# Discussion

Where to put low sample numbers??

## Overview

My analysis of XXXX self-reported surveys demonstrates complex heterogeneity of the influence of an innovative ESD intervention on changes of sustainability competencies. Contrary to my predictions, I revealed that one year after the end of the intervention, sustainability attitude and behaviour did not increase (Figure XX) FOR INVOLVED GROUP, suggesting a rejection of my alternative hypothesis of a positive relationship. This highlights the importance of long-term empirical data collection when analysing the effects of ESD interventions. Simultaneously, in line with my predictions, I demonstrated that the involvement of the students (n= 7) led to overall higher SA and SB, for SB (??) even one year after the intervention (Figure XX), highlighting the positive effect of innovative ESD interventions on changes of sustainability competencies. Careful considerations in terms of the generality of the results should be made, due to the very low sample size (n=7) of involved students. I found a strong positive relationship between the sustainability attitude and sustainability behaviour with the underlying construct of the theory of planned behaviour and the sustainability competences based on the underlying construct of (individual) self-efficacy beliefs (Figure XX), pointing towards the reciprocal validation of both scales to capture the same latent constructs of sustainability competencies and their usefulness. I uncovered no differences between individual and collective self-efficacy beliefs within and between the involved and the control group (Figure XX), HIGHLIGHTING?. In line with my predictions, I found that the involved students reported higher aim focussed self-efficacy beliefs (Figure XX), indicating the stabilisation of the formation of intentions and at the same time highlighting the importance of also considering outside barriers. *The lack of sufficient data prevented me from to answer my original questions of comparing the outcomes to a participative group as well, which highlights the challenges of collecting comprehensive data in a school context.* Measuring the outcome of ESD interventions requires many considerations and trade-offs - by using a quantitative, long-term, outcome-focussed approach, I uncovered heterogenous responses in sustainability competencies changes, challenging the assumption that innovative ESD interventions have real behavioural impacts or the assumption of their measurability.

**Summary of most relevant critiques and what they mean related to results**

Paragraphs about downsides measurement method, reflecting back to introduction

Order of paragraphs?

Sustainability competencies measurement have been criticised for various reasons with important implications for the interpretation of the results. HERE OR LIMITATIONS*? While this research can add to a more comprehensive understanding of sustainability competences, their continuous development, as well as possibilities of measurement, the interpretation of the outcomes of this research needs to be treated with caution. The generalisability of the findings are heavily impaired by the lack of data availability.* END The question remains how ESD and the outcomes are most appropriately operationalised, including the goals behind. *The presented method and instrument for operationalization of sustainability competencies picks up core competencies for students to enable them to shape a sustainable future. However, when dealing with competency models, this concurrently raises general questions about the possibilities of evaluation, definition and the seemingly antithetical need of openness of the ESD concept in order to stay adaptable to sustainability related challenges in the future. As Wals et al. conclude, “[t]he main point is that there is no single model of education and learning for environmental sustainability, nor should there be” [*[***112***](https://www.mdpi.com/2071-1050/11/6/1717#B112-sustainability-11-01717)*]. The conception of an adaptive and flexible concept of ESD, nevertheless, should not hinder our duty in the field of empirical research to create evidence via research programs, to verify if the undertaken programs of ESD show (the wanted) outcomes. We still argue that a focus on the ESD effects and learning outcomes is highly necessary to evaluate and improve the measures taken to enable learners to shape a sustainable future. Only if these further steps are taken can the compatibility of ESD with empirical research programs be guaranteed, and hence, its success be assessed.* This fact is even emphasized, when differentiating between ESD1 (instrumental) and ESD 2 (emancipatory) approach, where latter could be argues to be more about the process, than the outcome. Similarly, the discussion should continue, whether behavioural change should be the outcome of this study (REFS WHERE FROM AND WITH WHAT ARGUMENTS?), given the complexity of behaviour, its multitude of influences, including factors outside the individual, especially for young people. Looking at the specific goals of this project, democracy education is also explicitly stated, which on the one hand could also be considered within the ESD framework (and also a good example of ESD2 approach), but with the current approach focussing on sustainability friendly attitudes and behaviour is not really captured. As the need for measurement of ESD outcomes, to also inform ESD interventions based on evidence-based recommendations, persists, self-efficacy as a desirable outcome of ESD seems very fitting. *While behavioural change is an important indicator, it should be complemented by other measures that capture the complexity of human motivations and the broader educational goals of fostering critical thinking, empowerment, and intrinsic motivation. This comprehensive approach ensures that interventions not only change behaviour but also cultivate the underlying values and beliefs necessary for sustained and meaningful engagement with sustainability issues.*

Another big discussion within the field of ESD measurement and research is the context variability. Behavioural outcomes can vary significantly across different contexts and cultures. An intervention that promotes sustainable behaviour in one setting might not have the same effect in another due to varying social norms, economic conditions, and cultural values. This variability challenges the universality of behaviour-focused outcomes. All of the underlying theories stem from a western context and so does most of the empirical research, as does this research. When using indicators, there is an inherent trade-off between wanting to achieve a global scope, to allow for comparisions, contradicting the need for context-specificity. Qualitative methods of ESD research could start to address these challenges, by also integrating different research fields, such as environmental psychology, environmental sociology, science teaching, and empirical educational sciences. Especially, in this study, with its heavy data limitations, with low sample sizes and only tested at one school, the scalability of the results is seriously questioned.

*Thirdly, as implicated by the general definition of indicators, they only offer an approximation to the real world. Even though, I tried to validate the ESD outcome measures through the use of a second scale, they still remain a mere proxy for reality.* *In this regard, Kagawa states that “[t]here are multiple factors which influence the process of behavioral change and further investigation of dissonance between students’ perception of sustainability and their individual actions needs to be explored” [*[***106***](https://www.mdpi.com/2071-1050/11/6/1717#B106-sustainability-11-01717)*]. See, for example, research on the attitude–behavior gap [*[***103***](https://www.mdpi.com/2071-1050/11/6/1717#B103-sustainability-11-01717)*,*[***107***](https://www.mdpi.com/2071-1050/11/6/1717#B107-sustainability-11-01717)*,*[***108***](https://www.mdpi.com/2071-1050/11/6/1717#B108-sustainability-11-01717)*] or cognitive dissonance [*[***109***](https://www.mdpi.com/2071-1050/11/6/1717#B109-sustainability-11-01717)*,*[***110***](https://www.mdpi.com/2071-1050/11/6/1717#B110-sustainability-11-01717)*].* With the new Triple A framework of self-efficacy beliefs, I tried to partly address those challenges, as the limited empirical research points towards better prediction of real-world behaviour. Furthermore, the addition of the indicator for collective efficacy seems relevant as an outcome indicator. I would argue that the TPB-based scale used (built on the work on Pauli, 23) has limited fit for young people and students, as many of the questions used are neither age-appropriate, not necessarily in the hands of the students, especially the behavioural intentions ones (e.g. I support an in-crease in fuel taxes to reduce fossil fuel consumption OR I mainly drive or am driven by a car or a motor-scooter.). Furthermore, the challenge remains to try and exclude the social desirability of the results as much as possible. For young people, there is scientific agreement, of the magnitude of influence of the media, which is not considered here. In terms of using indicators for young people and students, better alternatives, than the one here used exist, for example in the project ProBiKlima.

Checking for real impact and shift of powers 🡪 impact-focussed research (Nielsen et al 21)// Interesting, whether real lief outcomes for individuals and society (REF Kurz und Kubeck , 2021) 🡪 here or later with collective efficacy?

*My research adds to a growing understanding of SCs, their development, and the sustainability and educational governance through policymaking. On this basis, appropriate evidence based recommendations for the further development of ESD research and the implementation of ESD in school practice can be formulated. Through the possibilities of measurement presented and the data already generated, further insights into the successful implementation of ESD in schools and the associated conditions for success can be gained.*

*Or conclusion?*

* Need for closer collaboration between practicioners, interdisciplinary research and society
  + Achieving SDGs cannot remain at normative, vague statements/ target formulations
  + Ideally stimulate benchmarking processes
  + International monitoring system for ESD implementation efforts

Therefore my results can be interpreted as . While changes of sustainability competencies and their attribution to innovative ESD interventions is somewhat limited with my method, I still observed an impression on the long-term effects captured across levels of involvement of the students.

## Sustainability attitude and sustainability behaviour (TPB-based) over time and level of involvement (Research Question 1a/b)

Contrary to my prediction, I found that sustainability attitude and sustainability behaviour did not increase one year after the ESD intervention (Figure XX). I did find a peak at the second point of measurement (straight after the ESD intervention) for the involved group, being significantly higher for both SA and SB (Figure XX). These difference of SB with significant higher scores for the involved group was constant even one year after the ESD intervention (Figure XX). At the same time SB was reported even significantly higher at the first point of measurement (before the start of the ESD intervention), raising the question of attribution of changes of SC to the ESD intervention (Figure XX). The observed findings could be due to various reasons. Firstly,

Sort according to main findings of this question

* Operationalisation and measurement tool
  + fittingness of TPB for students 🡪 better alternatives exists (ProBiKlima)
    - Abgesehen von der Kritik am Instrument ist außerdem anzumerken, dass durch die zu-grundeliegende Theory of Planned Behavior nur eine bedingte Vorhersage des Verhaltens möglich ist (Armitage & Conner, 2001, S. 471; Kaiser et al., 2006, S. 2153). Intention kann demzufolge im Schnitt nur 27 % der Varianz des Verhaltens erklären (Armitage & Conner, 2001, S. 471; Bamberg & Möser, 2007, S. 23; Kaiser et al., 2006, S. 2153), auch wenn einzelne Studien Aufklärungsquoten von bis zu 95 % bescheinigen (Kaiser et al., 2006, S. 2160). Selbst der Modellbegründer Icek Ajzen hat die TPB im Laufe der Zeit weiterentwickelt, da augenscheinlich noch weitere Faktoren neben der Intention das Ver-halten beeinflussen (Bosnjak et al., 2020
  + („Mismatch“/ Difference in) GOALS! Aim of study: also democratic aspects, weren’t considered here 🡪 difficult to make statements about effect of project
  + Effectiveness of innovative method? 🡪 evaluation of method of intervention (innovative) difficult
* Other factors that could play bigger role in SA and SB than ESD intervention
  + Already previous interest from self-chosen group 🡪 what would be goal of ESD intervention – quantity vs quality?
  + Social desirability (also at various time points?)
  + influence of media, FFF
    - Die Teilnahme an Fridays for Future war ein positiver Prädiktor sowohl für das Nachhaltigkeitswissen als auch für die Einstellungen und das Verhalten der Schüler\*innen. Außerschulische Lernumwelten (z. B. Freundeskreise, Familie, soziale Medien) haben im Jugendalter einen starken Einfluss, so dass die Wirksamkeit schulischer BNE beschränkt sein könnte.
  + BUGEN Attitude
    - Attitude: According to previous research, younger children also tend to have a higher environmental attitude than older children (Krettenauer, 2017; Leeming et  al., 1995; Liefländer et  al., 2013).
    - BUGEN: attitude went down
      * Die durchschnittliche Schulnote, die nachhaltigkeitsbezogenen Einstellungen zu Beginn des Schuljahres, die Teilnahme an Fridays for Future, die Kenntnis des Begriffs Nachhaltigkeit und die Jahrgangsstufe stellten jedoch weiter signifikante Prädikatoren auch der nachhaltigkeitsbezogenen Einstellungen dar. Die Schulformen standen dagegen in keinem statistisch bedeutsamen Zusammenhang mit der Entwicklung der nachhaltigkeitsbezogenen Einstellungen innerhalb eines Schuljahres.
      * Auf Lehrkräfteebene konnten das berichtete Umwelt- und Nachhaltigkeitsbewusstsein der Lehrkraft und die BNE-Fortbildungen – jedoch beide erwartungswidrig in negativer Richtung – als signifikante Prädiktoren für die nachhaltigkeitsbezogenen Einstellungen ermittelt warden
      * , lässt sich auch nur vermuten, dass es bei den Schüler/-innen bei zu pointierten Äußerungen bezüglich des eigenen Umwelt- und Nachhaltigkeitsbewusstsein seitens der Lehrkraft möglicherweise zu einer Reaktanz (d.h. einer Art innerer Widerstand) in der eigenen Einstellung kommen könnte.
  + BUGEN behaviour
    - Die durchschnittliche Schulnote, das von den Schüler/- innen zu Beginn des Schuljahres berichtete Nachhaltigkeitsverhalten und die Teilnahme an Fridays for Future stellten signifikante Prädiktoren dar.
    - Auf Lehrkräfteebene wurden der persönliche Stellenwert der BNE und die Anzahl von besuchten BNE-Fortbildungen als negative(!) signifikante Prädiktoren, die Selbstwirksamkeitseinstellungen in Bezug auf BNE jedoch als positiver signifikanter Prädikator für das selbstberichte nachhaltigkeitsbezogene Verhalten der Schüler/-innen ermittelt.
  + Auseinandersetzung ohne SW-Erfahrung führt zu Abfall (Klima-Emotionen 🡪 importance whole-institution approach; Stellenwert BNE an Schule (Whole School Approach!)
  + Influence of teachers (REF WALTNER) 🡪 high environmental consciousness( importance BNE 🡪 less succesful (Reaktanz der SuS?)// Bereits in anderen Studien wurde nachgewiesen, dass ein pluralistischer Zugang, also die Diskussion vielfältiger Sichtweisen anstatt der Präsentation einer „richtigen“ Meinung im Kontext nachhaltiger Entwicklung, einen positiven Effekt auf das Verhalten der Lernenden hat (Boeve-de Pauw et al., 2015).
* Other determining factors of the study
  + Schulform? In der wissenschaftli-chen Literatur wird diese Verbindung zwischen BNE und Montessori bereits untersucht (vgl. Howaida Sayed, 2017; Lewis, 2012).
* My findings highlight that
  + Importance design SC measurement (ESD research can benefit Using empirical, long-term data) +
  + Importance design ESD intervention (to reach whom, with what impact, external conditions as well)

## Sustainability competencies as sustainability attitude and sustainability behaviour (based on TPB) and self-efficacy beliefs (Research Question 2a/b)

### Validation for SA and SB (based on TPB) and self-efficacy beliefs (Research Question 2a)

I found a strong relationship between the scales used to capture sustainability competences with the underlying construct of the theory of planned behaviour and the underlying construct of (individual) self-efficacy beliefs(Figure XX). That indicates that they are capturing the same latent construct of sustainability competencies. This can be further emphasised if one considers the participation in the “expert group” as real-life behaviour. The question was asked in a simple dichotomous way, whether the students participated in the group (Kaiser). The data showed that the students of the involved group had higher sustainability intentions and behavioural intentions based on the TPB-scale (Figure XX) in the first measurement than the students in the control group. So one interpretation could be, that the higher intentions including behavioural ones) resulted in real-life behaviour, as the students expressed real-life behaviour by joining the group. The question remains in how far socially desirable answers played a role, as even for the first measurement point, the students perceived themselves as being part of the group, even if it had not started yet.Potentially, this could be considered as a validation for the TPB-scale through prediction of impact-relevant behaviour. To my knowledge in the literature, I found no validation processes for either of these two scales. Given, on the one hand, the validation of the TPB-based scale through prediction of impact-relevant behaviour and thereby also a first step in the validation of the self-efficacy beliefs scale, and on the other hand, the already mentioned limitations of this scale regarding its usefulness for students, the interesting implication arises about the potential extension of sustainability competencies as self-efficacy beliefs and their usefulness and relevance.

* + On the other hand, our findings also provide support for the Campbell paradigm (see Kaiser et al., 2010) – in this paradigm, personal attitudes can be derived from verbal acts, such as expressions of appreciation for the environment and self-reports of past engagement in environmentally friendly behaviors (Kaiser et al., 2018). Our findings also show that it is not relevant with which specific items a latent attitude is assessed but that any number of reasonably well-phrased behavioral or verbal selfreports which are aimed at the attitude object in question can be used to infer the underlying. This supports the call for a higher priority of specific objectivity within the validation criteria for measurements in general (for a detailed account, see Kaiser et al., 2018).
  + As a consequence, the competency differences which were assessed with this measurement instrument could point toward meaningful differences between the students which may have an actual impact on their future behavior.

### Sustainability competencies as self-efficacy beliefs and level of involvement (Research Question 2b)

**Why is measuring collective efficacy so interesting and relevant? How can it be increased? What are the links between individual and collective efficacy 🡪 implications for ESD design**

* **Implications for findings, and measurement and ESD design**

For discussion individual/ collective

* Focus on collective agents 🡪 inhowfar sucessfull here or not?
* TPB-based survey only on private sphere action
* Relation to ESD intervention has not been researched yet, but interesting to understand how collective efficacy could be increased (🡪 other term?)
* Importance of group size and group cohesion (not in intro yet!)

For discussion aim/action

* Feedback from environment and connection to difficulty of task
* If action focussed lower than more connected to actual behavioral costs, also going together with campbell paradigm (and steps to overcome knowledge/intention-behaviour gap) 🡪 could indicate actual constraints
* Makes sense that aim focussed higher, because probable desirability of aim higher. Making question methodological of relevancy proposed actions and/or barriers from outside
* Aim content not so relevant for control group – bridge to normative element and enabling people to work together no matter what normative goal?

Methodological: Need to check for desirability of aim, relevance group/actions asked in pilot test in future? Showing importance structural barriers + also to inform ESD design   
🡪 importance collective efficacy (as it also includes structural barriers)

Connection to my results

* Here: desirability of the aim not relevant for control group (considered because of framing of questions?), neither action
* Design not matching to collective efficacy (structural barriers) or not known in this context

I found mixed results regarding the level of involvement of the students and the differentiated self-efficacy beliefs. Contrary to my predictions, I uncovered no differences between individual and collective self-efficacy beliefs within and between the involved and the control group (Figure XX). Although all the mean scores, including the ones of the control group, were very similar, interestingly, I found that for the involved group, the individual self-efficacy beliefs were higher than the collective self-efficacy beliefs (despite no statistically significant differences). In line with my predictions, I found that the involved students reported higher action- and aim focussed self-efficacy beliefs (Figure XX), the aim-focussed being statistically significantly higher than the control group (Figure XX). Regarding the differentiation between individual and collective self-efficacy beliefs and the non-existent differences within and between the groups, methodological questions arise about the relevance of the chosen group and the desirability of the aims asked in the survey. The advantage of differentiation, being the option to self-categorise the agent, is slightly undermined by the fact, that in a quantitative survey without a pilot study, the relevant self-categorisations could not be found out. Other studies have found reciprocal reinforcement of individual and collective self-efficacy beliefs. individuals can derive personal benefits (e.g., self-efficacy beliefs) from social groups because groups can make them feel personally capable and in control [[**31**](https://www.mdpi.com/2071-1050/9/2/200#B31-sustainability-09-00200),[**32**](https://www.mdpi.com/2071-1050/9/2/200#B32-sustainability-09-00200)]). In fact, Jugert et al. [[**12**](https://www.mdpi.com/2071-1050/9/2/200#B12-sustainability-09-00200)] could show that through collective efficacy, individuals came to feel in control of their outcomes: People’s intention to act was enhanced through providing a sense of efficacy transferred from the group to the self. Similarly, using a qualitative research approach, Cocking and Drury [[**11**](https://www.mdpi.com/2071-1050/9/2/200#B11-sustainability-09-00200)] found that collective efficacy led to a feeling of personal empowerment. Thus, with collective and self-efficacy being strong and closely intertwined predictors of pro-environmental action.

Nevertheless, the very few existent studies that applied this differentiation between individual and collective efficacy beliefs found that collective efficacy was significantly stronger, when the task difficulty was intermediate – rather than easy or difficult. Furthermore, *through specific collective and self-efficacy perceptions, sustainable intentions were gauged—even when controlling for attitudes and social norms, suggesting collective efficacy beliefs to be particularly relevant for attaining environmental goals (REESE, JUNGE). Second, behaviors that are easy usually have a weaker environmental impact per se. It is likely that people believe actions that are too easy (e.g., refraining from plastic bags) to be unlikely to make a big difference in environmental issues, even if they are collectively practiced. In other words, when actions are too easy, the (potential) success may not translate into feeling collectively efficacious. In short, this suggests that efficacy beliefs would be strongest for medium difficulty tasks. However, for research on spillover effects (for a review, see [47]), it is helpful to know that task difficulty of a topic-specific challenge (as in our case, a plastic reduction task) can also increase general collective efficacy beliefs that might in turn enhance pro-environmental behavior in other domains—a finding in line with [26], who show that self-efficacy beliefs mediate between less difficult and more difficult behaviors. Our findings nicely complement this research, suggesting that such spill-over can also be mediated via collective efficacy beliefs.*This could be an indication, that the aim of making the school emit less CO2 emissions, led by a student initiative was considered too difficult a task by the students.

* And desirability of aim?
  + - * Reese and Jung suggest that agent-action-aim better predictor for more concrete intentions, whether agent-aim of more general
      * Actions and aims should and can! be adapted to outcome variables (which is the category of interest?)
      * Distinguish action- and aim links
        + Combining actions that are very concrete
        + With very abstract collective aims
        + With ingroup no agent-action
      * Similarly, the question arises whether these types of efficacy beliefs share the same relation to other constructs (predictors, outcomes, or moderators of relationships). We hypothesize that agent-action self-efficacy might be more connected to actual behavioural costs, socioeconomic circumstances, and impactful behaviour, whereas agent-aim self-efficacy might be more closely related to attitudes, goals, visions, and intentional behaviour (see [Bain et al., 2013](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr19-10888683231178056); [Bamberg & Rees, 2015](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr23-10888683231178056)). As perceived behavioural control in the theory of planned behaviour ([Ajzen, 1991](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr6-10888683231178056)) predicts intention but also moderates intention-outcome relations, we suspect that the same might be true for action-focused self-efficacy.
      * Action-focused self-efficacy is therefore likely to capture actual constraints such as time, money, or social resources that may prevent a person from following through on their intention. However, aim-focused self-efficacy is less related to these constraints and more involved in the formation of an intention. Thus, a key difference between action- and aim-focused self-efficacy may be that the former moderates intention-behavior relations while the latter does not. Connected to this, future research could also explore whether aim-focused self-efficacy is based on less rational thought and more emotional reaction than action-focused self-efficacy, which would explain why analytic interventions have been rather unsuccessful in manipulating it (see [Hornsey et al., 2021](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr163-10888683231178056)).
      * + Campbell: Within the Campbell paradigm, a person’s attitude becomes transparent in the amount of behavioral cost said person is willing to overcome in order to pursue their goal (Byrka et al., 2017).
      * as research shows that collective efficacy highest, when medium task 🡪 maybe too difficult?  
        🡪 link to climate anxiety and structural barriers!

Climate anxiety

Supporting H4, the less satisfaction of their basic psychological needs for autonomy,

competence, and relatedness people experienced, the more climate anxiety they reported.

Our result is in line with the theoretical underpinnings of self-determination theory (Deci

& R.M. Ryan 2000) and replicates previous findings on need frustration and anxiety (Hal-

vari et al. 2019; S. Ryan & McGuire 2016), worry (Howell & Sweeny 2019), and depres-

siveness (Heissel et al. 2018).

NEEDS AND ASPIRATIONS

Self-determination theory (Deci & R.M. Ryan 2000; R.M. Ryan & Deci 2017) is a human-

istic, organismic-dialectical theory of human motivation. It proposes that the universal,

innate basic psychological needs for relatedness (belonging), competence (efficacy), and

autonomy (self-determination) have to be satisfied to experience mental health and well-

being and to cope with stressors and threat proactively. People whose basic psychologi-

cal needs are satisfied are more likely to act pro-environmentally (see Wullenkord (2020)

for an overview). Need frustration is, in contrast, associated with inner conflicts, reduced

human functioning, ill-being, and defensiveness (Benita et al. 2019; Heissel et al. 2018;

Hodgins et al. 2006; R.M. Ryan & Deci 2017; Vansteenkiste & R.M. Ryan 2013). For

example, first findings in the climate context suggest that basic psychological need frustra-

tion is associated with climate denial (Wullenkord 2019). Severe and ongoing need frus-

tration can lead to non-optimal human functioning and psychopathology (Deci & R.M.

Ryan 2000). 🡪 support found

* Inform ESD design: Limited empirical data available, but having more could have interesting practical implications
* Different results regarding predictive power of the links  
  🡪Finally, we believe that distinguishing efficacy is also relevant from a more practical perspective. Distinguishing links between agents, actions, and aims enables better predictions about which characteristics of self-efficacy make it more or less predictive of relevant social and environmental outcome variables. Such detailed knowledge is needed, for example, in campaign design, political decisions, and team building in groups working against social and ecological injustice. Then again, in our own practical work with environmental and social rights activists (e.g., in workshops, lectures, counseling), we noticed that it is not intuitive for practitioners to make the above-mentioned distinctions. Responding to this, researchers could use the triple-A framework to practically integrate self-efficacy links into one overarching framework that simultaneously allows for a more nuanced research overview when it comes to practical counseling and advice.

Is somewhat integrated barriers from the outside? Aim is more desirable of involved group, but actions do not seem promising

* Difficulty of task 🡪 changing sth for school as expert group, too difficult or maybe also decreased after nothing happened? 🡪 considering structural factors as well!
  + Policy implications. The trade-off between responses to more or less difficult tasks and perceived (collective) efficacy is informative for policy making as it shows that people may more easily engage in behaviours that cost little but feel more efficacious through performing somewhat more difficult behaviours.
  + For collective aims, the hardest part is not performing an action as such (e.g., going to a protest) but creating social change *with* this action. Individuals only have a very limited amount of control over collective outcomes ([Hornsey et al., 2021](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr163-10888683231178056); [Jugert et al., 2016](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr183-10888683231178056)). Moreover, many barriers lie outside of the individual and are informed by the actions of powerful others; feedback is much more difficult to receive as aims are rather distal (e.g., the impact of an awareness campaign on people’s opinions is difficult to detect; [Hornsey et al., 2021](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr163-10888683231178056)).

Normative dimensions asking about self-efficacy beliefs, but also need for research on actual shifts in power (Findings highlight when/if differentiation is useful/ complementary as SC)

Normative dimension

Solutions to environmental problems are multifaceted; private-sphere proenvironmental behavior refers to the purchase, use, and disposal of personal and household products that have [environmental impacts](https://www.sciencedirect.com/topics/social-sciences/human-activities-effects), whereas public-sphere proenvironmental behavior refers to environmental citizenship as well as the support and acceptance of public policies ([Stern, 2000](https://www.sciencedirect.com/science/article/pii/S0272494415000237?via%3Dihub" \l "bib55)). Private actions are limited in addressing environmental problems unless combined in joint efforts for collective public change. According to [Bandura (1997)](https://www.sciencedirect.com/science/article/pii/S0272494415000237?via%3Dihub" \l "bib9), self-efficacy is strengthened when people master the specific skills required to engage in proenvironmental behavior and are verbally persuaded of their ability to perform such behavior. These sources of self-efficacy can be effective when people judge the effectiveness of proenvironmental behavior of their own groups. Therefore, if a group successfully masters a particular task and receives positive feedback about its proenvironmental performance, [group members](https://www.sciencedirect.com/topics/social-sciences/group-members) might be stronger in their belief that they can produce the desired results. A commitment to collective efforts is required to instill the belief in people that their actions can [influence](https://www.sciencedirect.com/topics/social-sciences/influencer) their surroundings; thus, people can become more willing to engage in proenvironmental behavior. (CHEN)

* Somewhat includes structural barriers
* Integrate self-efficacy research into SC research: linking the aim of BNE to self-efficacy framework (wanting collective action as outcome?)
* Field of collective social and ecological aims is especially prone to aim-fiocussed understanding of self-efficacy because it fits complex nature of collective crisis (Zomeren,2019)
* Collective efficacy was better predictor of pro-evironmental behaviour than self-efficacy ((M-F Chen, 2015)
* While self-efficacy theory strongly focuses on the need for efficacy (competence), self-determination theory ascribes equal importance to all basic psychological needs (i.e., competence, autonomy, and relatedness), assumes that meeting these needs is intrinsically satisfying ([Elliot et al., 2001](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr109-10888683231178056)), and emphasizes the important role of autonomy for human agency ([Chirkov et al., 2011](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr73-10888683231178056)). Rather than looking at aim strength, self-determination theory distinguishes different qualities of motivation (e.g., [Ryan & Deci, 2017](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr282-10888683231178056)). Based on this, we define perceived agency as the belief that a self-categorized agent can perform a *self-determined* action toward an *autonomous* aim.
* Thereby, it raises the question of where actual agency for collective social and ecological aims is situated ([Louis, La Macchia, et al., 2016](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr227-10888683231178056)). At this point, our reasoning reaches the boundaries of self-efficacy theory and the triple-A framework and enters the realm of actual (and not only perceived) agency that we believe [Bandura (1997)](https://journals.sagepub.com/doi/10.1177/10888683231178056#bibr28-10888683231178056) also wanted to call attention to. In terms of the triple-A framework, agency thus would not only include agent-action-aim *perceptions* but embrace actual agent-action-outcome *influences*.
* Implications
  + Methodological: Need to check for desirability of aim, relevance group/actions asked in pilot test in future? But also to inform ESD design
  + Is somewhat integrated barriers from the outside? Aim is more desirable of involved group, but actions do not seem promising
  + Normative dimensions asking about self-efficacy beliefs, but also need for research on actual shifts in power
    - Findings highlight when/if differentiation is useful/ complementary as SC?

Match of potential goal of ESD and self-efficacy beliefs (normative, collective, aim-focussed)

## Study limitations

“Analyses of biodiversity change can be limited by insufficient and imbalanced taxonomic, spatial and temporal data.”

* Applicability in other contexts (Cultural etc)
* Limitations (DISCUSSION?)
  + Furthermore, we propose the distinction of three efficacy links (agent-action, agent-aim, agent-action-aim) based on operationalizations and labeling decisions. However, strong empirical evidence for such a distinction and possible moderators of the relation between various efficacy links is still missing. It remains a task for future research to investigate how interdependent these facets of self-efficacy actually are under which circumstances. Therefore, the triple-A framework should be understood as a theoretical proposition that conceptually fleshes out what is already practiced, highlights previously overlooked research questions, and helps researchers make more strategic decisions in the study of efficacy beliefs.
  + Constraints to generality

## Future directions

* the dominant form of assessment of impact from the educational intervention utilised quantitative measures, such as a pre/post survey or questionnaire, essentially reflecting a positivist epistemology.
* are forms of assessment employed relevant and appropriate? (epistemologically)
* A performance measurement approach to project management insists on the inclusion and development of indicators of expected change, assessment of baseline, stated targets and validation tools to provide evidence of change. This results-orientated approach emphasises efficiency and accountability in public spending, with clearly defined outputs, and results demonstrating value for money. (Oflaherty, Liddy, 2018)
* Consequently the development of indicators and outcomes is more complex and relates to the researcher/educators’ definition of development education, as addressed earlier. This product outcome focus misses the distinctiveness of DE/ESD/GCED, where the learning outcomes may be in the form of questioning and activism, rather than immediate or short-term goals.

On a policy level, the development of further indicators (see for example [[**114**](https://www.mdpi.com/2071-1050/11/6/1717#B114-sustainability-11-01717),[**115**](https://www.mdpi.com/2071-1050/11/6/1717#B115-sustainability-11-01717)]), or the evaluation of ESD programs (see for example [[**13**](https://www.mdpi.com/2071-1050/11/6/1717#B13-sustainability-11-01717),[**116**](https://www.mdpi.com/2071-1050/11/6/1717#B116-sustainability-11-01717)]), seem like helpful supplements to foster future steps and crucial insights in the implementation process of programs that aim to promote learner competencies to build a sustainable future.