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Why consumers shift from single-use to reusable drink cups: An empirical application of the stage model of self-regulated behavioural change

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Abstract

Using single-use drink cups contributes to environmental issues like littering, resource depletion, and carbon dioxide emissions and thus comes into conflict with the UN Sustainable Development Goals. There are reusable alternatives to such single-use cups available to the general public, but uptake has so far been limited. To explain what factors are associated with using single-use cup alternatives, we apply the stage model of self-regulated behavioural change in a cross-sectional questionnaire study, $N = 573$. We investigated three single-use cup alternatives: a refundable cup system, bringing one's own cup, and reducing one's consumption of hot beverages on the go. According to the theory, behavioural change occurs in four stages: predecisional, preactional, actional, and postactional. An individual requires stage-specific information and needs to make stage-specific decisions to progress towards sustained behavioural change. The results of our study showed which factors were associated with consumers' shifts from to-go-cup use to each of the alternatives and which factors need to be targeted to advance individuals to the next stage of change. We found that a chain of increased awareness, responsibility, and negative emotions, complemented by social norms, positive emotions, and goal feasibility, was associated with an increased intention to change away from single-use cups. The choice of a behavioural alternative was most strongly associated with the perceived control over the behaviour. Based on these results, we derive recommendations for practitioners on which levers to use to effectively reduce the use of single-use cups.

Keywords: Stage model, behavioral change, sustainable behavior, sustainable consumption, to-go-cups

1 Introduction

The consumption of single-use drink cups is soaring around the globe (e.g. Statista, 2020; Sustainability Victoria, 2021; Zero Waste Canada, 2017), with around 500 billion single-use cups are discarded each year globally (Grand View Research, 2019). In Germany alone, single-use cups usage results in 28,000t of waste that constitute 10 to 15% of the waste volume in public bins (Kauertz et al., 2019). Single-use cups have a number of problems. First, they typically consist of paper bonded with an internal plastic lining, which makes them hard to recycle (Mitchell et al., 2014) and leads to single-use cups usually going to landfill (Foteinis, 2020; Kauertz et al., 2019). If improperly disposed of, material residues may even end up in oceans as microplastics, endangering marine ecosystems (European Commission, 2018). Second, single-use cups also contribute to climate change: The global annual carbon dioxide emissions resulting from their use are comparable to the carbon footprint of a small country (Foteinis, 2020). This situation will likely get worse in the future, as high demand for hygiene and convenience will continue to drive single-use cup consumption across the globe (IMARC, 2018; Nielsen, 2018; Statista, 2018). This trend is in stark contrast to the United Nations' Sustainable Development Goals (SDGs; United Nations, n.d.), promoting sustainable use of natural resources (SDG 12.2) and waste prevention (SDG 12.5), as well as with efforts to implement circular economy in the European Union (Circular Economy Act §6(1); European Commission, 2018). The purpose of this study is to explore the psychological factors influencing the uptake of alternatives to single-use cups, as economic incentives alone have proven inefficient (Environmental Audit Committee, 2018). In that way we contribute to the work of practitioners, communicators and policymakers, who can use these factors to facilitate the promotion and uptake of alternatives among consumers.

2 Literature Review

2.1 Alternatives to single-use cups

Single-use cups are a prominent example of a wide range of problematic single-use products with reusable alternatives. Some of these alternatives have a smaller environmental footprint, as has been demonstrated for example for take-away food containers (Gallego-Schmid et al., 2019). How these alternatives perform is highly dependent on consumer behaviour: Life cycle analyses show that reusable cups perform better than single-use cups when they are used multiple times, with critical thresholds for reuse cycles ranging from more than once (Potting & van der Harst, 2015; Woods & Bakshi, 2014) to more than nine times (Garrido & Alvarez del Castillo, 2007) – assuming they do not travel long distances during their use or to cleaning locations (Blanca-Alcubilla et al., 2020; Vercalsteren et al., 2010). While such analyses can recommend alternatives to single-use cups, distributing these alternatives remains an interdisciplinary task. Producers will only offer reusable alternatives, if they expect positive consumer uptake (Grimes-Casey et al., 2007), and consumers need good reasons to use reusable cup systems, which are often more expensive than disposable cups (Vercalsteren et al., 2010). As purely economic incentives (e.g., discounts) have proven ineffective in increasing the uptake of reusable cups (Environmental Audit Committee, 2018), an investigation of psychological processes that influence behaviour change towards reusable cups is warranted.

2.2 Explaining behaviour change with psychological stage models

Campaigns that are tailored to the characteristics of their target population have proven more effective in promoting pro-environmental behavioural change than non-tailored interventions (Daamen et al., 2001). Stage models can assist the design of such tailored interventions by segmenting a population according to specific characteristics, e.g., their current behaviour and attitudes (Klöckner & Ofstad, 2017). Stage models assume that

behavioural change is a decision process that happens in several steps (Prochaska & DiClemente, 1994), whereas static models (e.g. Theory of Planned Behaviour; Ajzen, 1991) describe behavioural change as a one-step decision. The Stage Model of Self-regulated Behavioural Change (SSBC; Bamberg, 2013b) combines elements of the Transtheoretical Model of Change (Prochaska and DiClemente, 1994) with elements from static models of pro-environmental behaviour. It includes and integrates factors known to influence the uptake of reusable cups, such as social norms (i.e. the felt pressure from others to act; Dorn & Stöckli, 2018; Loschelder et al., 2019; Terrier et al., 2020), and pro-environmental attitudes (Novoradovskaya et al., 2020). The SSBC is particularly suited to study habitualised, frequent, and automatic behaviour such as single-use cup consumption, as it models the behavioural change process from habit disruption (e.g., through awareness creation), to the formation of new habits (maintenance of new behaviour; Carden & Wood, 2018, 2018),

Studies applying the SSBC have taken different approaches, some investigating whether the model accurately describes and predicts behavioural change, and others comparing the efficacy of stage-tailored versus non-tailored behavioural change interventions (for a review see Keller et al., 2019). In both areas of investigation, the SSBC received support for low- and high-cost behaviours, such as transportation (Bamberg, 2013a, 2013b; Klöckner, 2014; Olsson et al., 2018; Sunio et al., 2018), beef consumption (Klöckner, 2017; Klöckner & Ofstad, 2017; Weibel et al., 2019), moving into an energy-efficient home (Schaffner et al., 2017), and postponing smartphone replacement purchases (Ohnmacht et al., 2018).
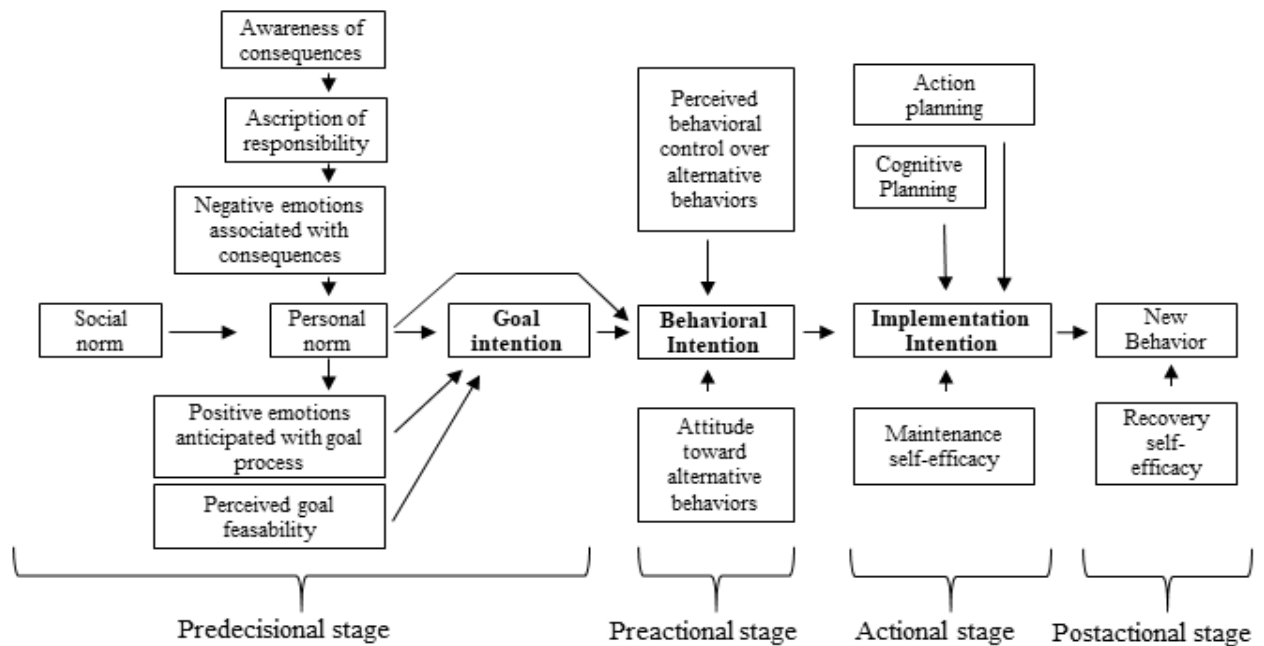
Figure 1. The stage model of self-regulated behavioural change,
adopted from Bamberg (Bamberg, 2013a).

The SSBC includes four different stages of behavioural change: predecisional,

preactional, actional, and postactional. An individual moves along this sequence by forming

the respective intention that takes them to the next stage. For example, in the predecisional

stage an individual re-evaluates their situation, resulting in an intention to change their

current behaviour (i.e., to use fewer single-use cups). In the preactional stage, they choose an

alternative behaviour to fulfil this goal (behavioural intention), followed by more detailed

plans of enacting that new behaviour in their personal life (implementation intention) in the

actional stage and the maintenance of that behaviour in the postactional stage.

Whether or not an individual forms the respective intention is determined by the

psychological factors displayed in Figure 1. In the predecisional stage, these consist of

perceived goal feasibility, positive emotions anticipated with goal progress, and personal

norm (Schwartz, 1977), the felt obligation to act. Personal norm is in turn activated when an

individual is aware of the consequences caused by their behaviour, is feeling responsible for

them, and experiencing negative emotions as a result. Social norms act as external pressure to change one's current behaviour.

In the preactional stage, the behavioural intention is influenced by the individual's attitude toward the different alternative behaviours and perceived behavioural control over external constraints (Ajzen, 1991). The implementation intention in the actional stage is influenced by an individual's ability to devise strategies to overcome hindrances to the chosen behaviour (coping planning), to plan the specifics of performing that behaviour (action planning), and to uphold difficult behaviour (maintenance self-efficacy; Schwarzer, 2008). In the postactional stage, the new behaviour is being habitualised, depending on an individual's ability to resume the new behaviour after relapsing to the old behaviour (recovery self-efficacy).

2.3 The present study

To understand various ways of how people may use less single-use cups, we investigated three different alternative behaviours in our study. The first alternative behaviour was *using a refundable cup* from a city-wide deposit system[1] (henceforth "refundable cup"; see Table B.3 for a full description of deposit system). The second alternative, *bringing one's own cup* ("own cup"), was included due to the increasing popularity of reusable cups (TNS Emnid, 2015). Lastly, *reducing one's consumption* ("reduced consumption") of hot beverages on the go, e.g., postponing consumption until the end of the journey or visiting a café, was included as a third option. All three behaviours constitute ways of reducing single-use cup consumption and can be performed alongside each other without impeding each other. Our focus was thus not on comparing the behavioural alternatives, but to investigate whether the

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[1] The scenario was modelled to inform the introduction of a refundable cup system in the city of Darmstadt, a mid-sized university city in Germany.

SSBC can be applied to the context of single-use consumption, that is, if it can describe single-use cup usage and the performance of the alternative behaviours (research question 1); and to analyse which factors are associated with behavioural change towards each of the alternative behaviours in each stage of the theorized process (research question 2). This allows drawing conclusions as to whether the conceptionally different behaviours can all be addressed with interventions based on the SSBC, and if so, which influencing factors are important for which alternative.

Regarding research question 1, we hypothesized that we would find the stagewise differences on key variables such as intentions and behaviour as postulated by the SSBC. That would indicate that single-use cup consumption can be successfully modelled by the SSBC concepts. Table 1 shows the specific pairwise differences in key variables that we expected to find. The goal intention was expected to be lower in the predecisional stage compared to each of the later stages (H1a-c); the behavioural intention to be lower in each of the first two stages compared to each of the two later stages (H2a-d); and the implementation intention to be higher in the postactional stage compared to each of the former stages (H3a-c). All hypotheses were derived directly from the model and findings of previous empirical studies (see Section 2.2 and Figure 1).

Table 1
Expected pairwise patterns for research question 1 Can the SSBC be applied to the context of TGCs?

Hypothesis	Variable	Predecisional[a]	Preactional	Actional	Postactional
H1a	Goal intention	low	high		
H1b	Goal intention	low		high	
H1c	Goal intention	low			high
H2a	Behaviour intention	low		high	
H2b	Behaviour intention	low			high
H2c	Behaviour intention		low	high	
H2d	Behaviour intention		low		high
H3a	Implementation intention	low			high
H3b	Implementation intention		low		high
H3c	Implementation intention			low	high

Note. [a]Differences between predecisional denial and predecisional inhibition were included in analysis, see section 3.2

Regarding research question 2, we formulated hypotheses regarding factors that predict the respective intention for each of the theorized stages of behavioural change (cf. Figure 1).

Predecisional stage:

- H4a: Goal intention is directly and positively predicted by personal norm, perceived goal feasibility, and positive emotions anticipated with goal progress.

- H4b: The relationship between social norm and goal intention is mediated by personal norm.

- H4c: The relationship between awareness of consequences and goal intention is serially mediated by ascription of responsibility, negative emotions associated with consequences, and personal norm.

Preactional stage:

- H5: Behavioural intention is positively predicted by goal intention, attitude towards the behaviour, and perceived behavioural control.

Actional stage:

- H6: Implementation intention is positively predicted by behavioural intention and planning ability.

Postactional stage:

- H7: Alternative behaviour is positively predicted by implementation intention.

All hypotheses were assumed equally for the alternative behaviours, as there was no empirical evidence suggesting differences between the alternative behaviours. To see whether

the alternatives need to be promoted differently, we investigated whether influencing factors differed in their strength between the alternatives in an exploratory manner.

3 Method

3.1 Participants

In June 2018, 2000 residents of Darmstadt, randomly drawn from the population registry, were mailed a paper-pencil questionnaire, followed by a reminder a few weeks after. Participants could opt to partake in a raffle of local shopping vouchers as an incentive. A total of 654 participants responded. The response rate, detracting 76 undeliverable questionnaires, was 34%. All participants who never drank hot beverages on the go and did not expect to change that were excluded from the analyses, resulting in a net sample of 573 participants[2]. Forty-three percent ($n = 238$) of participants were male, most were aged 26-35 years (29%, $n = 264$). Detailed sample characteristics can be found in Appendix A, Table A1.

3.2 Measures

We applied all SSBC constructs as outlined in Figure 1, with two exceptions. We separated the predecisional stage into predecisional denial (not recognising need to change) and predecisional inhibition (not feeling able to change), inspired by the precontemplation stage of the TTM (Prochaska and DiClemente, 1994) and previous research with the SSBC (Olsson et al., 2018). We also combined the influencing variables in the actional stage (action planning, coping planning, maintenance self-efficacy) into one variable called planning

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[2] We conducted the study adhering to the APA Ethics Code (American Psychological Association, 2017) and all participants gave their informed consent.

ability as done previously (Klöckner, 2017) to manage questionnaire length. Complete

descriptions of the items can be found in the Appendix to this article.

3.2.1 Stage membership and self-reported behaviour

Participants' stage membership was determined by a self-assessment measure derived

from prior SSBC studies (Bamberg, 2013b; Klöckner, 2017, 2014; Olsson et al., 2018) and

adapted to the purpose of this study. Out of six statements, each describing one of the

behavioural stages, participants selected one statement fitting their current status most

accurately (e.g., predecisional denial: "When I drink coffee, tea, or similar drinks on the go, I

often use to-go-cups. I am content with this situation and see no reason to change it".

Participants also completed a two-part self-assessment of their current behaviour (Bamberg,

2013b), estimating their average single-use cups per month as well as the extent to which

they already engaged in alternative behaviours. We did not measure the current use of

refundable cup as the system was introduced as a possible solution in the questionnaire.

3.2.2 Stage-specific intentions and influencing factors. Items measuring intentions and

influencing factors were based on Klöckner (2017) and Bamberg (2013b) and consisted of

statements which participants rated on a scale from 1 (*completely disagree*) to 5 (*completely

agree*). We measured most constructs with two-item scales and some with single items as has

been done previously to manage questionnaire length (Bamberg, 2013b; Klöckner, 2017;

Ohnmacht et al., 2018; Olsson et al., 2018; Schaffner et al., 2017; Weibel et al., 2019).

Awareness of consequences, ascription of responsibility, personal norm, social norm, goal

intention, and behavioural intention were measured with two items each. Spearman Brown

coefficient (Eisinga et al., 2013), indicated good reliability with values between .75 and .93.

Perceived behavioural control, also measured with two items, proved unreliable in two of the

alternative behaviours ($r_{sb} = .19$ for reduced consumption, $r_{sb} = .33$ for own cup). For those

behaviours only one item was included in the analyses that was closest to items used in prior studies (It would be easy for me to…, see Table B.2) (Bamberg, 2013b; Klöckner, 2017). Since the attitude measure employed by Klöckner (2017) had poor reliability, we instead operationalized attitudes as suggested by Azjen (2010) and implemented by Olsson et al. (2018), computing an attitude score of instrumental and affective attitude. For instrumental attitude, participants rated the statement "Using X would reduce my to-go-cup usage" on a scale from 1 (*completely disagree*) to 5 (*completely agree*); for affective attitude, participants rated the statement "Keeping my usage of to-go-cups low in the next three months would be" on a scale from 1 (*bad*) to 5 (*good*). Negative emotions associated with consequences, positive emotions anticipated with goal progress, perceived goal feasibility, planning ability, and implementation intentions were measured with one item each.

To enhance the comparability of answers between participants, short descriptions of the alternative behaviours (refundable cup, own cup, reduced consumption) were provided at the beginning of the respective questionnaire sections (see Table B3). Item sequence was randomized within each of the questionnaire sections.

3.3 Data analyses

Preliminary analyses confirmed that participants had successfully assigned themselves to the correct stage by testing for group differences between the SSBC stages for single-use cup consumption and alternative behaviour performance, using ANOVAs. In line with the assumptions of the stage model of self-regulated behavioural change, single-use cup consumption was significantly lower in the postactional stage than the other stages, and alternative behaviours were performed more frequently in later than in earlier stages. These results can be found in the Supplementary materials to this article.

The hypotheses were then investigated in two separate steps: First, H1-3 (members of different stages differ in their intentions) were tested by conducting group comparisons between stages. To this end, multiple univariate ANOVAs were performed with the goal intention, behavioural intention, and implementation intentions as the outcome measures. For each of these group comparisons, specific assumptions were made about which stages differ from each other in order to support the SSBC. These detailed hypotheses are further explained in Table 3. Welch's ANOVA and Games-Howell post-hoc tests were conducted to account for heterogeneity between variances. Effect sizes ε^2 (small: $\geq .01$, medium: $\geq .06$, large: $\geq .15$) are reported to minimize bias due to small group sizes and heterogeneity of variances (Okada, 2013; Troncoso Skidmore & Thompson, 2013).

Secondly, we tested H4-7 (stage intentions are predicted by respective model predictors) by estimating multiple linear regression and mediation models to predict stage-specific intentions from their theorized predictors. These included regressing the predictors of each stage as shown in Figure 1 onto their respective intention. Each estimated model will be explained in detail below.

Analyses were conducted using SPSS 24 (IBM Corp, 2016), and PROCESS macro (Hayes, 2018) for mediation analyses. Assumptions (Field et al., 2012) were tested and met for all analyses, if not noted otherwise. Sensitivity analyses (Faul et al., 2007) indicated that in multiple regression analysis, a sample of $N = 573$ allows to detect a small to medium effect size of at least $f^2 = .025$, assuming the power of .80, $\alpha = .05$ and 7 predictors (the largest number of predictors to be analysed; predecisional stage). An ANOVA comparing different stages (assuming 5 groups, power of .80, $\alpha = .05$) would be sensitive enough to detect a small to medium effect size of at least $f^2 = .145$. The sample size was therefore deemed adequate for the proposed analyses.

4 Results

Most participants assigned themselves to the postactional stage (67%, $n = 381$),

followed by the actional (13%, $n = 74$), preactional (13%, $n = 76$), predecisional inhibition

(3%, $n = 19$), and predecisional denial (4%, $n = 23$) stages.

4.1 Segmentation of stages according to intentions

The differences in intentions between the stages were tested, as above, using Welch's

ANOVA and Games-Howell post-hoc tests. Table 2 shows which hypotheses were supported

by the data. The ANOVA results and pairwise comparisons are displayed in Table 3.

Table 2
Expected and observed pairwise patterns for research question 1

| Hypothesis | Variable | Hypothesised comparative intention level | | | | Supported |
		Pre-decisional	Pre-actional	Actional	Post-actional	
H1a	Goal intention	low	high			Partially[a]
H1b	Goal intention	low		high		Yes
H1c	Goal intention	low			high	Yes
Refundable cup						
H2a	Behaviour intention	low		high		No
H2b	Behaviour intention	low			high	No
H2c	Behaviour intention		low	high		No
H2d	Behaviour intention		low		high	No
H3a	Implementation intention	low			high	No
H3b	Implementation intention		low		high	No
H3c	Implementation intention			low	high	No
Own cup						
H2a	Behaviour intention	low		high		Yes
H2b	Behaviour intention	low			high	Yes
H2c	Behaviour intention		low	high		Yes
H2d	Behaviour intention		low		high	Yes
H3a	Implementation intention	low			high	Yes
H3b	Implementation intention		low		high	Yes
H3c	Implementation intention			low	high	No
Reduced consumption						
H2a	Behaviour intention	low		high		No
H2b	Behaviour intention	low			high	No
H2c	Behaviour intention		low	high		No
H2d	Behaviour intention		low		high	No

H3a	Implementation intention	low			high	No
H3b	Implementation intention		low		high	No
H3c	Implementation intention			low	high	No

Note. [a]yes for denial, no for inhibition

Table 3
Welch's ANOVA results – stage differences in intentions

Dependent Variable	F(df)	*p*	ε²	Post-hoc tests[a] Stages[b]	*p*
Goal intention	**45.517(4, 66)** [c]	< .001	.354	**3-1**[c]	< .001
				3-2	.198
				4-1	< .001
				4-2	.017
				5-1	< .001
				5-2	< .001
Behavioural intention: refundable cup	2.114 (4, 68)	.089	.009	N/A	N/A
Behavioural intention: own cup	**12.631 (4, 68)**	< .001	.067	**4-3**	.001
				4-2	.001
				4-1	.002
				5-3	< .001
				5-2	.002
				5-1	.003
Behavioural intention: reduced consumption	**3.359 (4, 66)**	.015	.013	4-3	.942
				4-2	.996
				4-1	.973
				5-3	.253
				5-2	.280
				5-1	.228
Implementation intention: refundable cup	1.923 (4, 66)	.117	.004	N/A	N/A
Implementation intention: own cup	**10.426 (4, 63)**	< .001	.055	5-4	.440
				5-3	< .001
				5-2	.026
				5-1	.009
Implementation intention: reduced consumption	**2.960 (4, 68)**	.026	.008	5-4	.465
				5-3	.182
				5-2	.102
				5-1	.267

Note. [a]Calculated with Games-Howell test statistic to account for heterogeneity of variances. [b]Indices: 1 = predecisional denial, 2 = predecisional inhibition, 3 = preactional, 4 = actional, 5 = postactional. [c]Significant differences between stages are displayed in bold type

The goal intention (Figure 2) differed as expected, with the exception of the non-significant difference between the predecisional inhibition and preactional stages.
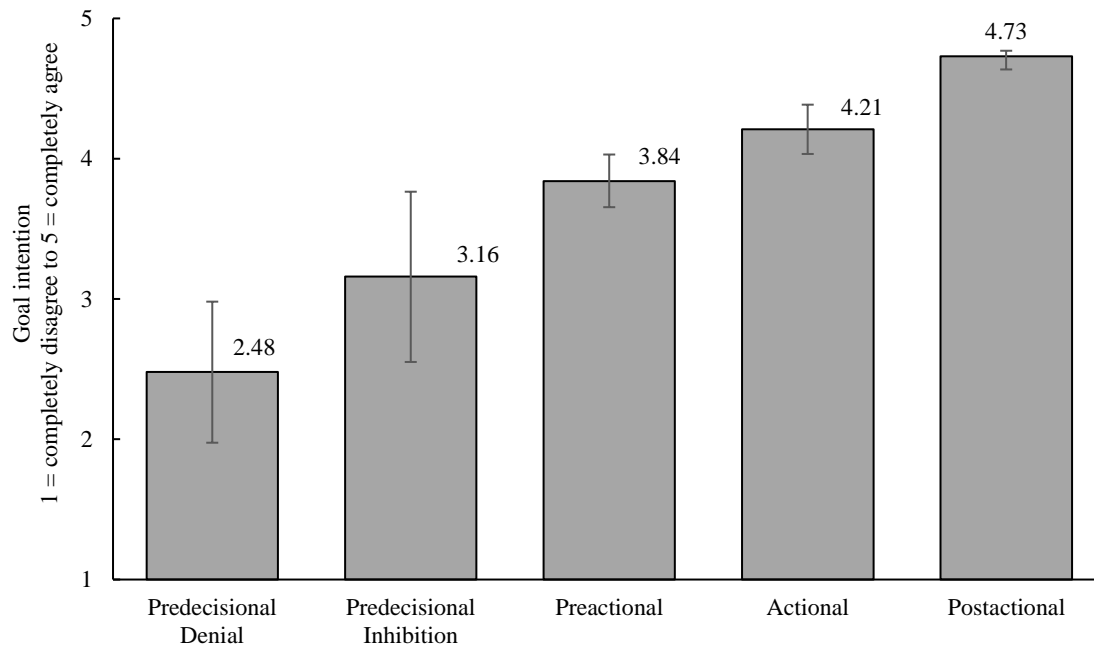
Figure 2. Mean goal intention as a function of the stages of self-regulated behavioural change with 95% confidence intervals.

There were no significant group differences in either the behavioural intention or the implementation intention for refundable cup (Figure 3). For the behavioural and implementation intention for reduced consumption, Welch's ANOVA indicated significant group differences, however, post-hoc testing revealed no significant effects for any of the stages. The behavioural and implementation intentions for own cup differed significantly between stages as expected, with the exception of a non-significant difference between the postactional and actional stages.
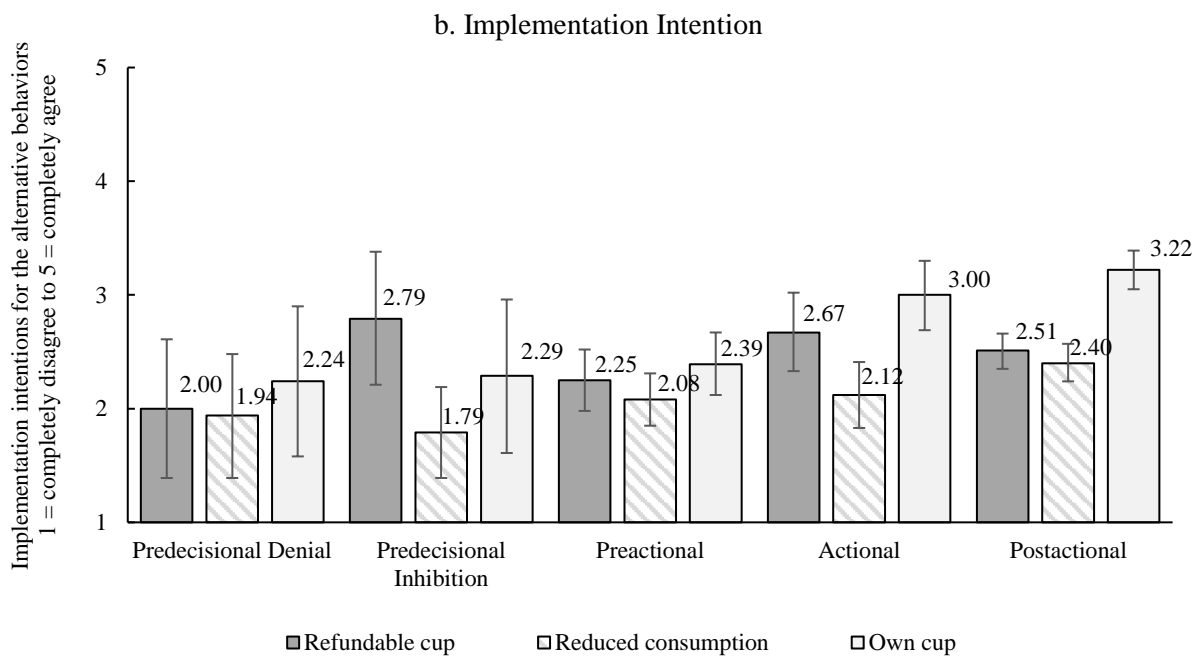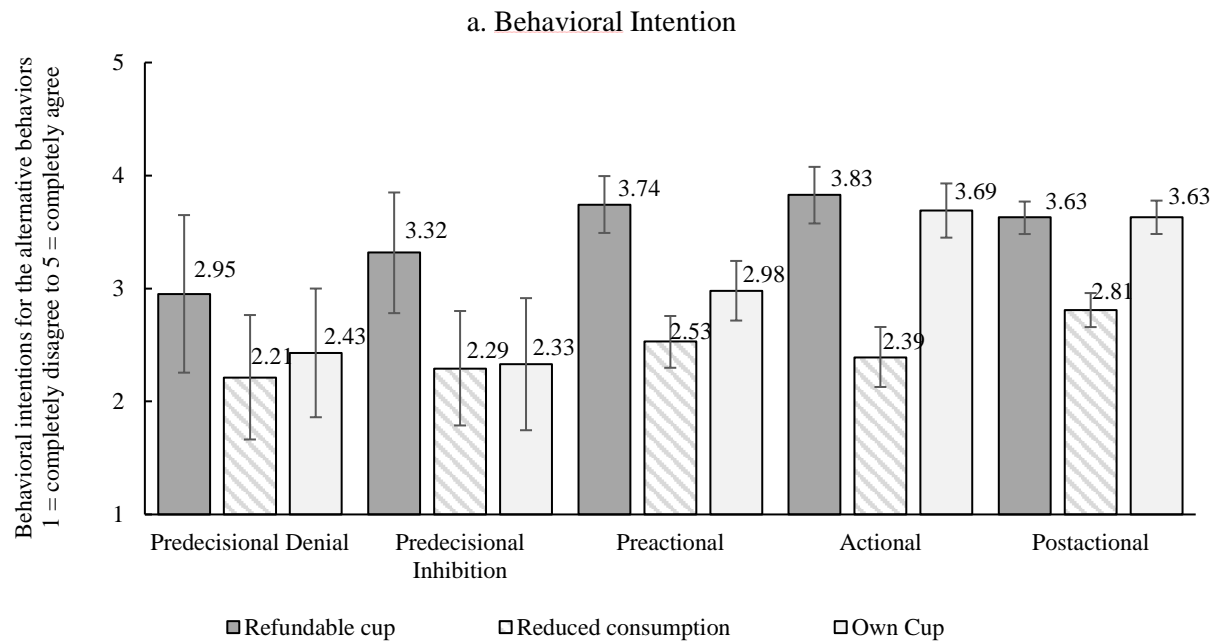
Figure 3. Mean behavioural (a) and implementation intentions (b) as a function of the stages of self-regulated behavioural change with 95% confidence intervals.

4.2 Predicting stage intentions

We now present the regression models describing which factors best explain why individuals progress through the respective stage. Extended descriptive statistics for all model predictors and intentions can be found in Appendix B, Table B1 (*M* and *SD*) and Appendix C, Table C1 (covariances and correlations).

4.2.1 Predecisional (inhibition/denial) stage

Three regression-based models were estimated to test the structure of the predecisional stage. A first linear model predicting goal intention from personal norm, positive emotions anticipated with goal progress, and perceived goal feasibility was found to explain 58% of variance, $F(3, 544) = 254.13$ and $p < .001$, supporting hypothesis H4a. Personal norm showed the strongest association ($B = 0.59$, 95% CI [0.50, 0.67], $\beta = .53$, $p < .001$), followed by perceived goal feasibility ($B = 0.19$, 95% CI [0.14, 0.24], $\beta = .24$, $p < .001$) and positive emotions ($B = 0.11$, 95% CI [0.05, 0.17], $\beta = .13$, $p < .001$).

A second model tested whether the relationship between social norm and goal intention was mediated by personal norm. As shown in Figure 4, mediation analysis conducted with the SPSS macro PROCESS to estimate regression coefficients and confidence intervals (see Hayes (2018) for a detailed explanation) suggested the relationship to be partly mediated with a direct effect of $\beta = .08$ (95% CI [0.02, 0.14], $p = .009$) and an indirect effect of $\beta = .08$ (95% CI [0.04, 0.13], $p < .001$) providing partial support for hypothesis H4b. Confidence intervals were generated using percentile-based bootstrapping with 5000 samples, in which the respective effects are first calculated in each of the generated samples, and then sorted to determine the 2.5% and 97.5% percentiles, resulting in a 95% confidence interval (for more information see Hayes, 2018).
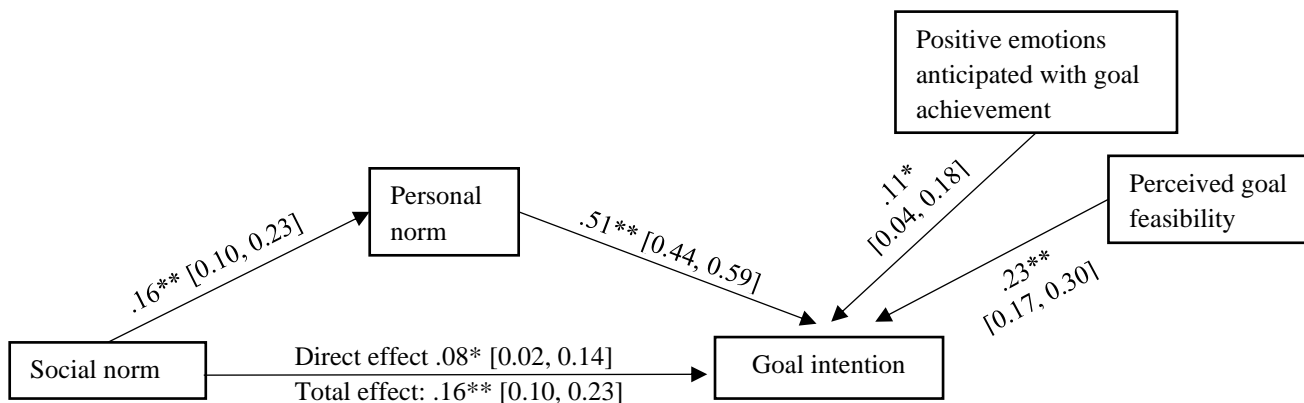
Figure 4. Standardized regression coefficients (β) and 95% confidence intervals (in brackets) for the relationship between social norm and goal intention as mediated by personal norm. Positive emotions and perceived goal feasibility are included in all models as covariates, as assumed by the SSBC and supported in the first regression model (see above). *$p < .05$, **$p < .001$

A third model (Figure 5) tested whether the relationship between awareness of consequences and goal intention was mediated by ascription of responsibility, negative emotions and personal norm in a serial mediation. Hypothesis H4c received support from this model. The total indirect effect was β = .19 (95% CI [0.13, 0.26], $p < .001$), with a minimal direct effect, suggesting full mediation. The following three specific indirect effects were significant:

- Awareness of consequences - personal norm - goal intention (β = .10, 95% CI [0.05, 0.16], $p < .001$)

- Awareness of consequences - ascription of responsibility - personal norm - goal intention (β = .04, 95% CI [0.02, 0.07], $p = .002$)

- Awareness of consequences - negative emotions - personal norm - goal intention (β = .02, 95% CI [0.02, 0.04], $p < .001$)
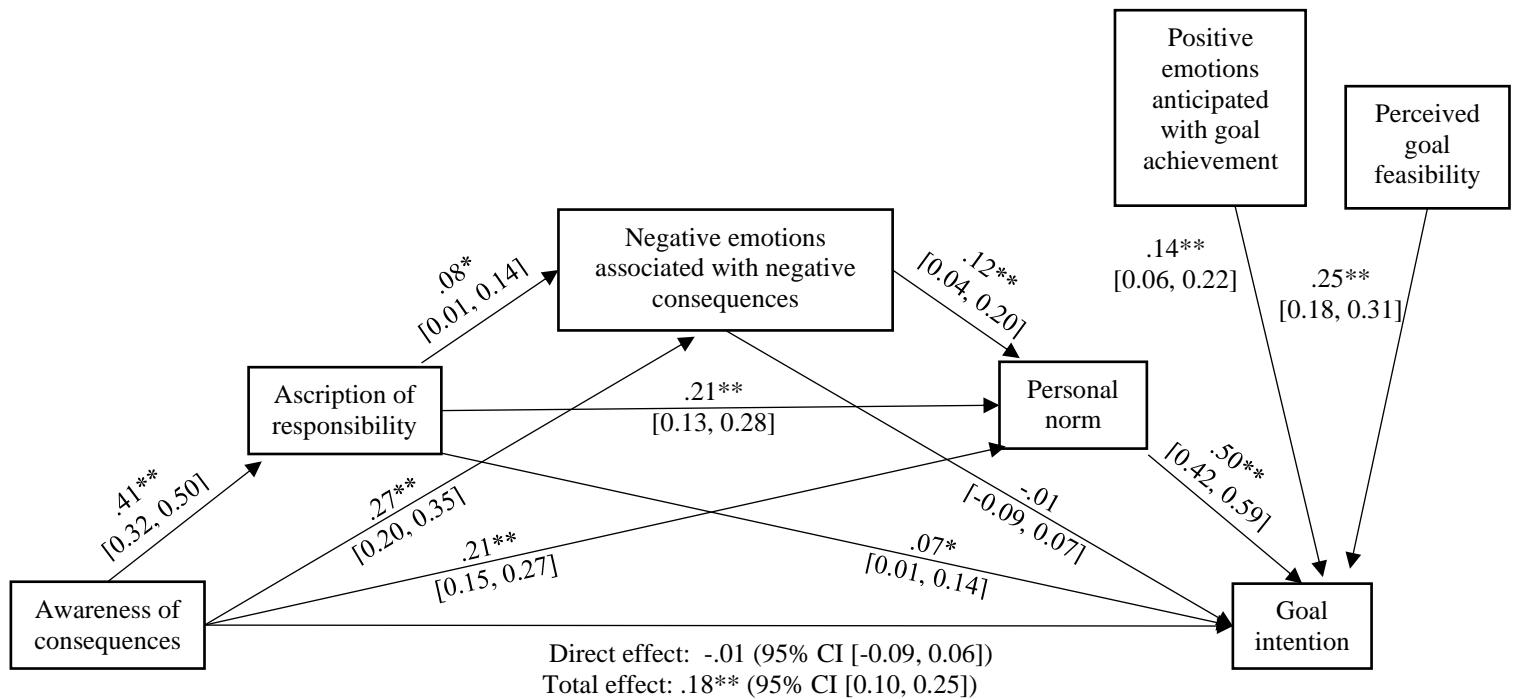
Figure 5. Standardized regression coefficients (β) and 95% confidence intervals (in brackets) for the relationship between awareness of consequences and goal intention as mediated by ascription of responsibility, negative emotions, and personal norm. Positive emotions and perceived goal feasibility are included in all models as covariates as assumed by the SSBC and supported in the first regression model. *p < .05, **p < .001

4.2.2 Preactional stage

Regression models predicting behavioural intentions for the three single-use cup alternatives (Table 4) were significant and explained between 47% and 51% of the observed variance. The strongest predictors were perceived behavioural control, followed by attitude. Individual contributions of the single predictors were similar in the models for three single-use cup alternatives. Goal intention did not act as a significant predictor in the models for reduced consumption and own cup. In the model for refundable cup, goal intention was only a very weak and negative predictor, together resulting in only partial support for hypothesis H5.

Table 4

Predictors of Behavioural Intention

Predictor	Refundable cup			Reduced consumption			Own cup		
	B	95% CI	β	B	95% CI	β	B	95% CI	β
Goal intention	0.12*	[-0.22, -0.02]	-.08	0.04	[-0.04, 0.14]	.04	0.10	[-0.01, 0.21]	.07
Attitude	0.28**	[0.21, 0.36]	.28	0.25**	[0.19, 0.31]	.28	0.22**	[0.15, 0.30]	.20
Perceived behavioural control	0.61**	[0.52, 0.69]	.53	0.54**	[0.48, 0.60]	.59	0.62**	[0.54, 0.69]	.57
R2		.47			.51			.48	
F		155.87** (3, 522)			175.21** (3, 506)			162.29** (3, 518)	

Note. *p < .05. **p < .001

Goal intention was significantly correlated with behavioural intentions ($r_{s\ refundable\ cup}$ (424) = .21, $p < .001$; $r_{s\ reduced\ consumption}$ (424) = .13, $p = .001$; $r_{s\ own\ cup}$ (424) = .33, $p < .001$; see Table C1 in Appendix C), but did not or only very weakly predicted them in the regression analyses. This discrepancy, as well as the results' contradiction of SSBC's predictions, led us to explore this relationship further with the aim of providing insights for further development or extension of the model in future research. We tested whether goal intention indirectly influences behavioural intentions, i.e., whether the relationship between goal intention and behavioural intention is mediated by perceived behavioural control and attitude. This explorative analysis was supported by the following theoretical reasoning: Attitude, as operationalised in this study, comprises an instrumental evaluation (does this behaviour lead to the desired goal) and an affective evaluation (how desirable is the goal). We propose that the goal intention could directly influence both evaluations, since they are related to the formulated goal itself. It is similarly possible that a strong goal intention increases an individual's motivation to perform a behaviour, which might in turn increase the perceived behavioural control over that behaviour.

The standardized regression coefficients (Figure 6) demonstrate that this suggested parallel mediation model is supported across all three behavioural alternatives, with relatively similar coefficients and consistently small direct effects. The total indirect effects, based upon

percentile bootstrapping with 5000 samples, were all significant, further supporting the

proposed mediation (refundable cup: $\beta = .28$, 95% CI [0.21, 0.36], $p < .001$; reduced

consumption: $\beta = .13$, 95% CI [0.07, 0.20], $p < .001$; own cup: $\beta = .27$, 95% CI [0.21, 0.34],

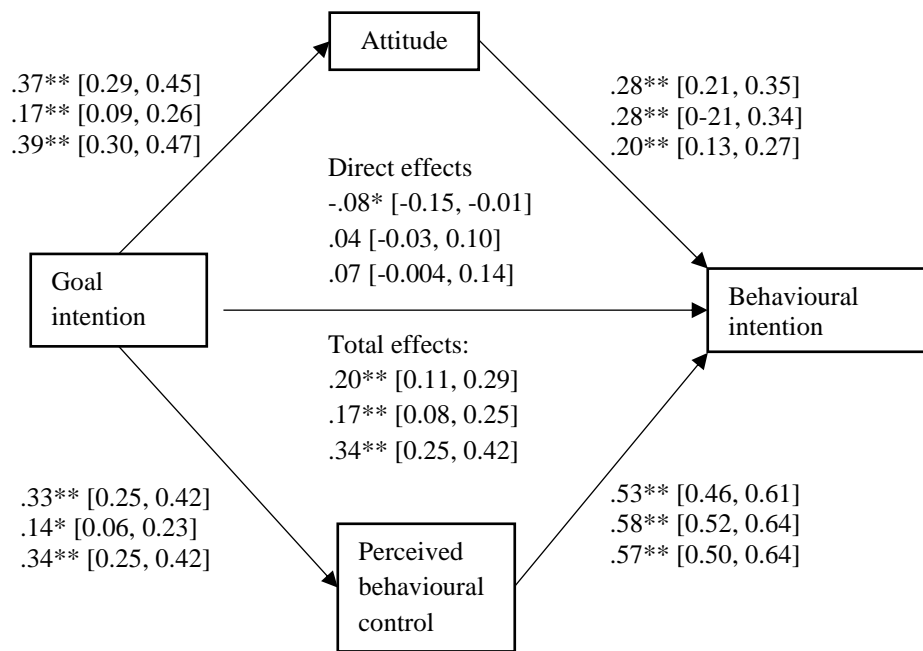$p < .001$). All specific indirect effects were significant for all models.

Attitude

.37** [0.29, 0.45]
.17** [0.09, 0.26]
.39** [0.30, 0.47]

.28** [0.21, 0.35]
.28** [0-21, 0.34]
.20** [0.13, 0.27]

Direct effects
-.08* [-0.15, -0.01]
.04 [-0.03, 0.10]
.07 [-0.004, 0.14]

Goal
intention

Behavioural
intention

Total effects:
.20** [0.11, 0.29]
.17** [0.08, 0.25]
.34** [0.25, 0.42]

.33** [0.25, 0.42]
.14* [0.06, 0.23]
.34** [0.25, 0.42]

.53** [0.46, 0.61]
.58** [0.52, 0.64]
.57** [0.50, 0.64]

Perceived
behavioural
control

Figure 6. Standardized regression coefficients (β) for the relationship between goal intention and behavioural intentions as mediated by attitude scores and perceived behavioural control. Coefficients are displayed for the models refundable cup, reduced consumption, and own cup (top to bottom). *p < .05, **p < .001

4.2.3 Actional stage

Predicting implementation intentions from behavioural intentions and planning

ability, regression models explained moderate (refundable cup) to larger (own cup) amounts

of variance, the strongest predictor consistently being behavioural intention (see Table 5).

Planning ability was a weaker predictor in the models for refundable cup and own cup and

did not predict the implementation of reduced consumption. Consequently, these results

partly support hypothesis H6.

Table 5

Predictors of Implementation Intention

Predictor	Refundable cup			Reduced consumption			Own cup		
	B	95% CI	β	*B*	95% CI	β	*B*	95% CI	β
Behavioural intention	0.44**	[0.34, 0.54]	.41	0.66**	[0.57, 0.73]	.62	0.80**	[0.72, 0.88]	.71
Planning ability	0.22**	[0.12, 0.32]	.20	0.07	[-0.01, 0.15]	.06	0.12*	[0.03, 0.20]	.09
R2		.30			.43			.59	
F		110.10** (2, 517)			188.92** (2, 500)			370.69** (2, 523)	

Note. *p < .05. **p < .001

4.2.4 Postactional stage

Regression models predicting alternative behaviours with respective implementation intentions provided support for hypothesis H7. Both reduced consumption and own cup were significantly and positively predicted by implementation intention with models explaining moderate to larger amounts of variance (see Table 6). Refundable cup was not analysed, as the system was a hypothetical scenario and therefore lacked a corresponding self-report behaviour measure.

Table 6

Predictor of Alternative Behaviour

Predictor	Reduced consumption			Own cup		
	B	95% CI	β	*B*	95% CI	β
Implementation intention	0.54**	[0.47, 0.61]	.57	0.68**	[0.61, 0.74]	.68
R2		.33			.46	
F		247.88** (1, 509)			446.48** (1, 522)	

Note. *p < .05. **p < .001

5 Discussion

The present study investigated single-use cup consumption and the alternatives refundable cup, own cup, and reduced consumption with the SSBC (Bamberg, 2013b). We aimed to understand behavioural change in this domain by investigating why people shift from single-use cups to alternatives. In the following, we discuss the results followed by recommendations for practitioners on how to promote single-use cup alternatives.

5.1 Discussion of findings and theoretical implications

Group comparisons between stage members' current behaviour and intention strengths mostly supported the applicability of the SSBC to single-use cups, consistent with previous applications of the SSBC (Bamberg, 2013b; Klöckner, 2017). There were, however, some unexpected patterns in regard to the observed strength of intentions. While goal intention was significantly lower in the predecisional stages than in later stages with a very large effect size, the hypothesized differences in behavioural and implementation intentions were detected solely for the alternative behaviour own cup, with medium effect sizes. Previous studies have also found that stage differences for behavioural and implementation intentions were less consistent with model predictions than for other model predictors (Klöckner, 2017; Schaffner et al., 2017). There are several possible explanations for this: Fewer participants were in the earlier stages than later stages. Despite controlling for heterogeneity of variances, small group sizes likely reduced the statistical power to determine whether effects that were observed descriptively (e.g., increasing behavioural intentions) were meaningful. The description of the refundable cup system and the prompt to respond as if this system was going to be in place tomorrow may not have been clear enough for participants to state intentions for this future scenario. The lack of change in reduced consumption specifically may reflect that this is an unpopular strategy for reducing one's single-use cup usage. Even postactional stage members were less inclined to implement this strategy in their everyday lives. A final contributor may have been the operationalisation of behavioural and implementation intentions (e.g., "I intend

to do behaviour X") which portrayed the alternative behaviours as complementary instead of substitutional of the original behaviour. Other studies which found changes in behavioural or implementation intentions (Bamberg, 2013b; Klöckner, 2017; Sunio et al., 2018) often phrased these items in direct reference to the old behaviour, e.g., "I intend to shift from eating beef meals to vegetarian meals" (Klöckner, 2017). Why people act pro-environmentally (to substitute harmful behaviour, or for independent reasons) may be less important, as long as people do make these changes. When analysing behavioural change with the SSBC, however, alternative behaviours might need to be framed as substitutes for the old behaviour. Researchers must decide whether they want to study alternative behaviours independently, or as substitutes for the old behaviour.

With some irregularities, usage of single-use cups and alternatives could be predicted by factors included in the SSBC, meaning that these factors are potential levers for the promotion of the three proposed alternative behaviours.

In the predecisional stage, goal intention was most strongly associated with personal norm, followed by perceived goal feasibility and positive emotions, altogether explaining large amounts of variance. Two mediation models supported the serial mediation chains proposed by the SSBC: Personal norm is activated by both social norms, and a chain of awareness of consequences of one's actions, felt responsibility to act, and negative emotions associated with negative consequences of one's behaviour. These findings support previous results (Bamberg, 2013b) and are highly relevant, as most SSBC studies have not tested the serial mediations (Klöckner, 2017; Sunio et al., 2018) or included a limited number of model variables (Klöckner, 2014).

In the preactional stage, the SSBC proposes that goal intention is translated into a behavioural intention to perform an alternative behaviour. Across all behavioural alternatives,

perceived behavioural control was the strongest predictor of behavioural intention, followed by attitude. Goal intention and the behavioural intentions were positively correlated, but this relationship was not significant (or small and negative) in the regression models. This finding contradicts previous studies (Bamberg, 2013b; Klöckner, 2017; Sunio et al., 2018). Additional analyses showed that this relationship was mediated by perceived behavioural control and attitude in a parallel mediation across all three behavioural alternatives. This suggests that forming a goal intention might positively affect an individual's attitude and perceived behavioural control. This affects their intention to perform the behaviour they are considering. This analysis was conducted exploratively based upon the observation that pairwise correlations between goal and behavioural intentions did not translate into a significant association in multiple linear regression, which can suggest a mediation relationship between variables. It was substantiated by considering that our attitude measure, in contrast to previous studies (Bamberg, 2013b; Klöckner, 2017; Sunio et al., 2018), explicitly referred to the behaviour goal and could thus be more directly related to the goal intention. A similar mechanism may have occurred with perceived behavioural control. Since this study was cross-sectional, our findings can only provide indications of possible causal relations within the SSBC's preactional stage, but the similarity of mediation models across all alternative behaviours does suggest that a systematic mediated relationship may be occurring. More research, particularly initiatives using experimental designs, is needed to clarify the underlying processes of stage progressions. More research is also needed to clarify the role of perceived behavioural control, which, being highly context-dependent, is often difficult to interpret and may have more nuanced underlying contextual factors.

In the actional stage, behavioural intention was a moderate (refundable cup) to strong (own cup) predictor of implementation intentions, echoing findings from Klöckner (2017). Our finding that planning ability only played a minor role is partly corroborating (Klöckner,

2017), partly contradicting (Klöckner, 2014) previous research. Consisting of both coping and action planning, planning ability might have been too fuzzy in its operationalisation and is critical for future research to clarify its conceptualisation and operationalisation.

In the postactional stage, as expected, strong implementation intentions were found to correspond to actual reduced consumption and usage of own cups, indicating that the model contributes to bridging the intention-behaviour gap.

5.2 Limitations and future directions

The study has several limitations that show directions for future research. All measures are taken at a single point in time. While this approach can give a valuable indication of whether the change processes around single-use cups can be investigated using a stage model, future studies should deepen our understanding of the this process by running longitudinal studies. Such studies with data from several measurement points can shed light on the psychological and behavioural characteristics of the same individual in all four stages. With regard to the measurement instruments, assessing some constructs with only one item might have reduced reliability. To counter this limitation, all items were based on previous work which tested the reliability and validity of the used instruments, and internal consistency was calculated where possible. Nonetheless, further application of the measures to various contexts is required to support their reliability. Therefore, future studies should consider applying extensive item batteries where possible. Using behaviour observations would help to reduce any bias introduced through analysing stated preferences in future studies.

Future research must explore whether the findings are generalisable to rural areas and other socio-demographic groups. This study was conducted in a medium-sized city with a large number of shops selling hot beverages. Most study participants had a high degree of formal education and are thus likely sensitised to environmental problems (e.g. De Silva &

Pownall, 2014). While this may have contributed to the high number of participants who placed themselves in the postactional stage, our participants' mean monthly single-use cup consumption was comparable to a sample representative of the German population, where most participants (79% of coffee to go drinkers) stated they used 1-5 cups a month (Kauertz et al., 2019).

We asked participants to respond to three pre-selected alternative behaviours to investigate whether specific alternatives can be explained and promoted using the SSBC. Individuals in the actional or postactional stage practicing other behaviours might have responded with weak behavioural and implementation intentions to the proposed alternatives, even though they were using few single-use cups. Participants may also have had experiences with other, non-comparable refundable cup schemes that may have biased their replies. To try and prevent this, we included a detailed description of our proposed system in the questionnaire to make sure that participants were able to judge the system correctly.

Despite these limitations, it is important to note that this study is the first empirical application of the SSBC to the present context, providing valuable pointers for interventions. One of the study's strengths is the inclusion of three alternative behaviours, which ensured that people with different behavioural patterns felt equally included. Including variables from all stages originally proposed and testing mediation models, this study provides important insights into the structure of this behavioural change process.

5.3 Practical implications for reducing single-use cup consumption

The European Commission noted in 2017 that cups for beverages are among the most often found plastic products on Europe's beaches (Hanke et al., 2017) and announced in 2019 directions to reduce single-use plastic products (Council Directive 2019/904). However, despite recognizing that diminishing the consumption of single-use products is an important

contribution to reducing plastic waste, current policy measures are not reflective of their potential to contribute to the reduction of plastic waste by informed policies accompanied by social marketing campaigns. So far, most efforts to reduce single-use cup consumption have been initiated by industry players (Foteinis, 2020). Industry managers have stated that currently their main incentive to initiate measures to reduce single-use cup consumption is pressure exerted by consumers (Ma et al., 2020). At the same time practitioners perceive consumer attitudes as a barrier to implementing substantial changes towards more sustainable packaging and products, as convenience of single-use cups and habits counteract changes people say they are willing to make in their everyday life (Ma et al., 2020). Findings of the present study inform those decision makers in industry, but also decision-makers in policy and NGOs, about person-level factors that might be at play when consumers decide to adopt alternatives to plastic and resource-intensive products. We will now illustrate how our results can be used to promote single-use cup alternatives.

The population of a city, region, or organisation can be surveyed to determine which of the SSBC's stages groups of consumers fall into. Campaigns or other behaviour interventions should then be tailored to supply the information and support that individuals require in a particular stage. Targeting the stage-specific predictors of intentions will enhance the intervention's effectiveness; we provide ideas on how this might be achieved below. Depending on the behavioural alternatives available, one or multiple alternative behaviours can be addressed in the interventions. Alternatively, an interactive campaign, for example on a website or in an app, can assess individuals' current stage of change and deliver appropriate information (e.g. Klöckner & Ofstad, 2017) or can assist consumers in choosing stage-fitting information themselves (e.g. Sunio et al., 2018).

Targeting individuals in the predecisional stage, personal norm could be leveraged through social norms (in line with Cialdini et al., 1990; Goldstein et al., 2008). Among the

factors associated with personal norm, participants scored lowest on social norms ($M = 2.76$, other factors $Ms > 4.00$). That means that social norms have the largest potential to be increased and might thus help foster the goal intention to use fewer single-use cups. Interventions could highlight that many people already choose not to use single-use cups (positive descriptive social norm) and emphasise that using fewer single-use cups is a socially desirable behaviour (injunctive social norm). However, it should be kept in mind that a person's susceptibility to social influence depends on their preferences. For example, Cheng and colleagues (2019) found that people aiming at maximising personal interests (e.g., time, money) are more susceptible to social information than people aiming to maximise hedonic values when it comes to making sustainable lifestyle decisions (Cheng et al., 2019).

When targeting individuals in the preactional stage, interventions should increase perceived behavioural control to facilitate alternative behaviours. For refundable cup, accessible information on how to use the system, and sufficient pick-up and drop-off stations for the cups should be provided. For own cup, cafés, organisations, and employers could distribute a discounted reusable cup. Even though charging extra for single-use cups was found to be more effective than a discount on reusable cups (Poortinga & Whitaker, 2018), discounts can still be a viable incentive when charges are impracticable or undesired. Financial incentives should only complement psychological interventions though, as they seem to be ineffective if used alone (Environmental Audit Committee, 2018). For reduced consumption, employers could encourage coffee and tea breaks at work, to relocate the consumption of hot beverages away from on the go. All behavioural alternatives should come with instructions on how to implement them for the least environmental burden (e.g., use them as long as possible, wash them with eco-friendly dish soap).

For individuals in the actional stage, planning ability can be enhanced through action or coping planning. For refundable cup, a phone application could enable users to plan trips

that pass by a participating café, comparable with studies in which people were prompted to plan their car-free trips on Google Maps or other planning tools (Hsieh et al., 2017; Sunio et al., 2018). For own cup, action planning can comprise simple measures like putting the cup in the same place near the front door. To enhance coping planning, solutions to common challenges with refundable cup systems could be provided; the above-mentioned application could serve as a coping strategy for forgetting to bring one's own cup. Action and coping planning measures should be combined, as the combination has been found to be most effective (Hsieh et al. 2017).

The above recommendations can help practitioners in waste management and industry players such as cafés identify and overcome common barriers to single-use cup alternatives. But initiatives by some industry players alone might not suffice to decrease plastic and other waste caused by single-use products (Foteinis, 2020; see also Xanthos & Walker, 2017 for a review of international policies to reduce plastic marine pollution from single-use plastics). Regulatory bodies must further incentivise providers and consumers to move away from single-use cups. For example, most people think that single-use cups are usually recycled, so labelling them as non-recyclable might increase consumers' problem awareness (Environmental Audit Committee, 2018). A recent proposal towards reducing single-use products was outlined by the European Commission (European Commission, 2018). The strategy has a heavy emphasis on production chains and extended producer responsibility (Leal Filho et al., 2019), which undoubtedly has a major impact on cleaner production and waste management. It does, however, also emphasise that currently there are no incentives for consumers to use reusable or recyclable options. This indicates that consumer demand, a major driving force of cleaner production, could be used to a larger extent to help and maintain the uptake of reusable options and thus increase the interest of corporations to produce sustainably. One major improvement to the European Commission's proposal would

be to encourage the implementation of deposit refund systems over a wide range of products, which has been shown to improve recycling and reuse rates (Leal Filho et al., 2019). The refundable cup system as researched in our study provides an example of such a concept and our results can provide policy makers with important insights into the factors influencing the uptake during consumers' different decision-making stages.

Our study shows which person-level factors might be at play when consumers adopt alternative behaviours to single-use cups: a refundable cup system, using one's own cup, and reducing one's consumption on the go. The consistent use of reusable cups (owned or refundable) throughout Germany could save vast amounts of CO_2, energy, and waste (Deutsche Umwelthilfe, n.d.). Over the next years, these savings are expected to increase as electricity mixes and cleaning procedures become greener (Woods and Bakshi, 2014). Reduced consumption on the go saves waste, as restaurants and households mostly use reusable (porcelain) cups. As single-use cups are only a proxy for a larger problem with single-use plastics products, the results of this study might be transferred to similar problematic products and contexts, and thus help to reduce the tremendous amount of plastic waste (approximately 275 million metric tons produced by coastal countries in 2010; Jambeck et al., 2015), polluting our planet.

6 Conclusion

This study explored consumers' behavioural change from single-use drink cups towards three alternatives: using a reusable cup system, using their own reusable cups, or reducing their consumption on the go. By separating the different stages of this process of change, we were able to show which factors need to be addressed in order to enable consumers to move towards the adoption of these alternatives. We recommend that stakeholders aiming to reduce single-use cups tailor their campaigns according to the

respective stage of change in which targeted consumers are currently in. For example, for motivating change away from single-use cups, emphasising social norms can be an effective tool; for those consumers who have already chosen an alternative, enabling them to plan this into their everyday routines is more effective. On a larger scale, we show that it is important to incorporate consumer perspectives into policy plans to reduce single-use cups and to recognise the different needs consumers have to be able to make this change in their personal lives. Looking forward, future research will be able to use these results as a basis to extend the theoretical model implemented in this study. For example, focusing on documenting and analysing consumer change processes over a period of time will provide additional insight into how stakeholders can promote behavioural alternatives such as the ones presented here.

Appendix A

Table A.1

Sample Descriptives

		Percentage	*n*
Gender	Male	43%	238
Age	25 and younger	19%	109
	26-35 years	29%	164
	36-45 years	19%	106
	46-55 years	17%	93
	56-65 years	15%	85
	66 and older	1%	7
Highest attained degree	No degree	1%	4
	Lower secondary degree	8%	41
	Qualification for university entrance ((Fach-)Abitur or other)	20%	106
	Vocational degree	11%	56
	University degree	58%	310
	Other	2%	12
Household income (monthly, after taxes)	1000€ or less	17%	91
	1001€ - 3000€	36%	199
	3001€ - 5000€	28%	151
	5001€ - 7000€	14%	77
	7001€ or more	6%	32

Note. $N = 573$

Appendix B

Table B.1

Stage diagnosis measure

Stage	Item for self-diagnosis	*n*	% of participants (excluding those falling into the "captive" category)
Predecisional denial	When I drink coffee, tea, or similar drinks on the go, I often use to-go-cups. I am content with this situation and see no reason to change it.	23	4%
Predecisional inhibition	When I drink coffee, tea, or similar drinks on the go, I often use to-go-cups. I would like to use fewer to-go-cups, but I do not think that is possible.	19	3%
Preactional	When I drink coffee, tea, or similar drinks on the go, I often use to-go-cups. I would like to use fewer to-go-cups, but I do not have a concrete idea of how to reach that goal yet.	76	13%
Actional	When I drink coffee, tea, or similar drinks on the go, I often use to-go-cups. I would like to use fewer to-go-cups, and I know how to reach that goal, but have not started implementing this in my everyday life.	74	13%
Postactional	I drink coffee, tea, or similar drinks on the go, but I am already using few or no to-go-cups and want to maintain that in the future.	381	67%
Captive	Since I do not drink coffee, tea, or similar drinks on the go, and do not plan to start doing so in the future, this question does not apply to me.	81	N/A

Table B.2

Full items and Scale Metrics: Stage-Specific Intentions and Influencing Factors

Construct	Item	*M*	*SD*	Reliability[a]
AC		4.60	0.70	.78
AC1	The amount of waste generated by to-go-cups is problematic.			
AC2	Producing to-go-cups harms the environment through resource consumption and emissions.			
AR		4.13	1.14	.81
AR1	I am personally responsible for containing the negative effects of to-go-cups.			
AR2	The environmental damage caused by to-go-cups lies within my responsibility.			
PN		4.37	0.87	.75
PN1	Based on what is important to me in life, I feel obliged to reduce my usage of to-go-cups as much as possible.			
PN2	Regardless of what others do, I should try not to use to-go-cups based on my own principles.			
SN		2.76	1.28	.83
SN1	People who are important to me think that I should use less or no to-go-cups.			
SN2	Most people in my social circle expect that I will avoid using to-go-cups in the future.			
PGF	I would find it easy to use few or no to-go-cups during the next three months.	4.11	1.14	
Pos Emo	If I used few or no to-go-cups in the near future, it would make me feel good.	4.17	1.07	

Table B.2 continued

Construct	Item	*M*	*SD*	Reliability[a]
Neg Emo	I feel bad when I think about the negative consequences of to-go-cups for the environment.	4.00	1.15	
GI		4.38	0.93	.85
GI1	I intend to use fewer or no to-go-cups in the future.			
GI2	I will try to reduce my to-go-cup usage or to keep it low.			
PBC refund		3.68	1.17	.84
PBC refund1	It would be easy for me to use a refundable cup system to drink my coffee, tea or similar drinks on the go.			
PBC refund2	I would be able to use a refundable cup system in my everyday life without major difficulties.			
PBC red	It would be easy for me to drink fewer cups of coffee, tea or similar drinks on the go, as described above.	3.43	1.46	
PBC own	It would be easy for me to use my own cup to drink my coffee, tea or similar drinks on the go.	3.78	1.28	
Attitude Score refund	Using a refundable cup system would reduce my to-go-cup usage. * Keeping my usage of to-go-cups low in the next three months would be: (scale from 1 (bad) to 5 (good)). (standardized to five-point scale)	3.80	1.33	
Attitude Score red	Drinking fewer cups of coffee, tea, or similar drinks on the go would reduce my to-go-cup usage. * Keeping my usage of to-go-cups low in the next three months would be: (scale from 1 (bad) to 5 (good)). (standardized to five-point scale)	3.35	1.52	
Attitude Score own	Using my own cup would reduce my to-go-cup usage. * Keeping my usage of to-go-cups low in the next three months would be: (scale from 1 (bad) to 5 (good)). (standardized to five-point scale)	4.05	1.31	
BI refund		3.59	1.33	.87
BI1	I intend to use a refundable cup system in the future.			
BI2	I will make an effort to make more use of a refundable cup system in the future.			
BI red		2.83	1.40	.83

Table B.2 continued

Construct	Item	*M*	*SD*	Reliability[a]
BI1	I intend to (continue to) avoid drinking my coffee, tea or similar drinks on the go.			
BI2	I will make an effort to reduce or keep low my consumption of coffee, tea, and similar drinks on the go.			
BI own		3.45	1.40	.93
BI1	I intend to use my own cup in the future.			
BI2	I will make an effort to use my own cup to drink coffee, tea, or similar drinks on the go.			
PA refund	I know how I could use a refundable cup system in spite of potential challenges (e.g., additional planning, longer routes).	3.50	1.30	
PA red	In spite of potential challenges, I know how I can do without a coffee or tea on the go.	3.89	1.29	
PA own	I know how I could use my own cups to have coffee or tea on the go.	3.91	1.28	
II refund	I already have a specific plan of when and how I would be able to use a refundable cup.	2.43	1.43	
II red	I already have a specific plan of how I can replace my coffee- and tea consumption on the go.	2.39	1.46	
II own	I already have a specific plan of when I could use my own cup to have coffee, tea, or similar drinks on the go.	2.94	1.57	
Behav red	I refrain from consuming hot beverages outside my house	2.06	1.36	
Behav own	I regularly bring a cup of my own to consume hot beverages on the go	2.51	1.55	

Note. AC = awareness of consequences, AR = ascription of responsibility, PN = personal norm, SN = social norm, GI = goal intention, BI = behavioural intention, PBC = perceived behavioural control, neg emo = negative emotions associated with negative consequences, pos emo = positive emotions anticipated with goal achievement, PGF = perceived goal feasibility, PA = planning ability, II = implementation intention, Behav = behaviour, refund = refundable cup system, red = reducing consumption of coffee, tea, and other similar drinks on the go, own = bringing own cup to have coffee, tea, or similar drinks on the go. [a]Spearman Brown coefficient.

Table B.3

Descriptions of Alternative Behaviours in Questionnaire

Alternative behaviour	Description
Introduction to behaviour alternatives	There are multiple ways of reducing how many to-go-cups one uses in everyday life. In the following section, we will describe three possible alternative behaviours. Please read each of the descriptions carefully and answer the corresponding questions.
Refundable cup system	Darmstadt is currently planning on introducing a refundable cup system within the city area and bordering communities. The system will include a reusable cup that you can obtain at partner business – for example, the bakeries, cafés, and cafeterias in and around town – for a refundable token. Later, you can then take back the cup to the same or a different partner business to get it filled up again or to receive back your token.
	Please answer the following questions assuming that the described refundable cup system is already in place in Darmstadt and is available at every place offering coffee, tea, or similar drinks.
Reduction of consumption	Another strategy of reducing the usage of coffee-to-go-cups is to drink fewer cups of coffee, tea, or similar drinks on the go. Instead, one could have these drinks at home or at your destination of travel, or replace the coffee with similar drinks or snacks that are easier to transport.
Own cup	A third possibility by which one can reduce how many to-go-cups one uses would be to bring a cup from home. By doing so, one could take some coffee or tea from home or work. Some cafés also offer to fill up cups that you bring with you.

Appendix C

Table C.1

Covariances and correlations of model variables

	AC	AR	PN	SN	PGF	Pos Emo	Neg Emo	GI	PBC refund	PBC red	PBC own	ATT refund	ATT red	ATT own	BI refund	BI red	BI own	PA refund	PA red	PA own	II refund	II red	II own
AC	0.66	0.28	0.29	0.28	0.18	0.38	0.45	0.25	0.19	0.12	0.16	0.29	0.33	0.35	0.22	0.14	0.20	0.25	0.23	0.17	0.18	0.18	0.19
AR	.38**	1.06	0.32	0.23	0.09	0.24	0.41	0.31	0.22	-0.06	0.17	0.41	0.44	0.45	0.36	0.12	0.38	0.24	0.18	0.17	0.34	0.08	0.31
PN	.51**	.40**	0.84	0.38	0.40	0.49	0.52	0.52	0.24	0.18	0.32	0.36	0.26	0.40	0.19	0.15	0.36	0.28	0.30	0.30	0.19	0.18	0.34
SN	.41**	.19**	.40**	1.25	0.33	0.43	0.55	0.41	0.30	0.19	0.18	0.35	0.33	0.37	0.22	0.23	0.26	0.35	0.32	0.08	0.50	0.32	0.31
PGF	.21**	.12*	45**	.24**	1.15	0.33	0.30	0.52	0.31	0.47	0.55	0.24	-.004	0.31	0.01	0.28	0.29	0.30	0.49	0.42	0.04	0.31	0.33
Pos Emo	.52**	.24**	.60**	.33**	.28**	1.10	0.80	0.48	0.32	0.24	0.37	0.48	0.40	0.57	0.36	0.23	0.44	0.46	0.33	0.33	0.33	0.29	0.41
Neg Emo	.58**	.34**	.59**	.39**	.23**	63**	1.15	0.47	0.34	0.32	0.30	0.51	0.54	0.54	0.38	0.41	0.42	0.48	0.42	0.35	0.40	0.41	0.41
GI	.41**	.36**	.70**	.36**	.55**	54**	.47**	0.93	0.31	0.23	0.39	0.43	0.20	0.41	0.22	0.18	0.380	0.33	0.35	0.36	0.24	0.18	0.39
PBC refund	.24**	.20**	.29**	.21**	.25**	25**	.23**	.34**	1.16	0.17	0.44	0.71	0.22	0.40	0.94	0.19	0.44	0.95	0.23	0.40	0.66	0.26	0.46
PBC red	.15*	.00	.19**	.12*	.32**	18**	.23**	.22**	.12*	1.45	0.26	0.23	0.52	0.09	-0.08	1.26	0.04	0.19	1.25	0.05	-0.09	0.86	-0.02
PBC own	.20**	.14*	.34**	.13*	.38**	28**	.20**	.35**	.30**	.15*	1.27	0.22	0.10	0.60	0.25	0.22	1.20	0.42	0.35	0.82	0.36	0.40	1.25
ATT refund	.32**	.26**	.34**	.23**	.20**	36**	.31**	.36**	.49**	.15*	.16*	1.30	0.55	0.72	0.84	0.22	0.35	0.57	0.28	0.26	0.68	0.33	0.32
ATT red	.34**	.25**	.25**	.20**	.04	27**	.32**	.17**	.14*	.27**	.07	.27**	1.49	0.72	0.44	0.79	0.21	0.27	0.50	0.04	0.26	0.72	0.15
ATT own	.39**	.32**	.44**	.27**	.28**	43**	.36**	.41**	.30**	.07	.42**	.43**	.37**	1.28	0.52	0.27	0.71	0.44	0.23	0.53	0.40	0.34	0.75
BI refund	.26**	.24**	.20**	.14*	.03	29**	.24**	.21**	.64**	-.004	.15*	.50**	.23**	.32**	1.31	0.07	0.47	0.99	0.01	0.33	0.95	0.17	0.33
BI red	.15*	.08	.14*	.13*	.16*	15*	.24**	.13*	.12*	.64**	.10*	.12*	.42**	.12*	.04	1.35	0.15	0.17	0.90	-.001	0.10	1.21	0.17
BI own	.23**	.26**	.36**	.16*	.21**	31**	.26**	.33**	.29**	.04	.68**	.19**	.10*	.42**	26**	.07	1.38	0.51	0.25	1.04	0.56	0.41	1.61
PA refund	.32**	.21**	.31**	.23**	.25**	35**	.33**	.33**	.67**	.13*	.27**	.38**	.18**	.30**	62**	.09	.30**	1.27	0.29	0.43	0.74	0.28	0.52
PA red	.27**	.17**	.36**	.20**	.35**	26**	.31**	.37**	.18**	.66**	.24**	.20**	.29**	.19**	.05	.50**	.17*	.21**	1.31	0.26	-0.08	0.71	0.18
PA own	.23**	.14*	.32**	.06	.31**	24**	.23**	.34**	.29**	.06	.54**	.17**	.04	.38**	19**	-.01	.64**	.29**	.21**	1.26	0.24	0.21	1.01
II refund	.22**	.22**	.13*	.30**	-.004	19**	.20**	.20**	.38**	-.05	.16*	.34**	.13*	.20**	50**	.06	.26**	.38**	-.05	.09	1.44	0.30	0.78
II red	.20**	.022	.13*	.17**	.13*	17*	.22**	.09	.15*	.40**	.17*	.16*	.35**	.14*	.09	.64**	.17**	.13**	.36**	.07	.16**	1.42	0.62
II own	.20**	19**	.29**	.17**	.17**	26**	.22**	.28**	.274**	-.01	.62**	.15*	.08	.40**	18**	.07	.77**	.26**	.09	.55**	.33**	.26**	1.56

Note. $N = 426$. Covariances are displayed above the diagonal, correlations are displayed below, standard deviations are displayed on the diagonal. All correlations calculated with Spearman Rho Correlation Coefficient to account for non-normal distributions. AC = awareness of consequences, AR = ascription of responsibility, PN = personal norm, SN = social norm, GI = goal intention, BI = behavioural intention, PBC = perceived behavioural control, neg emo = negative emotions associated with negative consequences, pos emo = positive emotions anticipated with goal achievement, PGF = perceived goal feasibility, PA = planning ability, II = implementation intention, refund = refundable cup system, red = reduction of coffee, tea, and other similar drinks on the go, own = bringing own cup to have coffee, tea, or similar drinks on the go. * $p < .05$, ** $p > .001$.

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