Learnings from applications of the stage model of self-regulated behavioral change: A systematic review

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Goal

Reviewing published studies applying the stage-model of self-regulated behavioural change (SSBC, Bamberg, 2013, cf. figure below) to environmental behaviour. Focus of the review: evaluating empirical support of the SSBC, identifying challenges in applying the SSBC, and deriving recommendations for future research.

Figure adopted from Keller et al. 2019

Method

Search strategy: (1) searching articles citing the initial publication of the SSBC (Bamberg, 2013) in Web of Science (n = 62) and Google Scholar (n = 147), (2) applying the search terms *stage model* OR stage based* AND *behavior OR behavior*change* AND *environment* OR sustainable** in Web of Science (n = 2748) and PsycINFO (n = 93), limited to publications since 2013 and articles, (3) contacting the author of the initial SSBC publication for additional studies (n = 7), (4) deleting duplicates (n = 73). Result: 2982 studies.

Article selection: screening abstracts and titles applying selection criteria (e.g. only original research that investigated several SSBC constructs or used SSBC as framework in intervention design). Result: 21 potentially relevant studies. Thereof, 11 were excluded (e.g., because they applied stage models other than SSBC or had not evaluated the model) after reading full texts.
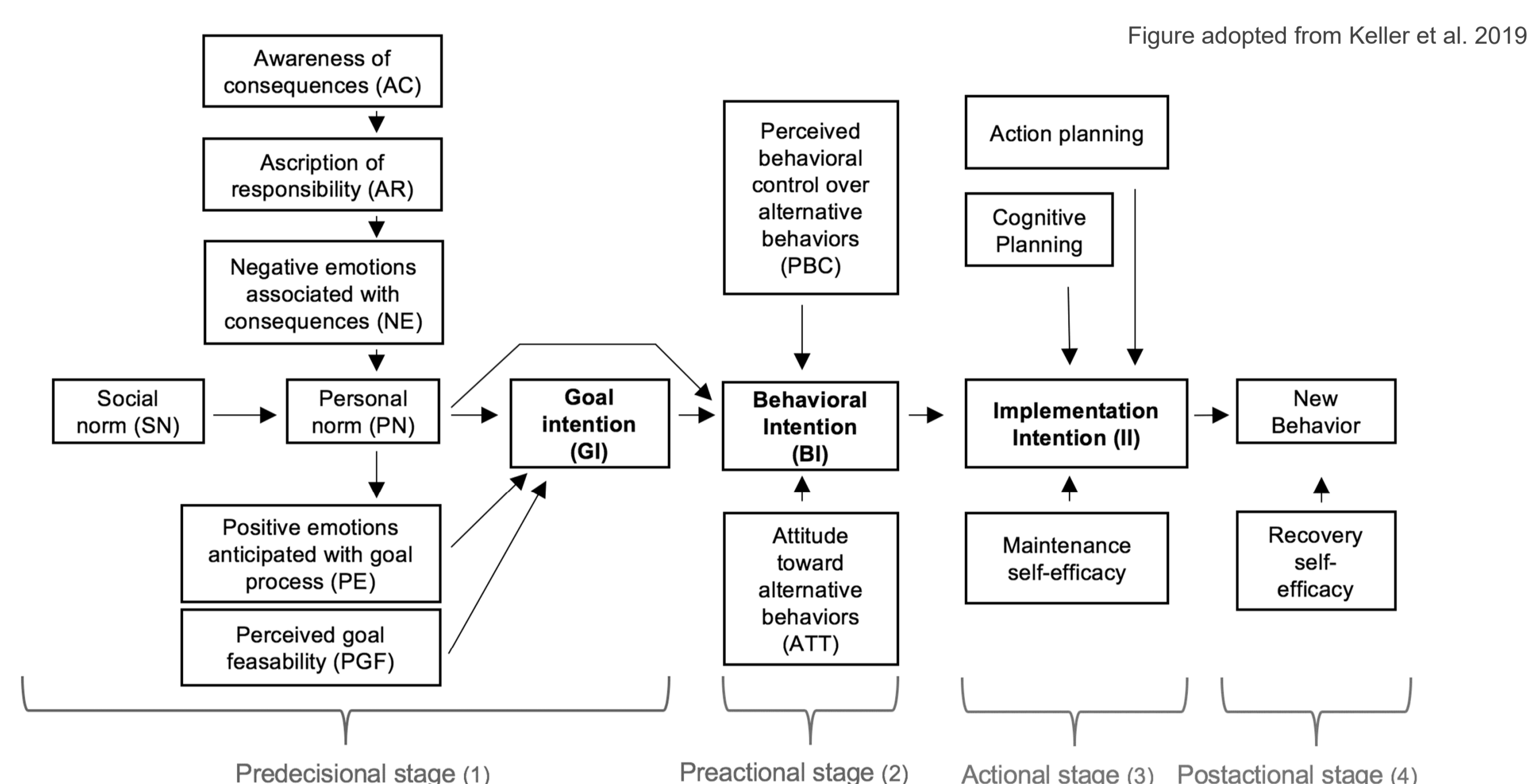
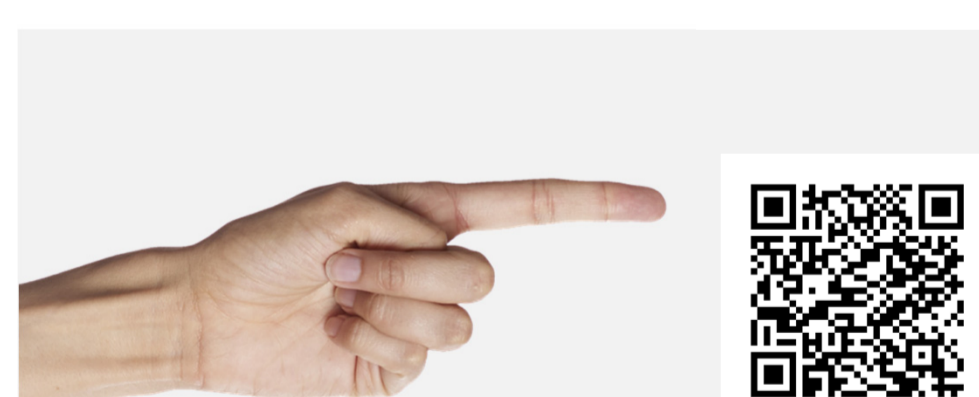**10 relevant studies** were retained for review (cf. table below)

Author(s)	Type of study	Sample size	Behavioural change domain	Key results
Bamberg, 2013	Correlational (cross-section)	N = 908	Car use to public transport and cycling	Structural equation modelling (SEM) path and measurement model with acceptable model fit. Stages thresholds predicted by model constructs. Constructs differed between stages (no pairwise comparisons).
Klöckner, 2017	Correlational (cross-section)	N_1 = 746 N_2 = 2967	Beef consumption to reducing portion sizes, replacing with other meats or fish, or eating vegetarian	SEM path model with acceptable fit. Model constructs differed between stages according to model predictions in behaviour and goal intention, less clear in behavioural intentions and implementation intentions.
Schaffner et al., 2017	Correlational (cross-section)	N = 1818	Moving into an energy-efficient home	Multi-group model (predecisional and preactional stage constructs predicting behavioural intentions) with acceptable fit. Stage predictors largely differed between stages according to model predictions.
Ohnmacht et al., 2018	Correlational (cross-section)	N = 1818	Smartphone: postponing replacement buys	Stages membership predicted by model constructs, independent from socio-demographic variables. Model constructs differed between stages (no pairwise comparisons).
Olsson et al., 2018	Correlational (cross-section)	N = 794	Car use to public transport, bike, walk, or carpool	Stages membership predicted by model constructs, independent from socio-demographic variables.
Weibel et al., 2018	Correlational (cross-section)	N = 1818	Reducing meat consumption	Stage membership predicted by model constructs, but included irregularities. Stage membership predicted by socio-demographic variables. Model constructs differed between stages (no pairwise comparisons).
Klöckner, 2014	Correlational (longitudinal, questionnaire every second day over two months)	N = 113	Purchasing an e-car	Stage transitions generally followed pattern predicted by SSBC. Intentions partially linkable to transitions. Intentions mostly predicted by model constructs.
Bamberg, 2013	Intervention study using stage-tailored phone campaign	N = 291	Car use to public transport, cycling or walking	Stage-tailored campaign was more influential on behaviour and stage progression than standardized information and no information.
Klöckner & Ofstad, 2017	Intervention study using stage-tailored websites	N_1 = 389 N_2 = 869 N_3 = 3508	Beef consumption to reducing portion sizes, replacing with other meats or fish, or eating vegetarian	Tailored-information website outperformed randomly tailored website, full website, and no intervention on stage progression and behaviour.
Sunio et al., 2018	Intervention study using website and smartphone app for participants to self-tailor after recommendations	N = 241	Car use to environmentally friendly modes of transport for University commute	Intervention had effect on behaviour and later stages of change (compared to no-intervention control group). SEM path model had to be significantly adapted to achieve acceptable fit.

Findings: empirical support of SSBC assumptions

- Model structure was largely supported across the cross-sectional studies, including different low and high cost behaviours, and by the longitudinal study. However, some irregularities were found: e.g., individual stage membership sometimes more ambiguous than predicted by the SSBC, model constructs associated with non-predicted stages.

- Stage-tailored information interventions promoted behavioural change more effectively than non-stage-tailored information interventions and outperformed no-information conditions.

full paper (open access), featuring recommendations for research initiatives that intend to apply the SSBC

Findings: challenges in applying the SSBC

- Behavioural alternatives to environmentally harmful behaviour: decision of whether to model behavioural change away from a current behaviour without addressing a concrete alternative behaviour ("I intend to perform a behaviour other than [old behaviour]") vs. toward concrete new behaviours ("I intend to perform behaviour X").

- Measuring model constructs: large number of model constructs; measuring all constructs (for several behavioural alternatives) may require trade-off between manageable questionnaire length and reliability of measurement instruments.

- Stage diagnosis: establishing a validated and reliable stage diagnosis tool (self-reported or behavioural measurement).

- Assumption of linear behavioural change process: linear, static model simplifies complex interdependencies and feedback loops.

References

Bamberg, S. (2013). Changing environmentally harmful behaviors: A stage model of self-regulated behavioral change. *Journal of Environmental Psychology, 34*, 151-159.

Keller, A., Eisen, C., & Hanss, D. (2019). Lessons learned from applications of the stage model of self-regulated behavioral change: A review. *Frontiers in Psychology.* 10:1091.

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