0.06	-0.03
REL2	I did feel a sense of contact with people who care for me, and whom I care for	-0.07	-0.87	0.11	-0.06	-0.04	-0.03
REL3	I did feel a strong sense of intimacy with the people I spent time with	0.22	-0.76	0.01	0.03	-0.02	0.04
POP2	I felt that I am someone, others take as a guidance	-0.03	-0.01	1.00	-0.03	-0.05	0.01
POP1	I felt that I was a person whose advice others seek out and follow	0.00	-0.01	0.71	0.01	0.13	-0.06
POP3	I did feel that I had a strong impact on what other people did	0.11	-0.22	0.59	0.01	-0.01	0.01
STI1	I felt that I was experiencing new sensation and activities	0.14	-0.13	-0.02	-0.56	0.28	-0.03
STI2	I felt that I have found new sources and types of stimulation for myself	0.22	-0.01	0.15	-0.52	0.04	-0.25
STI3	I did feel intense physical pleasure and enjoyment	0.43	-0.18	-0.07	-0.06	0.04	-0.25

¹ Consistent with [Hassenzahl et al. 2010] results, a well-defined factor solution did not result when the items for the subscale autonomy were included. Therefore, these items were not included in any further analysis.

Online Appendix 2: initial analysis and observations of rated experience (Study 1)

Need fulfilment. With both positive experiences and negative experiences, in terms of need fulfilment, the most salient need was competence (see Table A4). All needs were fulfilled to a larger degree in positive than in negative experiences (Table A4).

Affect. Positive affect was more salient than negative affect in positive experiences, but this was not true in negative experiences (Table A4). Positive affect was higher in positive than in negative experiences ($M = 3.9$ vs 2.9) and negative affect was higher in negative than in positive experiences ($M = 3.1$ vs 1.8). Moreover, negative experiences were rated similarly in regard to positive and negative affect ($M = 2.9$ vs 3.1), whereas positive experience received comparatively higher rating for positive affect than negative affect ($M = 3.9$ vs 1.8).

Technology perception and evaluation. Goodness was most salient in positive experiences, but this was not the case in negative experiences (Table A4). Pragmatic quality, hedonic quality, beauty and goodness were all higher in positive experiences (Table A4).

Table A4

Need fulfilment, experience and technology perception by activity domain (Study 1)

	Negative experience		Positive experience		$t(342)$	p	r
	Mean	SD	Mean	SD			
Need fulfilment							
Competence	2.57	1.21	4.00	0.89	-12.61	< .001	-0.56
Relatedness	2.39	1.22	3.72	1.26	-9.77	< .001	-0.47
Pleasure/stimulation	2.49	1.16	3.78	1.06	-10.76	< .001	-0.50
Self-actualization/meaning	1.92	0.92	3.04	1.03	-10.42	< .001	-0.49
Security	2.48	1.10	3.30	0.99	-7.21	< .001	-0.36
Popularity	2.41	1.18	3.21	1.06	-6.54	< .001	-0.33
Affect							
Positive affect	2.88	0.84	3.94	0.66	-13.24	< .001	-0.58

Online Appendix 3: initial analysis and observations of narrated experience (Study 1)

The extent to which social processes, affective processes and personal concerns were presented in narratives was analysed with linguistic inquiry and word count (LIWC) analysis. We previously reported and provided evidence for the benefits of using automated content analysis of people's self-reported experiences [Tuch et al. 2013]. We build on this work by further exploiting these benefits here.

Differences between positive and negative experiences. Within narratives of positive experiences, affective processes and positive emotion were most salient, but in negative experiences affective processes and work were (see Table A5). In narratives of positive experiences with technology participants to a greater degree of used language indicating social processes, family, positive emotion, leisure, home and money. However, in narratives of negative experiences with technology participants to a greater degree of used language indicating negative emotion, anxiety, anger, sadness and work (Table A5).

Table A5

Social processes, affective processes and personal concerns by activity domain (Study 1)

	Negative experience		Positive experience		<i>t</i> (253)	<i>p</i>	<i>r</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>			
Social processes	6.33	5.69	9.13	6.32	-4.24	< .001	-0.22
Family	0.27	0.86	1.04	1.75	-4.86	< .001	-0.25
Friend	0.39	0.97	0.61	1.23	-1.80	0.073	-0.10
Humans	0.24	0.70	0.42	1.21	-1.64	0.102	-0.09
Affective processes	4.03	2.89	4.35	3.02	-0.98	0.328	-0.05
Positive emotion	1.71	1.88	3.61	2.87	-6.95	< .001	-0.35
Negative emotion	2.31	2.24	0.71	1.16	8.64	< .001	0.42
Anxiety	0.32	0.95	0.13	0.40	2.61	0.010	0.14
Anger	0.55	1.01	0.05	0.37	6.41	< .001	0.33
Sadness	0.57	1.13	0.33	0.78	2.41	0.017	0.13
Personal concerns							

Online Appendix 4: Type of Technology and Activity in reported experiences (Study 1)

Experience narratives were coded for technology used and activity with technology. Besides the description of their experience, participants also had to indicate which specific technology was involved in their experience. Based on this information and the description of the experience one of the authors coded all experiences for technology used and for activity with technology. Table A6 shows the frequency of technologies and activities in negative and positive experiences.

Table A6

Type of technology and activity (Study 1)

	Negative (<i>n</i> = 145)	Positive (<i>n</i> = 199)
Technology		
Smartphone	39%	34%
Laptop	20%	10%
GPS	14%	9%
Desktop computer	10%	6%
Other	5%	4%
VoIP	3%	27%
Camera	3%	4%
Mobile media player	3%	3%
Video game console	1%	2%
Tablet	0%	2%
E-reader	0%	1%
Activity		
Other	29%	3%

Online Appendix 5: psychometric analysis (Study 2)

Four psychometric inventories were factor-analysed. For factor extraction principal-axis factoring was used with an oblique rotation (direct oblimin). In addition, reliability analysis was conducted.

Technology perception. Table A6 shows the factor structure of the AttrakDiff2 instrument. The two-factor solution explained 56% of variance. Simple structure was apparent, with the items for hedonic quality loading on Factor 1 and the items for pragmatic quality loading on Factor 2. Reliability of the subscales for hedonic quality (Cronbach's alpha = .87) and pragmatic quality (alpha = .82) was good. Given the good factor structure and reliability, average subscale scores were calculated for hedonic quality and pragmatic quality, and used in subsequent

Table A7

Pattern matrix for AttrakDiff2 (Study 2)

	Factor 1	Factor 2
Tacky - Stylish	0.93	-0.07
Dull - Captivating	0.82	-0.07
Unimaginative - Creative	0.67	0.17
Cheap - Premium	0.66	0.14
Unpredictable - Predictable	-0.01	0.73

analysis.

Positive and negative affect (PANAS). Table A7 shows the factor structure of the PANAS instrument. The two-factor solution explained 45% of variance. Simple structure was apparent, with the items for negative affect loading on Factor 1 and the items for positive loading on Factor 2. Reliability of the subscales for positive affect (Cronbach's alpha = .86) and negative affect (alpha = .89) was good. Given the good factor structure and reliability, average subscale scores were calculated for positive affect and negative affect, and used in subsequent analysis.

Table A8

*Pattern matrix for PANAS (positive and negative affect)
(Study 2)*

	Factor 1	Factor 2
Scared	0.75	0.06
Afraid	0.75	0.10
Irritable	0.74	-0.02
Hostile	0.72	-0.03
Upset	0.71	-0.12
Ashamed	0.71	-0.08
Jittery	0.67	0.21
Nervous	0.62	0.21
Distressed	0.62	-0.07
Guilty	0.59	-0.13
Proud	0.01	0.78
Inspired	0.02	0.73

Need fulfilment. Table A8 shows the factor structure of seven of the subscales of [Sheldon et al. 2001] need fulfilment inventory.² Overall, the intended factor structure was reproduced, with some exceptions. Factors for the constructs of popularity, relatedness, self-esteem and self-actualization were clearly defined by three items. For each of the remaining constructs a factor was clearly defined by two of the three items. There were cross-loadings for competence (Item 3), security (Item 3) and pleasure/stimulation (Item 1). After these three items were removed from this and any subsequent analyses, the seven-factor solution explained 67% of variance. Reliability analysis showed that most scales met the cut-offs of .70 (good) or .60 (acceptable), with alpha equal to .80 for competence, .89 for relatedness, .57 for pleasure/stimulation, .83 for self-actualization/meaning, .64 for security, .84 for popularity, and .86 for self-esteem. Average subscale scores were calculated for each of the seven analysed needs and used in subsequent analysis.

Table A9

Pattern matrix for need fulfilment (Study 2)

		F1	F2	F3	F4	F5	F6	F7
PO1	I felt that I was a person whose advice others seek out and follow	0.80	0.03	0.01	0.01	-0.06	0.01	-0.14
PO2	I felt that I am someone others take as a guidance	0.77	0.01	0.08	0.00	-0.01	-0.13	0.01
PO3	I felt that I had a strong impact on what other people did	0.62	0.19	-0.01	-0.02	0.11	0.00	0.02
RE2	I felt close and connected with other people who are important to me	-0.01	0.90	-0.02	-0.04	-0.02	0.01	-0.13
RE1	I felt a sense of contact with other people who care for me, and whom I care for	0.08	0.84	0.04	-0.03	0.05	0.01	0.05
RE3	I felt a strong sense of intimacy with the people I spent time with	0.07	0.78	-0.03	0.07	-0.01	-0.04	0.11
SL2	I felt quite satisfied with who I am	-0.09	0.04	0.93	-0.05	-0.06	0.00	-0.03
SL3	I felt a strong sense of self-respect	0.11	-0.05	0.75	0.03	-0.05	-0.15	0.00
SL1	I felt that I had many positive qualities	0.18	0.00	0.59	0.13	0.20	0.01	0.04
PS3	I felt that I have found new sources and types of stimulation for myself	-0.02	-0.04	0.00	0.85	0.09	-0.03	-0.01
PS2	I felt intense physical pleasure and enjoyment	-0.01	0.23	0.08	0.29	-0.05	-0.23	0.14
PS1	I felt that I was experiencing new sensation and activities	0.05	0.14	0.07	0.39	-0.10	-0.06	-0.42
SE2	I felt glad that I have a comfortable set of routines and habits	0.00	0.01	-0.04	0.09	0.71	-0.02	0.04

² Consistent with [Hassenzahl et al. 2010] results, a well-defined factor solution did not result when the items for the subscale autonomy were included. Therefore, these items were not included in any further analysis.

Online Appendix 6: initial analysis and observations of rated experience (Study 2)

Need fulfilment. With experiences in leisure activities, in terms of need fulfilment, the most salient needs were self-esteem and pleasure/stimulation, but in work activities it was competence and self-esteem (see Table A9). Needs of competence, popularity, security and self-esteem were fulfilled to a larger degree in work than in leisure (see Table A9). However, needs of pleasure/stimulation and relatedness were met in greater measure in leisure (Table A9).

Affect. Experiences did not differ significantly in terms of positive affect or negative affect.

Technology perception. With experiences in leisure, perceptions of hedonic quality and evaluations of beauty were greater than at work (see Table A9). However, no difference was found on pragmatic quality and goodness.

Table A10

Need fulfilment, experience and technology perception by activity domain (Study 2)

	Leisure		Work		<i>t</i> (253)	<i>p</i>	<i>r</i>
	Mean	SD	Mean	SD			
Need fulfilment							
Competence	3.57	0.96	4.36	0.57	-7.38	< .001	-0.42
Relatedness	3.44	1.26	3.09	1.09	2.32	0.021	0.14
Pleasure/stimulation	3.83	0.76	3.42	0.86	3.92	< .001	0.24
Self-actualization/meaning	3.13	1.01	3.38	0.95	-1.90	0.058	-0.12
Security	3.35	0.76	3.62	0.76	-2.73	0.007	-0.17
Popularity	3.04	0.95	3.66	0.90	-5.16	< .001	-0.31
Self-esteem	3.92	0.79	4.14	0.71	-2.22	0.027	-0.14
Affect and flow experience							
Positive affect	3.87	0.71	4.02	0.63	-1.66	0.097	-0.10
Negative affect	1.49	0.71	1.58	0.63	-0.99	0.324	-0.06

Online Appendix 7: initial analysis and observations of narrated experience (Study 2)

The extent to which social processes, affective processes and personal concerns were presented in narratives was analysed with LIWC analysis.

Differences between activity domains. Within narratives of experiences in leisure activities, most salient was positive emotion, but in work activities it was work (see Table A10). In narratives of leisure experiences with technology participants to a greater degree of used language indicating social processes, family, friend, affective processes and positive emotion, and leisure (see Table A10). However, in narratives of work experiences, they used more language indicating work, achievement, and money (see Table A10).

Table A11

Social processes, affective processes and personal concerns by activity domain (Study 2)

	Leisure		Work		<i>t</i> (253)	<i>p</i>	<i>r</i>
	Mean	SD	Mean	SD			
Social processes	6.57	5.16	5.30	4.21	2.04	0.043	0.13
Family	0.94	1.85	0.11	0.46	4.33	< 0.001	0.26
Friend	0.34	0.84	0.09	0.41	2.73	0.007	0.17
Humans	0.32	0.79	0.25	0.66	0.71	0.481	0.04
Affective processes	6.49	4.02	4.41	2.69	4.50	< 0.001	0.27
Positive emotion	5.75	4.09	3.63	2.52	4.59	< 0.001	0.28
Negative emotion	0.70	1.31	0.78	1.30	-0.45	0.654	-0.03
Anxiety	0.20	0.56	0.13	0.58	0.88	0.378	0.06
Anger	0.15	0.56	0.13	0.50	0.24	0.814	0.01
Sadness	0.16	0.52	0.19	0.58	-0.41	0.679	-0.03

Personal concerns

Online Appendix 8: Type of Technology and Activity in reported experiences (Study 2)

Experience narratives were coded for technology used and activity with technology. Besides the description of their experience, participants also had to indicate which specific technology was involved in their experience. Based on this information and the description of the experience one of the authors coded all experiences for technology used and for activity with technology. Table A12 shows the frequency of technologies and activities in experiences from the leisure and work domain.

Table A12

Type of technology and activity (Study 2)

	Leisure (n = 159)	Work (n = 96)
Technology		
Laptop	20%	28%
Smartphone	18%	15%
Desktop computer	11%	23%
Tablet	13%	6%
Camera	9%	6%
GPS	7%	5%
VoIP	6%	5%
Mobile media player	6%	0%
Video game console	5%	0%
E-reader	3%	0%
other	3%	11%
Activity		
Productivity	7%	60%

