

Supplemental materials

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Predicting recycling behavior

Because the general recycling behavior scale consisted of 8 different recycling categories, the differences between those categories were also assessed. The number of products that could potentially be recycled per week differed greatly between waste categories (N), as did the recycling mean itself (M , see Table S.1). Those differences between the categories can be explained, for example, by differences in the way the waste is collected (i.e., front of house waste collection vs. waste collection points; see **Appendix B**). Therefore, paired-samples t -tests were also performed per waste category. Recycling behavior significantly improved between Week 1 and Week 2 for paper waste and tinplate cans but not for the other categories (e.g., plastic waste, organic waste, etc.; see Table S.2).

The mediation was tested for recycling behavior of each of the eight recycling categories by using PROCESS Model 6 (Hayes, 2013) to perform the bootstrapping analyses with 5000 samples. Sequential mediation of application use through recycling knowledge, recycling self-efficacy and recycling intention on recycling behavior for a specific waste category was confirmed for three of the eight waste categories (i.e. bioplastic, paper waste, and plastic waste; see Table S3). These indirect effects are, however, very small and seem to be driven by the rear part of the model (the effect of knowledge on self-efficacy, intention and behavior) as there was no significant effect of app use on recycling knowledge. The sequential mediation was not confirmed for the remaining five waste categories (i.e. tin-plate waste, beverage cartons, organic waste, domestic chemical waste, and glass waste; see Table S3).

Table S.1 Measurements (*N*, *M*, *SD*) recycling behavior (ESM)

Measurements		<i>N</i>	<i>M</i>	<i>SD</i>
Week 1	Recycling behavior (in total)	118	3.53	1.14
	Recycling behavior for organic waste	95	3.31	1.65
	Recycling behavior for paper waste	90	4.12	1.16
	Recycling behavior for beverage cartons	50	3.48	1.65
	Recycling behavior for plastic waste	104	3.73	1.46
	Recycling behavior for bioplastics	39	2.12	1.49
	Recycling behavior for glass waste	46	4.15	1.32
	Recycling behavior for tinfoil waste	39	2.78	1.73
	Recycling behavior for domestic chemical waste	36	3.39	1.67
	App use (in %)	118	0.48	4.15
Week 2	Recycling behavior (in total)	118	3.77	1.16
	Recycling behavior for organic waste	94	3.47	1.65
	Recycling behavior for paper waste	94	4.23	1.14
	Recycling behavior for beverage cartons	50	3.76	1.63
	Recycling behavior for plastic waste	98	3.82	1.52
	Recycling behavior for bioplastics	34	2.62	1.74
	Recycling behavior for glass waste	43	4.33	1.26
	Recycling behavior for tinfoil waste	33	3.25	1.80
	Recycling behavior for domestic chemical waste	32	3.50	1.70
	App use (in %)	118	9.48	14.31

*Note: Not all participants recycled waste for all waste categories. Therefore, we included *N* to represent the number of participants that were included in that particular calculation (max = 118). For these participants, *M* represents the mean score of that week (min = 1; max = 5).*

Table S.2 Paired-samples T-tests for the mean scores for recycling between before and after downloading the app

Model	<i>N</i>	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>	<u><i>T1</i></u>		<u><i>T2</i></u>	
						<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Recycling (in total)	118	-3.44	117	.001	0.209	3.53	1.14	3.77	1.16
Plastic waste	117	-1.07	116	.286	0.060	3.73	1.46	3.82	1.52
Paper waste	116	-2.20	115	.030	0.133	4.12	1.16	4.27	1.10
Organic waste	113	-1.71	112	.090	0.073	3.36	1.64	3.48	1.64
Glass waste	101	-1.75	100	.083	0.147	4.15	1.32	4.34	1.26
Beverage cartons	94	-1.70	93	.093	0.122	3.52	1.63	3.72	1.64
Tinplate cans	84	-2.29	83	.025	0.186	2.80	1.76	3.13	1.79
Bioplastics	55	-1.84	54	.071	0.179	2.16	1.46	2.44	1.67
Domestic chemical waste	52	-0.64	51	.528	0.059	3.28	1.67	3.38	1.71

Table S.3 Testing Mediation Application Use through Knowledge, Self-efficacy, and Intention on Recycling Behavior

Mediation model	<i>95% CI</i>			
Application use > recycling knowledge > recycling self-efficacy > recycling intention > ...	<i>indirect effect</i>	<i>SE</i>	<i>lower</i>	<i>upper</i>
... recycling behavior (general)	0.0003	0.0003	-0.0001	0.0011
... recycling bioplastic*	< 0.0001	< 0.0001	0.0000	0.0001
... recycling tin-plate waste	< 0.0001	0.0001	-0.0001	0.0003
... recycling beverage cartons	0.0001	0.0001	-0.0001	0.0003
... recycling organic waste	< 0.0001	0.0001	-0.0001	0.0002
... recycling domestic chemical waste	< 0.0001	0.0002	-0.0004	0.0002
... recycling glass waste	0.0001	0.0001	-0.0001	0.0003
... recycling paper waste*	< 0.0001	< 0.0001	0.0000	0.0001
... recycling plastic waste*	< 0.0001	< 0.0001	0.0000	0.0001
* confirmed sequential mediation				

Predicting application use

Table S.4 Multiple linear regression models testing the TPB concerning application use

Model	<i>F</i>	<i>df</i>	<i>p</i>	<i>R</i> ²	<i>t</i>	<i>p</i>	β	<i>b</i>	95% CI	
									lower	upper
Dependent variable: Application use intention	25.13	3, 114	< .001	.398						
Application use Attitude					6.61	< .001	.53	0.61	0.43	0.80
Application use Subjective norms					1.48	.142	.11	0.10	-0.03	0.23
Application use Self-efficacy					1.72	.088	.14	0.26	-0.04	0.55
Dependent variable: Application use behavior	1.92	4, 113	.112	.064						
Application use Attitude					-1.03	.304	-.12	-1.58	-4.62	1.45
Application use Subjective norms					-1.49	.139	-.14	-1.38	-3.22	0.45
Application use Self-efficacy					1.11	.270	0.11	2.35	-1.85	6.55
Application use Intention					2.04	.043	0.24	2.69	0.08	5.29

Table S.5 Multiple linear regression models testing the extended TAM concerning application use (external variable: subjective norms)

Model	<i>F</i>	<i>df</i>	<i>p</i>	<i>R</i> ²	<i>t</i>	<i>p</i>	β	<i>b</i>	95% CI	
									lower	upper
Dependent variable: PEOU	4.49	1,116	.036	.037						
Subjective norms					2.12	.036	.19	.12	0.01	0.24
Dependent variable: PU	10.51	2, 115	<.001	.155						
Subjective norms					2.24	.027	.20	0.13	0.02	0.25
PEOU					3.49	.001	.31	0.33	0.14	0.51
Dependent variable: Attitude towards use	17.35	3, 114	<.001	.313						
Subjective norms					1.44	.154	.12	0.09	-0.03	0.21
PEOU					3.15	.002	.26	0.31	0.12	0.51
PU					4.31	<.001	.36	0.41	0.22	0.59
Dependent variable: Intention to use	20.53	4, 113	<.001	.421						
Subjective norms					1.17	.246	.09	0.08	-0.05	0.21
PEOU					-0.01	.994	<-.01	<-0.01	-0.22	0.22
PU					2.70	.008	.23	0.29	0.08	0.51
Attitude towards use					5.50	<.001	.48	0.55	0.35	0.75
Dependent variable: Application use	2.06	5, 112	.076	.084						
Subjective norms					-1.56	.122	-.15	-1.45	-3.29	0.39
PEOU					-1.09	.279	-.11	-1.70	-4.80	1.40
PU					1.76	.081	.19	2.80	-0.35	5.94
Attitude towards use					-0.91	.366	-.11	-1.45	-4.61	1.71
Intention to use					1.79	.076	.21	2.39	-0.25	5.02

Table S.6 Multiple linear regression models testing the extended TAM concerning application use (external variable: self-efficacy)

Model	<i>F</i>	<i>df</i>	<i>p</i>	<i>R</i> ²	<i>t</i>	<i>p</i>	β	<i>b</i>	95% CI	
									lower	upper
Dependent variable: PEOU	47.39	1,116	<.001	.290						
Self-efficacy					6.88	<.001	.54	.74	.53	.96
Dependent variable: PU	14.01	2,115	<.001	.196						
Self-efficacy					3.35	.001	.33	0.49	0.20	0.78
PEOU					1.66	.101	.16	0.18	-0.03	0.39
Dependent variable: Attitude towards use	16.73	3,114	<.001	.306						
Self-efficacy					0.87	.388	.08	0.14	-0.18	0.46
PEOU					2.55	.012	.24	0.28	0.06	0.51
PU					4.21	<.001	.37	0.41	0.22	0.60
Dependent variable: Intention to use	20.44	4,113	<.001	.420						
Self-efficacy					1.08	.284	.10	0.18	-0.15	0.52
PEOU					-0.39	.695	-.04	-0.05	-0.29	0.19
PU					2.53	.013	.22	0.28	0.06	0.50
Attitude towards use					5.60	<.001	.48	0.56	0.36	0.76
Dependent variable: Application use	1.93	5,112	.095	.079						
Self-efficacy					1.36	.178	.15	3.29	-1.52	8.10
PEOU					-1.67	.098	-.19	-2.89	-6.32	0.54
PU					1.27	.207	.14	2.06	-1.15	5.27
Attitude towards use					-1.04	.299	-.13	-1.67	-4.83	1.50
Intention to use					1.48	.141	.18	1.98	-0.67	4.62

Table S.7 Testing sequential mediations in TAM models

Model	<i>95% CI</i>			
	<i>indirect effect</i>	<i>SE</i>	<i>lower</i>	<i>upper</i>
Original TAM (DV = application use)				
- PEOU ⇒ PU ⇒ intention ⇒ application use	0.2121	0.2123	-0.0713	0.7571
- PEOU ⇒ attitude ⇒ intention ⇒ application use	0.3472	0.3386	-0.1888	1.1169
- PEOU ⇒ PU ⇒ attitude ⇒ intention ⇒ application use	0.1677	0.1818	-0.0739	0.6307
TAM (external variable = subjective norms; DV = application use)				
- Subjective norms ⇒ PU ⇒ intention ⇒ application use	0.0761	0.0873	-0.0261	0.3052
- Subjective norms ⇒ PEOU ⇒ PU ⇒ intention ⇒ application use	0.0229	0.0280	-0.0071	0.0962
- Subjective norms ⇒ PEOU ⇒ attitude ⇒ intention ⇒ application use	0.0422	0.0545	-0.0239	0.1833
- Subjective norms ⇒ PU ⇒ attitude ⇒ intention ⇒ application use	0.0602	0.0678	-0.0303	0.2339
- Subjective norms ⇒ PEOU ⇒ PU ⇒ attitude ⇒ intention ⇒ application use	0.0181	0.0229	-0.0077	0.0764
TAM (external variable = self-efficacy; DV = application use)				
- Self-efficacy ⇒ PU ⇒ intention ⇒ application use	0.2835	0.3541	-0.1025	1.2173
- Self-efficacy ⇒ PEOU ⇒ PU ⇒ intention ⇒ application use	0.0755	0.1191	-0.1514	0.3596
- Self-efficacy ⇒ PEOU ⇒ attitude ⇒ intention ⇒ application use	0.2582	0.3030	-0.1394	1.0371
- Self-efficacy ⇒ PU ⇒ attitude ⇒ intention ⇒ application use	0.2242	0.2565	-0.1190	0.8893
- Self-efficacy ⇒ PEOU ⇒ PU ⇒ attitude ⇒ intention ⇒ application use	0.0597	0.1127	-0.1163	0.3440

* = confirmed sequential mediation