

Deriving an Associative Framework: Relating Individual Values to the SDGs

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Abstract

This study assessed which Sustainable Development Goals (SDGs) students at German and Dutch universities perceive as the most important. According to the *Refined Theory of Basic Individual Values*, the study also examined which specific value priorities are associated with increased attributed importance to each specific SDG. For the furtherance of these assessments, a total of 179 students from Dutch and German universities participated in this online survey study. Herein, the results illustrated that students perceive *SDG 2 Zero Hunger* as well as *SDG 6 Clean Water and Sanitation* as the most important SDGs. Moreover, correlation and regression analyses illustrated distinct significant associations between specific values and the attributed importance to 15 of the 17 SDGs. Accordingly, the study derived a comprehensive model, thereby illustrating and rationalising the detected associations between each SDG and the respective values. Based on these results, this study raised multiple practical implications revolving around a two-fold strategy which businesses can apply to increase the value-congruence between their target SDGs and their future employees. Such strategy first features businesses to align their target SDGs to those that students perceive as most important, and second, to hire individuals whose value priorities are congruent with the values linked to increased attributed importance to the specific target SDGs.

Introduction

Given the detrimental impact of global issues such as climate change and poverty, the United Nations' Sustainable Development Goals (SDGs) might be the most important set of global goals ever composed. The SDGs feature 17 goals that set the blueprint for how humanity, on a global level, can achieve an improved and, more importantly, a sustainable future for all (United Nations, 2023b). Herein, specific sub-goals or so-called targets underlie each SDG, aiming to make their attainment more measurable. Of crucial importance to attaining the SDGs and their subgoals are companies and businesses. Prahalad and Stuart (2002) go as far as describing only the business sector as able to pursue global sustainability successfully, given its ability to simultaneously emphasize both social and economic improvement. Accordingly, companies such as Phillips and KLM participate in the United Nations' (UN) endeavour by identifying target SDGs to which attainment their companies can contribute (Hope, 2022; Phillips, 2021). In this regard, the corporate decision-making of individuals within such companies is one of the critical components that ultimately determines whether companies achieve their target SDGs (McKinsey & Company, 2019). Therefore, gaining insight into determinants that underlie individual corporate behaviour is imperative (Wood, 1991).

Notably, individual values act as such determinants. For instance, research links individual values to underlie both sustainable cooperate behaviour (Fryxell & Lo 2003) and even cooperate behaviour directly related to the SDGs (Fleming et al. 2017). Of similar significance are values also in determining the degree of compatibility between a company and a prospective worker (Dos Santos & Domenico, 2015). Accordingly, research reports that increased value congruence, meaning an enhanced resemblance between an individual's own value priorities and those valued or expressed by an organisation, leads to greater job satisfaction, job engagement and job performance (Andersson et al., 2017; Kristof-Brown et al., 2005). Thus, in the context of actually attaining a company's target SDGs, it is likely tremendously beneficial if the value priorities of employees are in congruence with those that underlie a high sense of attributed importance to the respective companies' target SDGs.

Considering previous research, companies can derive a two-fold strategy to enhance such value congruence. Firstly, in the context of Kristof-Brown et al.'s (2005) findings, it could prove to be crucial for Human Resource (HR) departments to hire individuals whose value priorities are in congruence with those related to high attributed importance to the companies' target SDGs. Secondly, a company could also improve their employees' SDG-related congruence by aligning their target SDGs to those that their workers and stakeholders

view as the most important (Yamane & Kaneko, 2022). One of the essential stakeholders are hereby students, who, as the future generation of individual workers and managers, will significantly impact the achievement of companies' target SDGs (Kleespies & Dierkes, 2018).

However, in both instances, the scientific literature is incredibly scarce. On the one hand, regarding the second part of the strategy, there has been a lack of studies assessing the importance that students attribute to each specific SDG (Kleespies & Dierkes, 2018). Thus, the first research question this paper aims to answer is: Which specific SDGs do students perceive as the most important? Based on the answer to this research question, this study aims to derive valuable insight into which specific SDGs students evaluate as the most important to thus fulfil the Kleespies and Dierkes (2018) highlighted literature gap.

On the other hand, no research exists that proposes a scientific framework that comprehensively models which value priorities are linked to the increased attributed importance of each respective SDG. Similarly, a guideline for hiring personnel in the context of the SDGs is hence also missing. Thus, this paper's second research question is: Which values are associated with increased attributed importance to each respective SDG? Based on the answer to this research question, the study aims to derive a comprehensive theoretical model depicting such associations. The model and the thereof resulting insight can then support HR departments in hiring individuals whose value priorities are congruent with the firm's target SDGs. Further, this model can also be of relevance in other domains that thematise value congruency and the SDGs, given the two constructs' relevance within other disciplines (Voola et al., 2022).

Theoretical Framework

Values

Individual values can hereby be defined as “trans-situational goals, varying in importance, which serve as guiding principles in the life of a person or group” (Schwartz, 2017, p. 52). More specifically, values act as the fundamental motivators of human behaviour as they make up individuals' goals and guide them towards such (Locke, 1991). Accordingly, numerous research refers to individual values as valid predictors of realised behaviour (Schwartz & Butenko, 2014; Schwartz et al., 2017). The most widely used model regarding individual values is hereby Schwartz's *Theory of Basic Human Values* (1992). Notably, according to Schwartz (2012), each individual possesses a distinct set of value priorities which drive their behaviour. Within these value priorities, values assume an order determined by their relative importance to one another. The model itself differentiates between ten basic

values and categorises them into four higher-order values namely: *Self-Transcendence*, *Openness to Change*, *Self-Enhancement*, and *Conservation*. Moreover, the model is also internally consistent, meaning that the motivations underlying each value are continuous and related (Schwartz, 1992). This results in a circular structure (see Figure 1). In this regard, Schwartz (1992) describes values that are located opposite of each other as incompatible, meaning they tend to be negatively correlated. Contrastingly, adjacency between value types depicts increased overlap as well as compatibility and thus results in an increased sense of correlation.

Figure 1

Circular Model of the Refined Theory of Basic Individual Values



Note. The outer bound depicts the four higher-order values, whereas the next bound depicts the 10 basic values, followed by the 19 refined values. Adapted from "Measuring the Refined Theory of Individual Values in 49 Cultural Groups: Psychometrics of the Revised Portrait Value Questionnaire," by S.H. Schwartz and J. Cieciuch, 2021, *Assessment*, 29, p. 1006.

Moreover, Schwartz et al. (2012) also published the *Refined Theory of Basic Individual Values*, which comprises the same circular model featuring the same basic- and overarching values but additionally possesses 19 "more narrowly defined values" (Schwartz et al., 2012). These refined values further differentiate between six of the original ten basic values. Figure 1 illustrates all values and the aforementioned circular structure, whereas Appendix A entails the definition of each respective refined value.

Moreover, research has since assessed the psychometric properties of the refined model and concluded that most-to-all values are indeed reliably and validly measurable (Schwartz & Cieciuch, 2021). In fact, Schwartz et al. (2017) found that such further differentiation of Schwartz's (1992) original continuum into more distinct sets of values increased the model's overall heuristic and predictive power. Notably, according to Schwartz & Cieciuch (2021), such improvements were especially relevant concerning the further differentiation of the higher-order value *Self-Transcendence*, and more specifically, its basic values, *Universalism* and *Benevolence*, into its six underlying refined values. This is especially important for increasing the model's discriminative validity in the context of the SDGs since research links a high-value priority of *Self-Transcendence* values to underlie many different types of sustainable behaviours (Pagliuca et al. 2022; See et al. 2019; Sharma & Jha 2017). Research supports the applicability of Schwartz's basic model to assess value congruence between employees or other stakeholders and an organisation (Arcieniega et al. 2017; Cohen, 2009; De Clercq et al. 2008). Nevertheless, De Clercq et al. (2008) suggested that further differentiation within the basic value model would increase the models' discriminative validity in this regard. Conclusively, in order to establish a greater and more distinct discriminant validity, Schwartz et al.'s (2012) refined value model seems to be the most suitable theoretical framework to consider since this paper thematises both value congruency in organisations and the SDGs.

Attributed Importance to SDGs

How the SDGs are viewed and evaluated by the general population, especially students, is crucial, as they carry the main responsibility to actually attain the SDGs (Kleespies & Dierkes 2018). In this regard, reports assessed the attributed importance to the SDGs by the Dutch and German general population (Ipsos, 2021). Herein the general population of both countries perceived *SDG 2 Zero Hunger*, *SDG 3 Good Health and Well-being* as well as *SDG 1 No Poverty* as the three most important.

However, since students are often especially aware of climate change and other environmental matters, their attributed importance to the SDGs can deviate from the general population's opinion. For instance, surveys from the National Union of Students (2019) found that students within the UK, unlike the general population, perceived *SDG 13 Climate Action* as the most important SDG. This is also consistent with the student population in Germany. Accordingly, Klesspies and Dierkes (2018) reported that German students perceive the SDGs related to climate change as more important than those categorised as socially or economically oriented. Although Klesspies and Dierkes's (2018) results present themselves as

a base for further propositions, the study did not assess students' attributed importance to each singular SDG. Instead, the authors divided the SDGs into three clusters, namely a social, an economic, and an environmental one, and examined which cluster the students attributed the most importance to.

In other words, more specific knowledge regarding the importance that German and Dutch students attribute towards each specific SDG is still needed. Accordingly, in regard to this study's first research question and based on the indicative findings of Klesspies and Dierkes (2018), the first hypothesis (H1a) thus states that *SDG 13 Climate Action* is the most important SDG in the eyes of students, studying at German and Dutch universities.

Attributed Importance to SDGs and Schwartz's Values: Deriving a Hypothesised Model

Despite the scientific gap concerning a comprehensive theoretical framework, some scientific literature does link specific SDG-related attitudes and behaviours to distinct values of Schwartz's model (Corner et al., 2014; Schwartz and Rubel-Lifschitz, 2009; Sharma & Jha, 2017). Thus, contextualising the SDGs within existing literature and the refined value model (Schwartz et al., 2012) allows for the composition of preliminary theoretical links between the refined values and the attributed importance to SDGs. Consequently, the following paragraphs introduce a literature-based model linking the attributed importance of each singular SDG to specific values. The hypothesised model consists of 17 hypotheses (i.e., indicated as H1b to H17; see Table 1 for a complete overview).

SDG 1 No Poverty, SDG 2 Zero Hunger, SDG 3 Good Health and Well-being, SDG 4 Quality Education, and SDG 6 Clean Water and Sanitation

Schwartz et al.'s (2012) conceptualisation of the refined values *Universalism-Concern* and *Security-Societal* enables crucial insight relevant to all of *SDG 1* to *SDG 4* and *SDG 6*. Herein, the authors associate *Universalism-Concern* with cherishing all people's welfare, while *Security-Societal* conceptually comprises valuing societal safety and stability (Schwartz et al., 2012). These value priorities' conceptualisations indicate an individual's prioritisation of necessary and basic needs that ensure societal safety and welfare. In turn, this greatly aligns with the aims of the respective SDGs that revolve around minimising poverty and hunger while maximising well-being, education and clean water for all. Thus, H1b, H2, H3, H4 and H6 proclaim the values *Universalism-Concern* and *Security-Societal* to be associated with increased attributed importance to *SDG 1*, *SDG 2*, *SDG 3*, *SDG 4*, as well as *SDG 6*, respectively.

SDG 5 Gender Equality & SDG 10 Less Inequality

Relevant to *SDG 5* as well as *SDG 10*, Schwartz and Rubel-Lifschitz (2009) pointed out that a value priority of *Universalism* is especially prevalent in countries with superior gender equality. More specifically, Schwartz et al. (2012) cited the value priority *Universalism-Concern* to be associated with heightened dedication to equality on a general scale. In the context of these findings as well as the definition given in Schwartz et al.'s (2012) refined value theory, H5 and H10 thus project the value *Universalism-Concern* to be associated with increased attributed importance to *SDG 5* and *SDG 10*, respectively.

SDG 7 Affordable and Clean Energy & SDG 11 Sustainable Cities and Communities

In relation to *SDG 7* and *SDG 11*, Pagliuca et al. (2022) found *Self-Transcendent* values, including *Universalism*, to be associated with a strong preference for solar energy. More specifically, the emphasis of both goals to use sustainable technology to lessen the impact on the natural environment therein greatly aligns with the more refined value *Universalism-Nature*. Similarly, research also demonstrates a link between *Self-Direction* values and the acceptance as well as the implementation of clean energy solutions and even the use of electric cars (Axsen & Kurani, 2013). Such preference, acceptance and usage of clean energy alternatives are essential targets for attaining both SDGs. Hence in alignment with these findings and Schwartz et al.'s (2012) refined value theory, H7 and H11 insinuate that the values *Universalism-Nature*, *Self-Direction-Thought* and *Self-Direction-Action* are all associated with increased attributed importance to both *SDG 7* as well as *SDG 11*, respectively.

SDG 8 Decent work and economic growth & SDG 9 Industry, Innovation and Infrastructure

Related to *SDG 8*, research linked the value *Achievement* to prioritising economic growth (Granato et al., 1996). Similarly, multiple studies linked the value *Achievement* to the actual implementation of changes and innovation within both work- as well industrial- settings, which aligns with the main thematic of *SDG 9* (Eva et al., 2017; Pandey & Tewary, 1979). Therefore, in the context of Schwartz et al.'s (2012) refined value model and according to the stated findings, H8 and H9 proclaim that the value *Achievement* is associated with increased attributed importance to both *SDG 8* as well as *SDG 9*.

SDG 12 Responsible Consumption and Production

Relevant to *SDG 12*, studies link sustainable consumption and production behaviour to a value priority of *Universalism* (Sharma & Jha, 2017; Carraciolo et al., 2015). Notably, according to the United Nations (2023a), most of *SDG 12*'s targets are directed at lessening the environmental impact of consumption and production (e.g. target 12.5: reduce waste

generation). Therefore, considering Schwartz et al.'s (2012) refined value model and based on the alluded-to research, H12 proposes that the value *Universalism-Nature* is associated with increased attributed importance to *SDG 12*.

SDG 13 Climate Action, SDG 14 Life under Water & SDG 15 Life on Land

In relation to *SDG 13*, *SDG 14* and *SDG 15*, Corner et al. (2014) underlined an association between a value priority of *Universalism* and the acceptance of pro-environmental policies. More specifically, the value *Universalism-Nature* was associated with an increased rate of pro-environmental actions (Skimina et al., 2019). Furthermore, concerning *SDG 14* and *15*, Cembalo et al.'s (2016) results indicate that *Universalism* is associated with a greater concern towards animal welfare. All findings abide with Schwartz et al.'s (2012) aforementioned definition of *Universalism-Nature*, which highlights the welfare of nature, therein also comprising the welfare of animals living in such. Thus, based on Skimina et al. (2019) and Cembalo et al.'s (2016) findings H13, H14, and H15 posit the value *Universalism-Nature* to be associated with increased attributed importance to *SDG 13*, *SDG 14* and *SDG 15*, respectively.

SDG 16 Peace, Justice and Strong Institutions & SDG 17 Partnership for Goals

Lastly, Tóth-Nagy et al. (2023) linked the value *Security* to *SDG 16* and *SDG 17*. Considering that aspects such as global peace, justice, and international partnerships are primarily wide-ranging societal concepts, both SDGs seem to align with *Security-Societal* and therein a striving towards ensuring safety on a macroscopic societal level (Schwartz et al., 2012). Accordingly, H16 and H17 proclaim the value *Security-Societal* to be associated with increased attributed importance to both *SDG 16* and *SDG 17*, respectively.

Table 1

Hypothesised model of SDG and the Refined Values

| Hypothesis | SDG | Hypothesised Refined Values |
|------------|--|---|
| H1b: | <i>SDG 1 No Poverty</i> | <i>Universalism-Concern Security-Societal</i> |
| H2: | <i>SDG 2 Zero Hunger</i> | <i>Universalism-Concern Security-Societal</i> |
| H3: | <i>SDG 3 Good Health and Well-being</i> | <i>Universalism-Concern Security-Societal</i> |
| H4: | <i>SDG 4 Quality Education</i> | <i>Universalism-Concern Security-Societal</i> |
| H5: | <i>SDG 5 Gender Equality</i> | <i>Universalism-Concern</i> |
| H6: | <i>SDG 6 Clean Water and Sanitation</i> | <i>Universalism-Concern Security-Societal</i> |
| H7: | <i>SDG 7 Affordable and Clean Energy</i> | <i>Universalism-Nature Self-Direction-Thought Self-Direction-Action</i> |
| H8: | <i>SDG 8 Decent work and economic growth</i> | <i>Achievement</i> |
| H9: | <i>SDG 9 Industry, Innovation and Infrastructure</i> | <i>Achievement</i> |
| H10: | <i>SDG 10 Less Inequality</i> | <i>Universalism-Concern</i> |
| H11: | <i>SDG 11 Sustainable Cities and Communities</i> | <i>Universalism-Nature Self-Direction-Thought Self-Direction-Action</i> |
| H12: | <i>SDG 12 Sustainable Consumption and Production</i> | <i>Universalism-Nature</i> |
| H13: | <i>SDG 13 Climate Action</i> | <i>Universalism-Nature</i> |
| H14: | <i>SDG 14 Life under Water</i> | <i>Universalism-Nature</i> |
| H15: | <i>SDG15 Life on Land</i> | <i>Universalism-Nature</i> |
| H16: | <i>SDG 16 Peace, Justice and Strong Institutions</i> | <i>Security-Societal</i> |
| H17: | <i>SDG 17 Partnership for Goals</i> | <i>Security-Societal</i> |

Note. Table depicts each of the 17 hypothesised links between each respective SDG and its associated values.

Methods

Participants

A total of 179 students voluntarily participated within this survey study ($M_{age} = 22.5$, $SD = 2.3$). The inclusion criteria of this study only necessitated participants to be enrolled students at either a German or a Dutch university. A three-fold opportunity sampling method was deemed the most reasonable data collection method as it enabled access to a sufficient number of participants in spite of the limited resources of this undergraduate study (Harrison

& Rentzelas, 2021). Firstly, the study was promoted on the University of Twente's *SONA* platform to recruit students from the Behavioural, Management, and Social Sciences (BMS) faculty. Secondly, the researcher contacted individuals who met the inclusion criteria directly through social media and asked them to participate. Thirdly, the study was also advertised on the participant-recruitment platform *SurveyCircle* (SurveyCircle, 2023).

Notably, upon completion of the study, students majoring in a programme of the University of Twente's BMS faculty were rewarded with 0.25 credits via the *SONA* platform. Similarly, participants that were recruited via *SurveyCircle* received credits in intra-platform currency. All other participants did not receive any compensation or reward for their participation. The BMS faculty's ethics committee of the University of Twente (No. 220174) granted this study's ethical approval, and the data collection itself was conducted in April of 2023.

Procedure

Prior to the start of data collection, a pilot test was conducted featuring five participants that filled out the survey to assess its comprehensibility. Overall, the results were satisfying, given that participants reported no comprehensibility issues and only reported minor typographical errors. Thus, following minimal adjustments in terms of wording, the survey was published. Participants who were enrolled students within the faculty of BMS at the University of Twente accessed the online survey through a link publicized on the *SONA* platform. Participants who were recruited via the *SurveyCircle* platform accessed the survey by means of a published link on said platform. The questionnaire itself was hosted on the *Qualtrics* webpage (Qualtrics, 2023). All other participants accessed the survey directly via a link sent to them by the researcher.

The opening statement was directly presented to the participants upon accessing the survey. It encompassed the study's purpose, the estimated completion time, and a notice stating that their data would be anonymised and treated confidentially. Following this, participants were asked to confirm their student status enabling a revalidation of their eligibility to participate in this study. Further, participants also indicated their gender. Next, participants read through a table depicting a concise one-sentence description of each SDG. After reading through the table, the participants indicated whether they understood the content of each SDG. Accordingly, within the survey's first main component, the participants were asked: "How important do you perceive each Sustainable Development Goal to be in relation to the others?" and thus, they proceeded to indicate their attributed importance to each SDG. After completion, the participants progressed to the survey's second main component, in

which they filled out Schwartz's (2021) *Revised Portrait Value Questionnaire*. At last, participants completed the survey's demographic section, which featured questions concerning their age, nationality, study major, and university.

Materials

As previously indicated, the survey utilised within this study comprised two main components in addition to the demographic section (see Appendix B for a complete version of the questionnaire).

Questionnaire on the Importance of the SDGs

The first main component of the survey intended to measure participants' attributed importance to each SDG. In accordance with Kleespies and Dierkes' questionnaire (2022), this component of the survey comprised 17 items, each depicting a singular SDGs' label and description akin to those given on the UN's webpage (United Nations, 2023b). While Kleespies and Dierkes (2022) asked students to rate each SDG on a five-point Likert scale ranging from unimportant to important, the study at hand slightly modified the authors' approach by applying a seven-point Likert scale, also ranging from unimportant to important. This modification was applied considering the recommendation of Taherdoost (2017) as well as the findings of Preston and Colman (2000), who demonstrated a higher degree of reliability, validity and discriminate power of seven-point Likert scales compared to five-point Likert scales. Such modification and thus increased psychometric properties were deemed appropriate, considering that this study's aim revolved around assessing differences in attributed importance in regard to each respective SDG.

Revised Portrait Value Questionnaire

The second main component of this study's survey comprised Schwartz's (2021) *Revised Portrait Value Questionnaire* (PVQ-RR), which aims to measure each participant's value priorities in accordance with Schwartz et al.'s (2012) refined value theory. Each of the PVQ-RR's 57 items describes a person of the same gender as the participant (Schwartz, 2021). Example items of the questionnaire comprise "It is important to him to have ambitions in life" as well as "It is important to her to care for nature". Male and female participants received hereby exactly the same items, with the only difference being the insertion of the suitable gender-related pronoun (e.g., "it is important to her to care for nature", "it is important to him to care for nature"). The questionnaire then features a six-point Likert scale ranging from "not like me at all" to "very much like me", through which the participant can then indicate to what extent the described person resembles themselves. Notably, the PVQ-RR was purposefully designed not to include the phrase "values" in its items to minimise any

social desirability bias (Schwartz and Cieciuch 2021). In the context of psychometric properties, Schwartz and Cieciuch (2021) rate the PVQ-RR as a reliable and valid measure for the four overarching values ($\alpha = 0.84$), the ten basic values ($\alpha = 0.76$) and nearly all 19 narrowly defined values ($\alpha = 0.70$).

Additionally, both main components of this study's survey included one so-called instructional manipulation check (i.e., "It is important to pay attention when filling out this survey, please select "Unimportant", if you read this") as such have been shown to increase the statistical power of a study by identifying participants who are giving their answers randomly (Oppenheimer et al., 2009). Further, all items within both survey components were randomised to prevent biases such as order effects (Malhotra, 2008). According to Dillman's (1978, p. 127) recommendation, the demographic part was installed at last.

Data Analysis

The application *RStudio* version 4.2.0 (RStudio Team, 2023) was used to analyse all data. The *R*-script of the complete analysis is embedded within Appendix C. Firstly, all non-eligible data entries were excluded from the data set, which also comprised the participants who failed the instructional manipulation check questions. In the context of the first research question, a multi-step descriptive analysis was conducted to assess which SDG the student sample perceived as the most important. Notably, each of the 17 SDG variables (e.g. *SDG 1*, *SDG 2*) measured the respective SDGs attributed importance, with one being the lowest and seven being the highest score. Hence, the first step of the analysis comprised deriving the means ($M_{importance}$) and standard deviations of the attributed importance to each of the 17 SDGs. Followingly, pairwise t-tests identified whether the SDG with the highest attributed importance differed significantly from the following SDGs.

In the context of the second research question, namely, which values underlie increased attributed importance to each SDG, a dual-step analysis based on Rodriguez et al.'s (2014) approach was conducted. In accordance with the authors' approach, the first step comprised running 17 correlation analyses, each featuring one of the 17 respective SDG variables and the centred value scores of all 19 values (Schwartz, 2016). This enabled the identification of values that significantly positively correlated with the respective SDG. Secondly, in the instances in which the linear assumptions were met, linear regressions were conducted featuring only values that significantly and positively correlated with the respective SDG (Rodriguez et al., 2014). The respective SDG variable served hereby as the dependent variable. By including only the values that positively and significantly correlated with the respective SDG, the number of independent variables was reduced, which is consistent with

Schwartz's (2016) suggestion amid his concerns regarding multicollinearity when all 19 values are included within one regression. The linear assumptions were fulfilled in the context of all but six cases in which solely the normality assumption was violated (*SDG 1*, *SDG 2*, *SDG 4*, *SDG 5*, *SDG 6*, and *SDG 13*). Hence, in these six instances, Rodriguez et al.'s (2014) approach was modified by applying generalised linear models (GLMs) instead of linear models. Such modification is in accordance with van den Berg's (2021) recommendation describing GLMs as a suitable alternative to linear regression models in cases in which solely the normality assumption is not met. For all analyses, the significance level (α) was set to .05.

Results

Attributed Importance of each SDG

In the context of the first research question, deriving and comparing the mean attributed importance of the 17 SDGs showed that the student sample attributed the highest mean importance to *SDG 2* ($M_{importance} = 6.42$, $SD = 0.94$) followed by *SDG 6* ($M_{importance} = 6.28$, $SD = 0.87$), *SDG 3* ($M_{importance} = 6.12$, $SD = 1.04$) as well as *SDG 13* ($M_{importance} = 6.12$, $SD = 0.20$). Subsequently, the results of a pairwise t-test illustrated that *SDG 2* did not significantly differ from *SDG 6* in terms of their attributed importance ($t(178) = 1.75$, $p = .082$). However, a significant difference existed between *SDG 2* and *SDG 3* ($t(178) = 3.17$, $p = .002$). Hence, regarding the first research question, *SDG 2 Zero Hunger* and *SDG 6 Clean Water and Sanitation* were thus jointly rated as the most important SDGs. Accordingly, H1a stating that students perceive *SDG 13* as the most important SDG, was rejected. Table 2 illustrates a summary of the SDGs ranked in descending order based on their mean attributed importance.

Table 2

SDGs ordered by their mean attributed importance

| SDG | Mean Importance | SD |
|--|-----------------|------|
| <i>SDG 2 Zero Hunger</i> | 6.42 | 0.94 |
| <i>SDG 6 Clean Water and Sanitation</i> | 6.28 | 0.87 |
| <i>SDG 13 Climate Action</i> | 6.12 | 1.20 |
| <i>SDG 3 Good Health and Well-being</i> | 6.12 | 1.04 |
| <i>SDG 4 Quality Education</i> | 6.11 | 1.05 |
| <i>SDG 1 No Poverty</i> | 5.98 | 1.20 |
| <i>SDG 15 Life on Land</i> | 5.81 | 1.10 |
| <i>SDG 16 Peace, Justice and Strong Institutions</i> | 5.73 | 1.12 |

| | | |
|--|------|------|
| <i>SDG 14 Life under Water</i> | 5.69 | 1.12 |
| <i>SDG 10 Less Inequality</i> | 5.65 | 1.39 |
| <i>SDG 7 Affordable and Clean Energy</i> | 5.64 | 1.13 |
| <i>SDG 12 Sustainable Consumption and Production</i> | 5.61 | 1.20 |
| <i>SDG 5 Gender Equality</i> | 5.55 | 1.50 |
| <i>SDG 11 Sustainable Cities and Communities</i> | 5.37 | 1.24 |
| <i>SDG 8 Decent work and economic growth</i> | 5.18 | 1.23 |
| <i>SDG 17 Partnership for Goals</i> | 4.77 | 1.50 |
| <i>SDG 9 Industry, Innovation and Infrastructure</i> | 4.70 | 1.27 |

Associations between the refined values and the attributed Importance to each SDG

Regarding the second research question that aims to assess which values underlie high attributed importance to each specific SDG, the following paragraphs present the results of both the correlational analyses and the regression models or, alternatively, the GLMs. Further, Table 3 illustrates a comprehensive representation of these findings.

SDG1 No Poverty

The results of the first correlation analysis revealed that the values *Humility* ($r = 0.25$, $p < .001$), *Security-Personal* ($r = 0.17$, $p = .020$), *Universalism-Concern* ($r = 0.24$, $p = .001$), *Conformity-Interpersonal* ($r = 0.20$, $p = .007$), as well as *Conformity-Rules* ($r = 0.17$, $p = .026$) displayed a significant positive correlation with the attributed importance to *SDG 1*. The results of the subsequent GLM illustrated that the values *Humility* ($\beta = 0.04$, $t(173) = 2.28$, $p = .024$, 95 % *CI* [0.01, 0.07]), *Security-Personal* ($\beta = 0.04$, $t(173) = 2.05$, $p = .042$, 95 % *CI* [0.03, 0.52]) and *Universalism-Concern* ($\beta = 0.72$, $t(173) = 3.55$, $p < .001$, 95 % *CI* [0.03, 0.11]) were significantly associated with the attributed importance to *SDG 1*. Accordingly, based on these findings, H1b, which stated that the values *Universalism-Concern* and *Security-Societal* are associated with increased attributed importance to *SDG 1*, was rejected.

SDG 2 Zero Hunger

The results of the second correlation analysis showed that the values *Benevolence-Caring* ($r = 0.19$, $p = .009$), *Security-Societal* ($r = 0.16$, $p = .035$), and *Universalism-Concern* ($r = 0.15$, $p = .044$) displayed a significant positive correlation with a high attributed importance score to *SDG 2*. Thereafter, the results of the ensuing GLM showed that the values *Benevolence-Caring* ($\beta = 0.03$, $t(175) = 2.19$, $p = .023$, 95 % *CI* [0.00, 0.07]), *Security-Societal* ($\beta = 0.02$, $t(175) = 1.98$, $p = .049$, 95 % *CI* [0.00, 0.04]) and *Universalism-Concern* ($\beta = 0.031$, $t(175) = 1.99$, $p = .048$, 95 % *CI* [0.00, 0.63]) were significantly associated with

the attributed importance of *SDG 2*. Therefore, H2, which proclaimed the values *Security-Societal* and *Universalism-Concern* to be associated with increased attributed importance to *SDG 2*, was refuted.

SDG3 Good Health and Well-being

The results of the third correlation analysis depicted no significant positive correlation between any of the values and the attributed importance to *SDG 3*. Therefore, H3, which proclaimed the values *Security-Societal* and *Universalism-Concern* to be associated with increased attributed importance to *SDG 3*, was rejected.

SDG 4 Quality Education

The results of the fourth correlation analysis displayed a significant positive correlation between the value *Security-Societal* ($r = 0.18, p = .014$) and the attributed importance to *SDG 4*. The results of the subsequent GLM indeed illustrated that the value *Security-Societal* ($\beta = 0.04, t(177) = 3.36, p < .001, 95\% \text{ CI } [0.02, 0.06]$) was significantly associated with the attributed importance to *SDG 4*. Thus, H4, which stated that the values *Universalism-Concern* and *Security-Societal* are associated with increased attributed importance to *SDG 4*, was rejected.

SDG 5 Gender Equality

The results of the fifth correlation analysis showed that the values *Universalism-Concern* ($r = 0.20, p = .006$) and *Conformity Interpersonal* ($r = 0.16, p = .037$) exhibited a significant positive correlation with the attributed importance to *SDG 5*. Subsequently, the following regression analysis ($R^2 = 0.10, F(2,176) = 10.41, p < .001$) displayed that both the values *Universalism-Concern* ($\beta = 0.51, t(176) = 3.52, p < .001, 95\% \text{ CI } [0.22, 0.80]$) and *Conformity-Interpersonal* ($\beta = 0.19, t(176) = 2.12, p = .04, 95\% \text{ CI } [0.01, 0.37]$) were significantly associated with the attributed importance to *SDG 5*. Accordingly, H5, which proposed that solely the value *Universalism-Concern* is associated with increased attributed importance to *SDG 5*, was rejected.

SDG 6 Clean Water and Sanitation

The results of the sixth correlation analysis depicted the values *Benevolence-Dependability* ($r = 0.22, p = .003$) and *Universalism-Concern* ($r = 0.15, p = .039$) to display a significant positive correlation with the attributed importance score to *SDG 6*. The following regression analysis ($R^2 = 0.06, F(2,176) = 6.65, p < .001$) depicted a significant association between the value *Benevolence-Dependability* ($\beta = 0.25, t(176) = 2.48, p = .014, 95\% \text{ CI } [0.05, 0.44]$) and the attributed importance to *SDG 6*. Hence, H6, which insinuated that the

values *Universalism-Concern* and *Security-Societal* are associated with increased attributed importance to *SDG 6*, was rejected.

SDG 7 Affordable and Clean Energy

The results of the seventh correlation analysis indicated the values *Universalism-Nature* ($r = 0.31, p < .001$) as well as *Humility* ($r = 0.19, p = .011$) to have a significant positive correlation with the attributed importance to *SDG 7*. The results of the subsequent regression analysis ($R^2 = 0.19, F(2,176) = 22.21, p < .001$) indicated that both the values *Universalism-Nature* ($\beta = 0.40, t(176) = 5.09, p < .001, 95\% \text{ CI } [0.25, 0.56]$) and *Humility* ($\beta = 0.25, t(176) = 2.76, p = .006, 95\% \text{ CI } [0.07, 0.40]$) were significantly associated with the attributed importance to *SDG 7*. Accordingly, H7, which proposed that the values *Universalism-Nature*, *Self-Direction-Thought* and *Self-Direction-Action* are associated with increased attributed importance to *SDG 7*, was refuted.

SDG 8 Decent work and economic growth

The results of the eighth correlation analysis illustrated the values *Security-Societal* ($r = 0.25, p < .001$) and *Tradition* ($r = 0.16, p = .031$) to have a significant positive correlation with the attributed importance to *SDG 8*. Subsequently, the regression analysis ($R^2 = 0.12, F(2,176) = 13.71, p < .001$) depicted that only the value *Security-Societal* ($\beta = 0.35, t(176) = 3.65, p < .001, 95\% \text{ CI } [0.16, 0.54]$) was significantly associated with the attributed importance to *SDG 8*. Therefore, H8, which insinuated the value *Achievement* to be associated with increased attributed importance to *SDG 8*, was rejected.

SDG 9 Industry, Innovation and Infrastructure

The results of the ninth correlation analysis revealed the values *Security-Societal* ($r = 0.32, p < .001$), *Tradition* ($r = 0.20, p = .007$) as well as *Power-Resources* ($r = 0.19, p = .001$) to display a significant positive correlation with the attributed importance to *SDG 9*. Subsequently, the regression analysis ($R^2 = 0.12, F(3,175) = 9.44, p < .001$) displayed that only the value *Security-Societal* ($\beta = 0.30, t(175) = 3.14, p < .001, 95\% \text{ CI } [0.11, 0.50]$) was significantly associated with the attributed importance to *SDG 9*. Accordingly, H9 proposing the value *Achievement* to be associated with increased attributed importance to *SDG 9* was rejected.

SDG 10 Less Inequality

The results of the tenth correlation analysis indicated the values *Humility* ($r = 0.30, p < .001$), *Universalism-Concern* ($r = 0.26, p < .001$), *Conformity-Interpersonal* ($r = 0.24, p = .002$), *Universalism-Tolerance* ($r = 0.16, p = .030$), to have a significant positive correlation with the attributed importance to *SDG 8*. The subsequent regression analysis ($R^2 = 0.24,$

$F(4,174) = 13.42, p < .001$) depicted that only the values *Humility* ($\beta = 0.33, t(174) = 2.93, p = .004, 95\% \text{ CI } [0.11, 0.55]$), *Universalism-Concern* ($\beta = 0.39, t(174) = 2.60, p = .001, 95\% \text{ CI } [0.09, 0.69]$) and *Conformity Interpersonal* ($\beta = 0.18, t(174) = 2.22, p = .028, 95\% \text{ CI } [0.02, 0.34]$) were significantly associated with the attributed importance to *SDG 10*.

Accordingly, H10 stating that solely the value *Universalism-Concern* is associated with increased attributed importance to *SDG 10* was rejected.

SDG 11 Sustainable Cities and Communities

The results of the eleventh correlation analysis exhibited the values *Universalism-Nature* ($r = 0.20, p = .009$) and *Security-Societal* ($r = 0.15, p = .046$) to have a significant positive correlation with the attributed importance to *SDG 11*. Similarly, the regression analysis ($R^2 = 0.09, F(2,176) = 10.07, p < .001$) illustrated that both the values *Universalism-Nature* ($\beta = 0.31, t(176) = 3.54, p < .001, 95\% \text{ CI } [0.49, 0.36]$) as well as *Security-Societal* ($\beta = 0.21, t(176) = 2.55, p = .012, 95\% \text{ CI } [0.05, 0.38]$) were significantly associated with the attributed importance to *SDG 11*. Thus, based on these findings, H11, which insinuated the values *Universalism-Nature*, *Self-Direction-Thought*, and *Self-Direction-Action* to be associated with increased attributed importance to *SDG 11*, was rejected.

SDG 12 Responsible Consumption and Production

The results of the twelfth correlation analysis indicated a significant positive correlation between the value *Universalism-Nature* ($r = 0.23, p = .002$) and the attributed importance to *SDG 12*. Similarly, the subsequent regression analysis ($R^2 = 0.10, F(1,177) = 20.71, p < .001$) depicted that the value *Universalism-Nature* ($\beta = 0.38, t(177) = 4.55, p < .001, 95\% \text{ CI } [0.21, 0.55]$) was significantly associated with the attributed importance to *SDG 12*. Hence, H12, which proposed the value *Universalism-Nature* to be associated with increased attributed importance to *SDG 12*, was accepted.

SDG 13 Climate Action

The results of the 13th correlation analysis revealed the values *Universalism-Nature* ($r = 0.43, p < .001$), *Universalism-Tolerance* ($r = 0.16, p = .029$) and *Universalism-Concern* ($r = 0.15, p = .041$) to display a significant positive correlation with the attributed importance to *SDG 13*. Subsequently, the following GLM showed that both the value *Universalism-Nature* ($\beta = 0.10, t(175) = 6.57, p < .001, 95\% \text{ CI } [0.07, 0.13]$) and *Universalism-Tolerance* ($\beta = 0.06, t(175) = 2.31, p = .02, 95\% \text{ CI } [0.01, 0.10]$) were significantly associated with the attributed importance to *SDG 13*. Therefore, H13 stating that the value *Universalism-Nature* is associated with increased attributed importance to *SDG 13* was rejected.

SDG 14 Life under Water

The results of the 14th correlation analysis illustrated a significant positive correlation between the value *Universalism-Nature* ($r = 0.22, p = .003$) and increased attributed importance to *SDG 14*. Consistently, the ensuing regression analysis ($R^2 = 0.08, F(1,177) = 17.43, p < .001$) illustrated that the value *Universalism-Nature* ($\beta = 0.36, t(177) = 4.18, p = .001, 95\% \text{ CI } [0.18, 0.52]$) was significantly associated with the attributed importance to *SDG 14*. Thus, H14 stating that the value *Universalism-Nature* is associated with increased attributed importance to *SDG 14* was accepted.

SDG 15 Life on Land

The results of the 15th correlation analysis illustrated the values *Universalism-Nature* ($r = 0.31, p < .001$), *Self-Direction-Action* ($r = 0.23, p = .002$) and *Self-Direction-Thought* ($r = 0.20, p = .008$) to exhibit a significant positive correlation with the attributed importance to *SDG 15*. The following regression analysis ($R^2 = 0.24, F(3,175) = , p < .001$) depicted that the values *Universalism-Nature* ($\beta = 0.37, t(175) = 4.98, p < .001, 95\% \text{ CI } [0.22, 0.51]$) and *Self-Direction-Action* ($\beta = 0.31, t(175) = 2.44, p = .02, 95\% \text{ CI } [0.06, 0.57]$) were significantly associated with the attributed importance to *SDG 15*. Therefore, H15, proposing the value *Universalism-Nature* to be associated with increased attributed importance to *SDG 15*, was rejected.

SDG 16 Peace, Justice and Strong Institutions

The results of the 16th correlation analysis illustrated that no values correlated significantly with the attributed importance to *SDG 16*. Henceforth, H16, proclaiming a significant association between *SDG 16* and the value *Security-Societal*, was rejected.

SDG 17 Partnership for Goals

The results of the 17th correlation analysis illustrated that the values *Security-Societal* ($r = 0.21, p = .004$) and *Humility* ($r = 0.15, p = .044$) displayed a significant positive correlation with the attributed importance to *SDG 17* ($R^2 = 0.11, F(3,175) = 12.46, p < .001$). Consistently, the following regression analysis presented that both *Security-Societal* ($\beta = 0.33, t = 3.11, p = .003, 95\% \text{ CI } [0.16, 0.56]$) and *Humility* ($\beta = 0.35, t(175) = 3.10, p = .002, 95\% \text{ CI } [0.13, 0.58]$) were significantly associated with the attributed importance to *SDG 17*. Accordingly, H17 proposing the value *Security-Societal* to be associated with increased attributed importance to *SDG 17* was rejected.

Summary

Regarding the first research question, namely, which SDG is perceived as the most important among Dutch and German students, the results depicted that the participants attributed the highest mean importance to *SDG 2 Zero Hunger* as well as *SDG 6 Clean Water*

and Sanitation. Accordingly, H1a was rejected in the context of the first research question. In regard to the second research question, namely which values are significantly associated with each respective SDG's increased attributed importance, the analysis detected significant associations for all SDGs but *SDG 3 Good Health and Well-being* and *SDG 16 Peace, Justice and Strong Institutions*. In this regard, Table 3 illustrates a summary of all detected associations.

Table 3

Significant associations between each SDG and specific values

| SDGs | Significant associated Values |
|--|---|
| <i>SDG 1 No Poverty</i> | <i>Humility*</i> <i>Security-Personal*</i> <i>Universalism-Concern***</i> |
| <i>SDG 2 Zero Hunger</i> | <i>Benevolence-Caring*</i> <i>Universalism-Concern*</i> <i>Security-Societal*</i> |
| <i>SDG 3 Good Health and Well-being</i> | - |
| <i>SDG 4 Quality Education</i> | <i>Security-Societal***</i> |
| <i>SDG 5 Gender Equality</i> | <i>Universalism-Concern***</i> <i>Conformity-Interpersonal*</i> |
| <i>SDG 6 Clean Water and Sanitation</i> | <i>Benevolence-Dependability*</i> |
| <i>SDG 7 Affordable and Clean Energy</i> | <i>Universalism-Nature***</i> <i>Humility**</i> |
| <i>SDG 8 Decent work and economic growth</i> | <i>Security-Societal***</i> |
| <i>SDG 9 Industry, Innovation and Infrastructure</i> | <i>Security-Societal***</i> |
| <i>SDG 10 Less Inequality</i> | <i>Humility**</i> <i>Universalism-Concern***</i> <i>Conformity-Interpersonal*</i> |
| <i>SDG 11 Sustainable Cities and Communities</i> | <i>Universalism-Nature***</i> <i>Security-Societal*</i> |
| <i>SDG 12 Responsible Consumption and Production</i> | <i>Universalism-Nature***</i> |

| | |
|--|---|
| <i>SDG 13 Climate Action</i> | <i>Universalism-Nature***</i> <i>Universalism-Tolerance*</i> |
| <i>SDG 14 Life under Water</i> | <i>Universalism-Nature***</i> |
| <i>SDG 15 Life on Land</i> | <i>Universalism-Nature***</i> <i>Self-direction-Action*</i> |
| <i>SDG 16 Peace, Justice and Strong Institutions</i> | - |
| <i>SDG 17 Partnership for Goals</i> | <i>Security-Societal***</i> <i>Humility**</i> |

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; “-” indicates that no significant association was found

Discussion

The study at hand contributed to not only augment one but two existing literature gaps. The first scientific contribution was in the context of this study’s first research question, namely identifying which SDGs Dutch and German students perceived as the most important. In response to the second research question, this study’s second contribution is a priorly non-existent, overarching model illustrating which value priorities are significantly associated with higher attributed importance to each respective SDG.

In the context of the first research question, the initial hypothesis (H1a) suggesting *SDG 13 Climate Action* to be the most important SDG was rejected. Instead, Dutch and German Students perceived *SDG 2 Zero Hunger* as well as *SDG 6 Clean Water and Sanitation*, as the most important SDGs. They were followed by *SDG 13 Climate Action*, *SDG 3 Good Health and Well-being*, as well as *SDG 4 Quality Education*. Notably, these results thereby do not only differentiate from the hypothesis (H1a) and the findings of Kleespies & Dierkes (2018) but also contrast findings regarding the general Dutch and German populations (Ipsos, 2021).

Firstly, the difference between the findings of this study and those of Kleespies & Dierkes (2018) is that students perceived social SDGs (namely, *SDG 2 Zero Hunger* and *SDG 6 Clean Water and Sanitation*) as the most important rather than an environmental SDG (*SDG 13 Climate Action*). In this regard, two main differences in study design explain the deviations in results. The first difference concerns that Kleespies and Dierkes (2018) did not assess the attributed importance to each singular SDG but rather divided the SDGs into three clusters (i.e., social, economic, and environmental) which they assessed in terms of attributed importance. Accordingly, it could be that other SDGs within Kleespies & Dierkes’ (2018)

social cluster, such as *SDG 5 Gender Equality* which German and Dutch individuals perceive as less important (Ipsos, 2021), negate the high attributed importance to singular social SDGs (i.e., *SDG 2* and *SDG 5*). This might explain why students attribute great importance to singular social SDGs, although holistically, the environmental SDG cluster still is perceived as the most important to attain.

Moreover, the authors' student sample population manifests the second crucial differentiation in terms of study design. Evidently, Kleespies and Dierkes (2018) sample included solely students majoring in fields related to environmental studies. The authors themselves described their sample as a critical limitation since students majoring in environmental studies are likely to be more knowledgeable of environmental matters and hence perceive environmental SDGs as more important than the average student. Contrastingly, the sample of the study at hand comprised students from various academic fields. Hence, these differences in the student sample's academic background might explain why this study's student sample perceived two social SDGs as the most important and not an environmental SDG, as indicated by Kleespies and Dierkes' results (2018).

Secondly, the slight differences in attributed importance between the general population in the Netherlands and Germany in comparison to the countries' student population also needs to be rationalised. The report by Ipsos (2021) illustrated that the general population perceives *SDG 2 Zero Hunger*, *SDG 3 Good Health and Well-being* as well as *SDG 1 No Poverty* as the most important SDGs. Notably, crucial differences exist between these findings and the results of the study at hand. Herein, the general population perceived *SDG 1 No Poverty* as the third most important SDG, whereas this study's student sample perceived it as the sixth most important. In turn, the student sample considered *SDG 6 Clean Water and Sanitation* as the second most important SDG, while the German and Dutch general population ranked it fifth and fourth, respectively.

A possible explanation for this phenomenon and specifically the increased attributed importance to *SDG 6 Clean Water and Sanitation* could concern SDG 6's dualistic emphasis on both social and environmental development. This notion is consistent with the targets of *SDG 6*, which cover both social (i.e., target 6.1: secure drinking water) and environmental (i.e., target 6.6: protect aquatic ecosystems) aspects (United Nations, 2022b). Suitably, students regard environmental matters as critically important (National Union of Students, 2019) while also attributing great importance to social matters, as indicated by the results of this study (i.e., *SDG 2 Zero Hunger*). Henceforth, in the context of this study's student sample, the high attributed importance to *SDG 6 Clean Water and Sanitation*, seemingly in

favour of *SDG 1 No Poverty*, could very well stem from the students' inclination to perceive the dual emphasis of *SDG 6*, on both social and environmental improvement, as especially imperative.

A Results-driven model: Detected Associations between Values and SDGs

In the context of the second research question, namely, which values are associated with increased attributed importance to each respective SDG, the derived results will be explained and placed in the context of the existing literature within the following paragraphs.

SDG 1 No Poverty

In contrast to the initially proposed and now rejected hypothesis (H1b), which assumed solely the values *Universalism-Concern* and *Security-Societal* to be associated with high attributed importance to *SDG 1 No poverty*, the results of the study at hand portrayed the values *Universalism-Concern*, *Security-Personal*, as well as *Humility* to be associated with attributed importance to *SDG 1*.

Firstly, the aim of *SDG 1* to end poverty is consistent with the definition of *Universalism-Concern*, which comprises a desire to secure the well-being of all people (Schwartz et al., 2012). More specifically, previous findings also point towards an association between a value priority of *Universalism-Concern* and desiring governmental reforms to narrow differences in income across the population (Schwartz et al., 2012). Thus, it seems like individuals with a value priority of *Universalism-Concern* attribute high importance to *SDG 1 No Poverty* because relinquishing poverty on a global scale would mean a definite increase in the general welfare of all people.

Secondly, poverty often bears immediate threats to individuals on a microscopic and personal scale which explains the significant association between the attributed importance to *SDG 1 No Poverty* and the value *Security-Personal* and not as hypothesised *Security-Societal* (Enoch & Luka, 2020). Examples of such immediate threats include increased violence, crime and dire living conditions (Patterson, 1991). Although poverty is undoubtedly also a societal issue as it can influence a whole community or even a country, the immediate threats people face on an individual level seem to prevail and therein explain the association between *Security-Personal* and the increased attributed importance to *SDG 1 No Poverty*.

Additionally, placing the association between *Humility* and the increased attributed importance to *SDG 1* in the context of Schuessler et al.'s (2012) findings provides a rationale for such an association. Herein, the authors linked *Humility* to an increased awareness of poverty's detrimental effects, possibly elicited through direct confrontation to such.

Accordingly, such increased awareness of poverty could explain why individuals with a value priority of *Humility* attribute increased importance to *SDG 1 No Poverty*.

SDG 2 Zero Hunger

The initial hypothesis (H2) cited the values *Universalism-Concern* and *Security-Societal* to be associated with increased attributed importance to *SDG 2*. However, the results, which indicated that next to the values *Universalism-Concern* and *Security-Societal*, also *Benevolence Caring* was associated with increased attributed importance to *SDG 2*, led to the rejection of such initial hypothesis.

A possible explanation for the association between the value *Universalism-Concern* and the increased attributed importance to *SDG 2* lies in the prioritisation of food security to thereby protect the basic needs of others (Schwartz et al., 2012). Accordingly, research links a value priority of *Universalism-Concern* to acts of collecting and sharing food for individuals or groups in need (Arboleda et al., 2023; Butenko & Schwartz, 2013). Furthermore, the relationship between *SDG 2* and the value *Security-Societal* becomes increasingly apparent considering reports that describe food insecurity, which is thematised within one of the main targets of *SDG 2* (United Nations, 2015a), as a societal issue given its significant societal implications (FAO, 2023). Accordingly, such labelling explains why a value priority of *Security-Societal* is associated with increased importance to *SDG 2* since a high regard for societal safety and stability aligns with establishing food security (Schwartz et al., 2012).

Notably, while these two value-SDG associations present a rationale driven by providing welfare or security at a large societal scale, the association between *SDG 2* and *Benevolence-Care* introduces a rationale driven by prioritising the well-being of in-group members (Schwartz et al., 2012). The authors further highlight that such value is greatly associated with the emotions of care and fulfilment. Notably, Arboleda et al. (2020) relate the value of *Benevolence-Caring* to an increased desire to take care of in-group members by providing nutritious food to improve their health and immune system. Hence, highly cherishing such a caring act might explain the association between a value priority of *Benevolence-Care* and a high attributed importance to *SDG 2 No Poverty*.

SDG 3 Good Health and Well-being

The results, which illustrated the absence of a significant association between *SDG 3* and any value, led to the rejection of the initial hypothesis (H3) proclaiming the values *Universalism-Concern* and *Security-Societal* to be significantly associated with *SDG 3*.

Notably, according to the targets of *SDG 3* as indicated by the UN (2022a), ensuring good health and well-being comprises a wide range of psychological (i.e., target 3.4: promote

mental health), physical (i.e., target 3.3: combat communicable diseases) and social facets (i.e., target 3.8: global health care). Consequently, the conceptualisation of *SDG 3* might greatly differ from one individual to another, which could mean that the value priorities of students who attach importance to *SDG 3* also substantially vary. Hence, the complexity and the multiplicity of the facets involved could explain the absence of distinct associations between *SDG 3 Good Health and Well-being* and specific values.

SDG 4 Quality education

The results depicted only the value *Security-Societal* to have a significant association with increased attributed importance to *SDG 4 Quality Education* which led to the rejection of the initial hypothesis (H4), which proclaimed that both *Security-Societal* as well as *Universalism-Concern* are associated with *SDG 4*. Of note is that Kharazishvili et al. (2020) stated that a lack of education is commonly interpreted as a societal issue, thereof primarily threatening society's stability (i.e., *Security-Societal*) rather than directly affecting aspects such as equality and justice on an individual level (i.e., *Universalism-Concern*). Such a notion is consistent with research that also emphasises education's numerous indirect influences on the general society through social and economic development (Hill et al., 2005; Türkkahraman, 2012). Therefore, the direct as well as indirect influences that adequate education has on the macroscopic stability of society might explain the association between the high attributed importance to *SDG 4 Quality Education* and the value *Security-Societal*.

SDG 5 Gender Equality

The results, which depicted that the values *Universalism-Concern* and *Conformity-Interpersonal* are associated with increased attributed importance to *SDG 5*, led to the rejection of the initial hypothesis (H5) proclaiming an association between *SDG 5* and solely the value *Universalism-Concern*. The detected linkage between *Universalism-Concern* and the attributed importance to *SDG 5* is consistent with prior findings by Schwartz and Rubel-Lifschitz (2009). In particular, highly cherishing equality is a crucial component of a value priority *Universalism-Concern*, which explains the association between said value and the attainment of gender equality as depicted in *SDG 5* (Schwartz et al., 2012).

On theoretical grounds, an inclination of individuals with a value priority of *Conformity-Interpersonal* to avoid causing harm or upsetting others can elucidate the link between a value priority of *Conformity-Interpersonal* and a high attributed importance to *SDG 5 Gender Equality* (Schwartz et al., 2012). In this instance, individuals perceive *SDG 5* as increasingly important due to an intent to minimise harm towards others by attaining gender-related equitable treatment.

Notably, the association between the attributed importance of *SDG 5* and the value *Conformity-Interpersonal* was not apparent in Schwartz and Rubel-Lifschitz's study (2009). However, the authors' study design solely revolved around assessing the basic value *Conformity*. Oppositely, the study at hand considered the basic values' more distinct constructional features, namely *Conformity-Rules* and *Conformity-Interpersonal*. Henceforth, when assessed together by way of the basic value *Conformity*, the sub-construct *Conformity-Rules* might negate any possible positive association that the other sub-construct *Conformity-Interpersonal* has with aspects of gender equality. Such negation could then explain the insignificant relationship between gender equality and the basic value of *Conformity* in the context of Schwartz and Rubel-Lifschitz's study (2009). This explanation aligns with other findings pointing towards a positive association between the value *Conformity-Interpersonal* and socially sustainable matters while highlighting a negative association between such matters and *Conformity-Rules* (Van der Sluijs and Silviu, 2023).

SDG 6 Clean Water and Sanitation

This study's finding regarding a significant association between only the value *Benevolence-Dependability* and increased attributed importance to *SDG 6* led to the rejection of the hypothesis (H6), which projected the values *Universalism-Concern* and *Security-Societal* to have a significant association with *SDG 6*. A possible explanation for why only the value *Benevolence-Dependability* depicts a significant relationship could be that, according to Schwartz et al.'s (2012), such value priority specifically comprises being a responsible and trustworthy in-group member. Hence, individuals might perceive limited access to clean water and sanitation to threaten their valued ability to fulfil their in-group responsibilities. An example hereof could be that fulfilling one's responsibility of ensuring health and hygiene for in-group members such as children depends on access to a trustworthy water source. Hence this would explain the association between *Benevolence-Dependability* and attributed importance to *SDG 6 Clean Water and Sanitation*. Such a potential explanation aligns with findings by Drew et al. (2022), which indicate that parents with a value priority of *Benevolence-Dependability* specifically emphasised the deliberate selection of trustworthy nourishment sources for their children.

SDG 7 Affordable and Clean Energy

The detected significant association between increased attributed importance to *SDG 7* and the values *Universalism-Nature* as well as *Humility*, led to the rejection of the initial hypothesis (H7) that insinuated a significant association between *SDG 7* and the values *Self-Direction-Thought*, *Self-Direction-Action*, as well as *Universalism-Nature*. The link between

Universalism-Nature and higher attributed importance to *SDG 7* is consistent with findings by Pagliuca et al. (2022), which detected the basic value *Universalism* to underlie a preference for green energy solutions. A possible explanation for such findings comprises that individuals with a value priority of *Universalism-Nature* cherish preserving the natural environment, which necessitates clean energy solutions and thus the accomplishment of *SDG 7 Affordable and Clean Energy* (Schwartz et al., 2021).

Additionally, the findings of Sun et al. (2021) can explain the unexpected link between the value *Humility* and the increased attributed importance of *SDG 7*. The authors associated humble corporate executives with increased incorporation of green innovation strategies such as clean energy sources. More specifically, Sun et al. (2021) linked such humility to a world-centred mindset, thereby prioritising the attainment of benefits for the common good that reach far past one's own interests. Such reasoning might also explain the link between *SDG 7 Affordable and Clean Energy* and the value *Humility* as individuals with such value priority acknowledge their own "insignificance in the larger scheme of things" (Schwartz et al., 2012, p. 669) and thus adopt a world-centred mindset. This mindset, in turn, leads them to perceive *SDG 7 Affordable and Clean Energy* as important since clean energy solutions contribute to the common good considering their environmental benefits.

Notably, the results of this study deviate from prior findings (Axsen & Kurani, 2013), which linked a value priority of *Self-Direction* to the implementation of clean energy solutions. However, a possible explanation could be that the authors' study revolved around implementing clean energy solutions during a timeframe when they were less commonly used (Ritchie et al., 2022). Currently, it is thus likely that the average proponents of clean energy solutions are those who emphasize the conservation of the natural environment (i.e., value priority of *Universalism-Nature*) and the common good (i.e., *Humility*). Such an explanation is consistent with recent studies that did not detect a link between green energy solutions and *Self-Direction-Thought* or *Self-Direction-Action* (Pagliuca et al.'s, 2022).

SDG 8 Decent work and economic growth

Opposing to the initial hypothesis (H8), which linked the value *Achievement* to *SDG 8 Decent Work and Economic Growth*, this study's results depicted a significant association between increased attributed importance to *SDG 8* and the value *Security-Societal*. The results therein contrast the findings of Granato et al.'s (1996). A possible explanation for such deviations regards a difference in the assessed constructs. Herein, Granato et al. (1996) assessed and detected an association between an emphasis on economic growth and *Achievement*. In contrast, the study at hand assessed the attributed importance to *SDG 8*,

which, next to achieving economic growth, also encompasses decent work conditions (target 8.8: ensuring secure working environments; United Nations, 2022c). Accordingly, the conceptual inclusion of sustainable work conditions shifts the motivational focus towards attaining economic growth for the sake of societal stability, which explains the detected association between *SDG 8* and the value *Security-Societal*. This explanation is consistent with reports citing socially sustainable economic growth to have a positive effect on societal security by raising living standards while lowering conflict incidence (Kęsoń & Gromek, 2021; Stewart, 2004)

SDG 9 Industry, Innovation and Infrastructure

Akin to *SDG 8*, the value *Achievement* was hypothesised (H9) to be significantly associated with increased attributed importance to *SDG 9*. However, the results detected solely the value *Security-Societal* to be significantly associated. Notably, such results seem to contrast the findings of Eva et al. (2017) as well as Pandey & Tewary (1979), who linked innovation across industries to the value *Achievement*. However, a key difference between the authors' research and the study at hand is that the latter not only revolves around the construct of innovation but, in the context of *SDG 9*, stresses the importance of sustainable innovation across industries and infrastructure (i.e., target 9.4: develop sustainable infrastructure; United Nations, 2022d). Hence, whereas the value *Achievement* might be associated with venerating innovation unrelated to sustainability, revering innovation of sustainable industries and infrastructure is associated with greatly valuing societal stability, and hence a value priority of *Security-Societal*. For instance, installing innovative infrastructure enabling low-carbon transport directly reduces air pollution as well as emissions and therein contributes to societal safety by mitigating environmental risks (Lah, 2017). Such an explanation aligns with research linking social-sustainable innovation to conservation values such as *Security-Societal* (Sastre-Castillo et al., 2015; Sotiropoulou et al., 2019).

SDG 10 Less Inequality

In contrast to the refuted hypothesis (H10), which proposed a significant link between solely the *Universalism-Concern* and higher attributed importance to *SDG 10*, a significant association was found between attributed importance to said *SDG* and the values *Universalism-Concern*, *Conformity-Interpersonal* as well as *Humility*. Similarly, to *SDG 5 Gender Equality*, the association between attributed importance to *SDG 10 Less Inequality* and the value *Universalism-Concern* can be explained considering that an integral part of such value priority is to be firmly committed to the equality of all people (Schwartz et al.,

2012). Thus, the value thematically aligns with *SDG 10*'s priority of reducing inequality between the citizens of countries (United Nations, 2015b).

A desire to reduce harm and distress in others through attaining equitable treatment for all, independent of nationality, explains the association between *Conformity-Interpersonal* and the attributed importance to *SDG 10 Less Inequality* (see section *SDG 5 Gender Equality* for a detailed explanation). Thirdly, Sun et al.'s (2012) explanation can once again rationalise the link between *Humility* and *SDG 10 Less Inequality*. Herein, individuals with a value priority of *Humility* possess a world-centred mindset leading them to value objectives such as reducing the inequality between citizens of countries to thereby attain a common good. Such an explanation aligns with findings by Chloe et al. (2012), who linked the value *Humility* to a decrease in discriminative attitudes towards others.

SDG 11 Sustainable Cities and Communities

In contrast to the rejected hypothesis (H11) proposing a link between *SDG 11* and the values *Universalism-Nature*, *Self-Direction-Though* and *Self-Direction-Action*, a significant association was found between *SDG 11* and the values *Universalism-Nature* as well as *Security-Societal*. The detected link between the attributed importance to *SDG 11* and the value *Universalism-Nature* is consistent with prior research relating the basic value *Universalism* to a positive attitude towards sustainable technology, such as green energy solutions (Pagliuca et al., 2022). Such sustainable technology forms critical pillars that crucially underlie the establishment of any sustainable city or community that desires to lessen humanity's overall environmental impact and therein rationalises the detected link between *Universalism-Nature* and *SDG 11* (i.e., target 11.6; Schwartz et al., 2012; United Nations, 2022e).

Notably, the targets of *SDG 11* not only emphasise the need to lessen the negative effect on the environment but also revolve around establishing safety on a societal level. For instance, subgoal 11.7 emphasises the need to increase the quantity of safe public spaces within cities worldwide (United Nations, 2022e). Hence, such emphasis explains the link between *SDG 11 Sustainable Cities and Communities* and *Security-Societal*

Notably, the following deliberation explains the deviations of this study's results compared to Axsen and Kurani (2013). Herein, self-direction values might be key drivers to actually invent technologies that lead to sustainable changes within a community, as indicated by the authors. However, the perceived importance of establishing sustainable cities and communities that implement such as aspired for by *SDG 11* seems rather driven by cherishing

societal safety and environmental conservation as indicated by the values *Security-Societal* and *Universalism-Nature*.

SDG 12 Responsible Consumption and Production

The detection of a significant association between the attributed importance to *SDG 12* and solely the value *Universalism-Nature* led to the acceptance of the initial hypothesis (H12). Accordingly, such results are consistent with prior findings of Sharma and Jha (2017) as well as Carraciolo et al. (2015). Notably, practising sustainable consumption and production would lessen humanity's impact on the environment, as indicated by the targets of *SDG 12* (i.e., target 12.2; United Nations, 2022e). Hence, the thereof resulting environmental conservation aligns with a value priority of *Universalism-Nature* and thereby rationalises the above-mentioned findings (Schwartz et al., 2012).

SDG 13 Climate Action

The results of this study which gave rise to a significant association between increased attributed importance to *SDG 13 Climate Action* and the values *Universalism-Nature* and *Universalism-Tolerance*, led to the rejection of the initial hypothesis (H13) that only linked said SDG to *Universalism-Nature*. Attaining *SDG 13* and therein engaging against climate change is crucial for protecting the natural environment and hence explains the link between said SDG and *Universalism-Nature*. This association also aligns with Skimina et al. (2019), who linked said value to specific pro-environmental behaviours.

In the context of the second detected association, it is important to note that *Universalism-Tolerance* is related to an increased belief in climate change and an increased perceived responsibility to engage in mitigating efforts (Sorvali et al., 2021). Additionally, according to Schwartz et al. (2012), a value priority of *Universalism-Tolerance* revolves around accepting and understanding those who are different. Within the framework of *SDG 13 Climate Action*, it is plausible that an individual with a value priority of *Universalism-Tolerance* accepts the inactivity of others and, in turn, feels increasingly responsible for actively mitigating climate change. Hence, such an increased sense of responsibility might lead them to attribute more importance to *SDG 13 Climate Action*, aligning with findings associating perceived responsibility with increased attributed importance to climate change (Sorvali et al., 2021).

SDG 14 Life under Water

As hypothesised (H14), the results depicted a significant association between increased attributed importance to *SDG 14 Life under Water* and the value *Universalism-Nature* therein aligning with similar findings by Cembalo et al.'s (2016). An explanation for

this link is that individuals who prioritise the natural environment's conservation (i.e., value priority of Universalism Nature) also consider protecting the species living in such as important.

SDG 15 Life on Land

In contrast to the hypothesis (H15) linking only *Universalism-Nature* with increased attributed importance to *SDG 15 Life on Land*, the results displayed a significant association between the SDG and both the values *Universalism-Nature* as well as *Self-Direction-Action*. Similar to *SDG 14*, the desire to preserve the environment, which also comprises preserving species living in such terrestrial environments, explains the link between *SDG 15* and *Universalism-Nature*.

However, the link between *Self-Direction-Action* and high attributed importance to *SDG 15 Life on Land* might be more complex. Notably, Cembalo et al. (2016) linked a value priority of *Self-Direction* to an increasingly positive attitude to food products that secure animal welfare. More specifically, Ghaffari et al. (2021) detected a value priority of *Self-Direction-Action* to underlie adopting a vegan diet to reduce animal suffering. Likewise, engaging in such an alternative diet is consistent with the value's definition, which emphasises self-determination in regard to one's own actions (Schwartz et al., 2012). Thus, the self-determination to adopt behavioural changes such as a diet change to secure the welfare of terrestrial animals could explain the link between *SDG 15 Life on Land* and *Self-Direction-Action*.

SDG 16 Peace, Justice and Strong Institutions

The initially stated hypothesis (H16) insinuated a significant relationship between increased attributed importance to *SDG 16* and the value *Security-Societal*. However, no significant relationship between the attributed importance to *SDG 16* and any value was detected, rejecting the initial hypothesis. Such results contrast earlier reports by Tóth-Nagy et al. (2023), who linked *SDG 16* to the basic value *Security*. However, differentiations in terms of study design rationalise deviations between the study's results. First, Tóth-Nagy et al.'s (2023) study only revolved around the basic value model and did not differentiate between *Security-Societal* and *Security-Personal*. Secondly, Tóth-Nagy et al. (2023) performed a thematic analysis, linking each *SDG* to a singular Schwartz's basic value based on the content of each value's items within Schwartz's *Portrait Value Questionnaire* (2021). Contrastingly, the study at hand relied on quantitative analysis. Thus, while the items regarding *Security* within the *PVQ* seem to align with the content of *SDG 16* thematically, the empirical analysis

conducted within this study did not detect any empirical relation between the SDG and the refined value *Security-Society* within this sample.

SDG 17 Partnership for Goals

The results illustrating a significant association between *SDG 17 Partnerships for Goals* and the values *Security-Societal* as well as *Humility*, contrasted the since then rejected hypothesis (H17) that linked solely the value *Security-Societal* to the increased attributed importance of said *SDG*.

The main aim of *SDG 17* of forming global partnerships stabilises societies across multiple countries and thereby fully aligns with the value *Security-Societal*, hence explaining the values' association with *SDG 17*, which also aligns with previous findings (Tóth-Nagy et al., 2023). Further, the following deliberation explains the association between *Humility* and *SDG 17*. Herein, individuals with a value priority of *Humility* place great importance on *SDG 17 Partnership for Goals*, as it emphasizes the significance of nations collaborating to address global issues. This aligns with their fundamental belief of striving for the common good while perceiving their individual acts as unable to affect the broader outcome, possibly leading them to cherish international partnerships greatly (Schwartz et al., 2012; Sun et al., 2021). Such explanation accords with further findings describing *Humility* as essential for social projects comprising international partnerships (Wang et al., 2020).

Holistic Interpretation

Assessing the model holistically therein enables the identification of multiple holistic patterns in the form of certain value-SDG associations. First, a value priority of *Security-Societal* is associated with increased attributed importance to SDGs across social (i.e., *SDG 2*, *SDG 4*, *SDG 17*), economic (i.e., *SDG 8* and *SDG 9*) and to some extent environmental (i.e., *SDG 11*) domains. Hence, valuing societal stability and safety (Schwartz et al. 2012) appears to be a fundamental driver of attributing importance to the SDGs across disciplines. Secondly, consistent with previous research (Schwartz et al., 2012), a value priority of *Universalism-Concern*, and therein a prioritisation of the equality and welfare of all people, seems to be especially essential in attributing importance to socially oriented SDGs (i.e., *SDG 1*, *SDG 2*, *SDG 5*, *SDG 10*). Thirdly, the value *Universalism-Nature* plays a crucial role in attributing importance to multiple environmentally related *SDGs* (i.e., *SDG 7*, *SDG 11*, *SDG 12*, *SDG 13*, *SDG 14*, *SDG 15*), which is consistent with its defining emphasis regarding environmental conservation (Schwartz et al., 2012). Lastly, a value priority of *Humility*, and hence being aware of one's insignificance while prioritising the common good (Schwartz et al., 2012; Sun

et al., 2021), also plays a relevant role in attributing importance to certain social (i.e., *SDG 1*, *SDG 7*, *SDG 10*, *SDG 17*) as well as an environmental (i.e., *SDG 7*) related SDGs.

Practical Implications

Next to the study's above-stated theoretical contributions, the study at hand's contribution also enabled multiple practical implications. Such practical implications especially regard the priorly alluded to two-fold strategy to establish value congruency surrounding firms' target SDGs and their employees. To reiterate, establishing such value congruency would likely boost employees' well-being as well as performance and, therein, the firms' likelihood of actually contributing to such SDGs (Andersson et al., 2017; Kristof-Brown et al., 2005). The first part of such a two-fold strategy comprises that businesses adapt their target SDGs to the preference of future stakeholders, as this alignment would increase their engagement to attain such (Yamane & Kaneko, 2022). Henceforth, based on the results regarding this study's second research question, businesses would be wise to target one or a multitude of *SDG 2 Zero Hunger*, *SDG 6 Clean Water and Sanitation*, *SDG 13 Climate Action*, *SDG 3 Good Health and Well-being* as well as *SDG 4 Quality Education*. Aligning their target SDGs based on these results enables businesses to increase the likelihood of creating value congruency with their future employees and stakeholders since students perceive said SDGs as the most important.

The second part of such a two-fold strategy would then incorporate hiring talent whose value priorities are associated with increased attributed importance to the respective SDGs. In this regard, this study's results regarding the second research question can act as a blueprint. For instance, the Dutch company Phillips has specifically identified *SDG 12 Responsible Consumption* as well as *SDG 13 Climate Action* as their specific target SDGs (Phillips, 2021). Accordingly, consistent with the construct of value-congruence, the results of this study therein suggest that Phillips should hire individuals with a value priority of both *Universalism-Nature* as well as *Universalism-Tolerance* since such value priority was significantly associated with the attributed importance to *SDG 12* and *SDG 13*.

Notably, research also identified value congruency as an essential construct in other domains involving companies and their stakeholders, such as marketing (Voorn et al., 2020). Similarly, Voola et al. (2022) also described the SDGs to be a central theme in such domain. More specifically, Voola et al. (2022) advise firms to connect their marketing strategies to their target SDGs and communicate a value proposition that aligns with what consumers and other stakeholders perceive as important. Hence, also in this context, the results of this study can be used as a blueprint to enact a two-fold strategy. First, firms could revolve their

marketing strategy around the SDGs that students and, therein, their future stakeholders perceive as most important. Secondly, based on this study's results, firms could incorporate the values associated with increased attributed importance to their target SDGs within their marketing strategy. However, in these instances, the companies' actual efforts to achieve the SDGs must underlie such campaigns. Otherwise, these campaigns would present supremely unethical acts of greenwashing therein undermining the firm's scrutiny and consumers' purchase intentions (Akturan, 2018).

In sum, since value-congruence and SDGs are constructs of multidisciplinary importance, the results of this study derive crucial practical implications beyond the scope of solely hiring talent.

Limitations and Future Research

The first limitation of this study concerns the validity of the findings considering the representability of the relatively small sample size ($N = 179$) and the non-probability sampling method used. It is thus unlikely that the sample population was truly heterogenetic enough to adequately represent the whole student population within Germany and the Netherlands. Such limitation is consistent with reports citing opportunity sampling methods to lead to bias and unrepresentativeness of the sample, therein often impeding the validity of the results (Harrison & Rentzelas, 2020). Accordingly, a crucial recommendation for future research concerns testing the replication of these findings in a study design that revolves around a large sample size but also applies a more sophisticated random sampling method to ensure increased validity.

A further limitation of this study regards the value-SDG associations in which multiple values seemed to be significantly associated with a single SDG. In these cases, it is unclear whether a robust existing value association might moderate the relationship between a further value and the same SDG. For instance, when taking the significant association between *SDG 13 Climate Action* and *Universalism-Tolerance* as well as *Universalism-Nature* as an example, it could be that the value *Universalism-Nature* moderates the association of *Universalism-Tolerance* with SDG 13. Accordingly, a recommendation for further research is to assess possible moderation between values, especially in the instances in which multiple values were significantly associated with a single SDG. Such research would enable further insight into whether the associated values truly had a significant independent association with the attributed importance to the respective SDG.

A third limitation of this study comprises the possibility that the values which were associated with increased attributed importance to a specific SDG do not extrapolate to be

also associated with actual SDG-related behaviour, therein limiting the validity of the practical implication of this study. This is especially the case considering research detecting a discrepancy between individuals' pro-environmental statements (e.g., attributing importance to an SDG) and their actual relative pro-environmental behaviour (Gatersleben et al., 2002; Johnson et al., 2004). Moreover, the use of a self-report scale further limits the validity of predicting actual sustainable behaviours given their proneness to the social-desirability bias (Gatersleben et al., 2002). Hence, considering the potential limitations involved in extrapolating the found SDG-value associations to SDG-related behaviour, a recommendation for future research comprises to assess whether the detected SDG-value associations persist if the dependent variable embeds specific SDG-related target behaviour (Gatersleben et al., 2002). An example herein could be the extent of green energy usage within an individual's household as a target behaviour in the context of *SDG 7 Affordable and Clean Energy*.

Conclusion

The study at hand enhances literature on two fronts by demonstrating which SDGs Dutch and German students perceive as the most important while also uncovering which values are significantly associated with increased attributed importance to each respective SDG. Firstly, the study evidently displayed that students perceive *SDG 2 Zero Hunger* as well as *SDG 6 Clean Water and Sanitation* as the most important SDGs. Furthermore, the study detected significant associations between specific values and the attributed importance to every specific SDG except for *SDG 3 Good Health and Well-being* as well as *SDG 16 Peace, Justice and Strong Institutions*. Based on these findings, the study formulated practical implications relevant across multiple disciplines.

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Appendix A

Definitions of each Refined Value according to Schwartz & Cieciuch (2021)

| Refined Values | Definition of Refined Values |
|---------------------------|--|
| Self-Direction-Thought | The freedom to cultivate one's own ideas and abilities |
| Self-Direction-Actions | The freedom to determine one's own actions |
| Stimulation | Excitement, novelty and challenge in life |
| Hedonism | Pleasure and sensuous gratification for oneself |
| Achievement | Personal success through demonstrating competence according to social standards |
| Power-Dominance | Power through exercising control over people |
| Power-Resources | Power through control of material and social resources |
| Face | Security and power through maintaining one's public image and avoiding humiliation |
| Security-Personal | Safety in one's immediate environment |
| Security-Societal | Safety and stability in the wider society |
| Conformity-Rules | Compliance with rules, laws, and formal obligations |
| Conformity-Interpersonal | Avoidance of upsetting or harming other people |
| Tradition | Maintaining and preserving cultural, family or religious traditions |
| Humility | Recognizing one's insignificance in the larger scheme of things |
| Benevolence-Dependability | Being a reliable and trustworthy member of the group |
| Benevolence-Caring | Commitment to the welfare of ingroup members |
| Universalism-Concern | Commitment to equality, justice and protection for all people |
| Universalism-Nature | Preservation of the natural environment |
| Universalism-Tolerance | Acceptance and understanding of those who are different from oneself |

Note. Definitions of the refined values are from "Measuring the Refined Theory of Individual Values in 49 Cultural Groups: Psychometrics of the Revised Portrait Value Questionnaire," by S.H. Schwartz and J. Cieciuch, 2021, *Assessment*, 29, p. 1006

Appendix B

Complete Questionnaire used for a Male Participant

Q1 Opening Statement

You are being invited to participate in a research study titled "Assessing Human Values and the SDGs: a Framework to Enhance Hiring Practices". This study is being conducted by Tim Möller from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

The purpose of this research study is to investigate the relationship between values and preferences concerning the UN's Sustainable Development Goals (SDGs), and will take you approximately 10-15 minutes to complete. The only participation criteria that you need to fulfill is that you are currently enrolled at either a German or Dutch university. The data will be used for only scientific purposes, and more specifically, the above-mentioned students bachelor thesis.

Your participation in this study is entirely voluntary and you can withdraw at any time.

We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by anonymising your data and ensuring complete confidentiality. Only the lead researcher and the supervisor will have access to your anonymised data.

We encourage you to take your time to review the form and to ask any questions or raise any concerns that you may have before giving your consent. If you indeed have questions please don't hesitate to contact the lead researcher of this study via the following email address: t.j.moller@student.utwente.nl.

Once you have provided your consent, you will be given further instructions for the study.

Thank you for participating within this scientific study.

Q2 By continuing with this survey, you confirm that you understand your participation is voluntary, and that your responses will be kept confidential and anonymous. You may withdraw from the study at any time without penalty. Please indicate your consent to participate by selecting "I consent" below.

- I consent (1)
- I do not consent (2)

End of Block: Block 1

Start of Block: Block 2

Q3 Thank you for participating within this study.

The questionnaire is divided into three parts. In the transition to the first part of the questionnaire, you are asked to read through a very concise one-sentence description of each of the 17 Sustainable Development Goals (SDGs). Please take hereby your time to ensure that you grasped the theme of

each SDG. The second part is a questionnaire which assesses your individual value priorities. The third part aims to collect additional demographic information.

Q4 Gender: As what do you identify ?

- Male (1)
- Female (2)
- Other (5)

Q20 Are you currently enrolled at an University?

- Yes (1)
- No (2)

End of Block: Block 2

Start of Block: Block 4

Q5

Please read through the Table to understand the content of each Sustainable Development Goal (SDG):

Q18

How important do you perceive each Sustainable Development Goal (SDG) to be in relation to the others?

Please read through the Table to understand the content of each Sustainable Development Goal (SDG):

| Sustainable Development Goal | Content |
|--|--|
| SDG 1 No Poverty | End Poverty in all its forms everywhere |
| SDG 2 Zero Hunger | End Hunger, achieve food security and improved nutrition and promote sustainable agriculture |
| SDG 3 Good Health and Well-being | Ensure healthy lives and promote well-being for all at all ages |
| SDG 4 Quality Education | Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all |
| SDG 5 Gender Equality | Achieve gender equality and empower all women and girls |
| SDG 6 Clean Water and Sanitation | Ensure availability and sustainable management of water and sanitation for all |
| SDG 7 Affordable and Clean Energy | Ensure access to affordable, reliable, sustainable and modern energy for all |
| SDG 8 Decent Work and Economic Growth | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all |

SDG 6 Clean Water and Sanitation

Ensure availability and sustainable management of water and sanitation for all (69)

**SDG 7 Affordable and Clean**

Energy Ensure access to affordable, reliable, sustainable and modern energy for all (70)

**SDG 8 Decent Work and Economic**

Growth Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (71)

**SDG 9 Industry, Innovation and**

Infrastructure Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation (72)

**SDG 10 Reduced Inequalities**

Reduce inequality within and among countries (73)

**SDG 11 Sustainable Cities and**

Communities Make cities and human settlements inclusive, safe, resilient and sustainable (74)

**SDG 12 Responsible Consumption and Production**

Ensure sustainable consumption and production patterns (75)

**SDG 13 Climate Action**

Take urgent action to combat climate change and its impacts (76)

**SDG 14 Life Below Water**

Conserve and sustainably use the oceans, seas and marine resources for sustainable development (77)

**SDG 15 Life on Land**

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (81)



It is important to him to accept people even when he disagrees with them. (104)

It is important to pay attention when filling out this survey, please indicate "Not like me at all", if you read this (105)

Page Break

End of Block: Default Question Block

Start of Block: Block 6

Q10 Where do you study?

- University of Twente (1)
- Other Dutch university (2)
- German university (3)

Q11 What is your field of study?

- Natural Sciences (1)
- Social Sciences (2)
- Business and Economics (3)
- Engineering and Technology (4)
- Humanities (5)
- Other (Please Specify) (6) _____

Q12 What is your Nationality?

- German (1)
- Dutch (2)
- Other (please specify) (3) _____

Q21 What is your age?

End of Block: Block 6

Appendix C

R-Script used for Data Analysis

```

setwd("C:/Users/Tim/OneDrive/Bachelor thesis/Rstudio")
sessionInfo()
install.packages("Hmisc")
install.packages("ggplot2")
install.packages("readr")
install.packages("lme4")
install.packages("readxl")
install.packages("haven")
install.packages("effects")
install.packages("car")
install.packages("ggpubr")
install.packages("lmerTest")
install.packages("lme4")
install.packages("tidyverse")
library(Hmisc)
library(ggplot2)
library(readr)
library(lme4)
library(readxl)
library(haven)
library(effects)
library(car)
library(ggpubr)
library(lmerTest)
library(lme4)
library(tidyverse)
library(lmtest)

mydata <- read_excel("final.dataset.xlsx")
mydata$Age <- as.numeric(mydata$Age)
data_clean <- na.omit(mydata$Age)

# Calculating the mean of the cleaned data
age_mean <- mean(data_clean)
age_sd <- sd(data_clean)
# Printing the mean
cat("Mean:", age_mean, "\n")
cat("Standard Deviation:", age_sd, "\n")

#Results according to paper's two step approach
#Correlation for SDG1 and Regression for SDG1

# Select the columns of interest
myvars1 <- c("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev", "M_Pdom",
"M_Pres", "M_Face", "M_SP", "M_SS", "M_Trad", "M_ConRul", "M_ConInt", "M_H
um", "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG1")
mydata_subset1 <- mydata[, myvars1]

```



```

# Calculate the correlation matrix
correlation_matrix1 <- cor(mydata_subset1)
# Print the correlation matrix: SP ,ConINT,Hum,M_UNC
print(correlation_matrix1)

myvars1 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG1")
rcorr(as.matrix(myvars1))

hist(SDG1_Tim_model$residuals, breaks = 15, col = "lightblue", main = "His
togram of UNC")

# Check the assumptions of the regression model

# 1. Linearity assumption
ggplot(mydata, aes(x = SDG1, y = UNC)) +
  geom_point() +
  geom_smooth(method = "lm", se = FALSE) +
  labs(title = "Linearity Plot")

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG1_Tim_model, ~ UNC, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG1_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG1_Tim_model)
summary(bp_test)
print(bp_test)

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG1_Tim_model))
summary(shapiro_test)
print(shapiro_test)

```

```

# 4. Independence assumption
durbinWatsonTest(SDG1_Tim_model_transformed)

# 5. Multicollinearity assumption
vif(SDG1_Tim_model)

GLM1 <- glm(SDG1 ~ SP + ConRul + ConInt + Hum + UNC, data = mydata, Gamma(
link = "log"))

summary(GLM1)

confint(GLM1, level = 0.95)

summary(SDG1_Tim_model)

myvars2 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG2")
rcorr(as.matrix(myvars2))

# Calculate the correlation matrix
correlation_matrix2 <- cor(mydata_subset2)
# Print the correlation matrix: SS, ConRul,UNC,BC
print(correlation_matrix2)

SDG2_Tim_model <- lm(SDG2 ~ UNC + BC + SS, data=mydata)
summary(SDG2_Tim_model)
confint(SDG2_Tim_model, level = 0.95)
vif(SDG2_Tim_model)

GLM2 <- glm(SDG2 ~ UNC + BC + SS, data = mydata, Gamma(link = "log"))
summary(GLM2)
confint(GLM2, level = 0.95)
summary(SDG2_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG2_Tim_model, data=mydata)
summary(harv_test)
# Print the test results: not significant thus linearity confirmed
print(harv_test)

#Homoscedasticity
plot(SDG2_Tim_model_, which = 1)
# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG2_Tim_model)
summary(bp_test)
print(bp_test)

# Create histogram for SDG2
hist(SDG2_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Hi
stogram of Res")

```

```

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG2_Tim_model))
summary(shapiro_test)
print(shapiro_test)
# 4. Independence assumption
durbinWatsonTest(SDG2_Tim_model)
# 5. Multicollinearity assumption
vif(SDG1_Tim_model)

# Select the columns of interest ##Trad
myvars3 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG3")

rcorr(as.matrix(myvars3))

# Calculate the correlation matrix
correlation_matrix3 <- cor(mydata_subset3)
# Print the correlation matrix:Pres, trad
print(correlation_matrix3)

GLM3 <- glm(SDG3 ~ Pres + Trad, data = mydata, Gamma(link = "log"))
summary(GLM3)
summary(SDG3_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG3_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus liearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG3_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG3_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG3_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG3_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

```

```

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG3_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG3_Tim_model)

# 5. Multicollinearity assumption
vif(SDG3_Tim_model)

# Select the columns of interest
myvars4 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG4")

rcorr(as.matrix(myvars4))

# Calculate the correlation matrix
correlation_matrix4 <- cor(mydata_subset4)
# Print the correlation matrix:
print(correlation_matrix4)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG4_Tim_model, data=mydata)
summary(harv_test)

# Print the test results:
print(harv_test)

# 2. Homoscedasticity assumption
plot(SDG4_Tim_model, which = 1)
plot(SDG4_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG4_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG4_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG4_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Hi
stogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG4_Tim_model_transformed))
summary(shapiro_test)
print(shapiro_test)

```

```

# 4. Independence assumption
durbinWatsonTest(SDG4_Tim_model)

# 5. Multicollinearity assumption
vif(SDG4_Tim_model)

#correlation regression:
SDG4_Tim_model <- lm(SDG4 ~ SS, data=mydata)
summary(SDG4_Tim_model)
confint(SDG4_Tim_model, level = 0.95)

GLM4 <- glm(SDG4 ~ SS, data = mydata, Gamma(link = "log"))
summary(GLM4)
confint(GLM4, level = 0.95)
summary(SDG4_Tim_model)

# Select the columns of interest
myvars5 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG5")

rcorr(as.matrix(myvars5))

# Calculate the correlation matrix:
correlation_matrix5 <- cor(mydata_subset5)
# Print the correlation matrix:
print(correlation_matrix5)

SDG5_Tim_model <- lm(cbind(SDG5) ~ ConInt + UNC, data=mydata)
summary(SDG5_Tim_model)
confint(SDG5_Tim_model, level = 0.95)
vif(SDG1_Tim_model)

#GLM
GLM5 <- glm(SDG5 ~ UNC, data = mydata, Gamma(link = "log"))
summary(GLM5)
summary(SDG5_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG5_Tim_model, ~ UNC, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)
# 2. Homoscedasticity assumption
plot(SDG5_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG5_Tim_model)

```

```

summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG5_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG5_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG5_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG5_Tim_model)

# 5. Multicollinearity assumption
vif(SDG5_Tim_model)

# Select the columns of interest
myvars6 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG6")

rcorr(as.matrix(myvars6))

# Calculate the correlation matrix
correlation_matrix6 <- cor(mydata_subset6)
# Print the correlation matrix:BD, UNC, BC
print(correlation_matrix6)

#correlation regression:
SDG6_Tim_model <- lm(cbind(SDG6) ~ BD + UNC, data=mydata)
summary(SDG6_Tim_model)
confint(SDG6_Tim_model, level = 0.95)
vif(SDG6_Cons_model)

GLM6 <- glm(SDG6 ~ BD + UNC, data = mydata, Gamma(link = "log"))
summary(GLM6)
summary(SDG6_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG6_Tim_model, data=mydata)
summary(harv_test)

# Print the test results
print(harv_test)

# 2. Homoscedasticity assumption

```

```

plot(SDG6_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG6_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG6_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for UNC
hist(mydata$UNC, breaks = 15, col = "lightblue", main = "Histogram of UNC"
)
# Create histogram for SDG1
hist(SDG6_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# 4. Independence assumption
durbinWatsonTest(SDG6_Tim_model)
# 5. Multicollinearity assumption
vif(SDG6_Tim_model)
# Select the columns of interest
myvars7 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG7")

rcorr(as.matrix(myvars7))
# Calculate the correlation matrix
correlation_matrix7 <- cor(mydata_subset7)
# Print the correlation matrix:
print(correlation_matrix7)

#correlation regression: HUm, UNN,
SDG7_Tim_model <- lm(cbind(SDG7) ~ UNN + Hum, data=mydata)
summary(SDG7_Tim_model)
confint(SDG7_Tim_model, level = 0.95)
vif(SDG7_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG7_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG7_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG4_Tim_model)
summary(bp_test)
print(bp_test)

```

```

# 3. Normality assumption
qqPlot(SDG4_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG7_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG4_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG4_Tim_model)

# 5. Multicollinearity assumption
vif(SDG4_Tim_model)
# Select the columns of interest
myvars8 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG8")

rcorr(as.matrix(myvars8))

# Calculate the correlation matrix
correlation_matrix8 <- cor(mydata_subset8)
# Print the correlation matrix:
print(correlation_matrix8)

#correlation regression:
SDG8_Tim_model <- lm(cbind(SDG8) ~ SS + Trad, data=mydata)
summary(SDG8_Tim_model)
confint(SDG8_Tim_model, level = 0.95)
vif(SDG8_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG8_Tim_model, data=mydata)
summary(harv_test)

# Print the test results:
print(harv_test)

# 2. Homoscedasticity assumption
plot(SDG8_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG8_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG8_Tim_model$residuals, main = "Normal Q-Q Plot")

```



```

# Create histogram for SDG1
hist(SDG8_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG8_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG8_Tim_model)

# 5. Multicollinearity assumption
vif(SDG4_Tim_model)

# Select the columns of interest
myvars9 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG9")

rcorr(as.matrix(myvars9))

# Calculate the correlation matrix
correlation_matrix9 <- cor(mydata_subset9)
# Print the correlation matrix:
print(correlation_matrix9)

#correlation regression:
SDG9_Tim_model <- lm(cbind(SDG9) ~ SS + Trad + Pres, data=mydata)
summary(SDG9_Tim_model)
confint(SDG9_Tim_model, level = 0.95)
vif(SDG9_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG9_Tim_model, data=mydata)
summary(harv_test)
# Print the test results:
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG9_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG9_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG9_Tim_model$residuals, main = "Normal Q-Q Plot")

```

```

# Create histogram for SDG1
hist(SDG9_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG9_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG9_Tim_model)

# 5. Multicollinearity assumption
vif(SDG9_Tim_model)

myvars10 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG10")

rcorr(as.matrix(myvars10))

#correlation regression:
SDG10_Tim_model <- lm(cbind(SDG10) ~ ConInt + UNC + UNT + Hum, data=mydata
)
summary(SDG10_Tim_model)
confint(SDG10_Tim_model, level = 0.95)
vif(SDG10_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG10_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG10_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG10_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG10_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG10_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Apply logarithmic transformation to SDG10
mydata$log_SDG10 <- log(mydata$SDG10)

```

```

# Create a new model with the logarithmically transformed response variable
SDG10_Tim_model_log <- lm(cbind(log_SDG10) ~ ConInt + UNC + UNT + Hum, data = mydata)

# Apply square root transformation to SDG10
mydata$sqrt_SDG10 <- sqrt(mydata$SDG10)

# Create a new model with the square root transformed response variable
SDG10_Tim_model_sqrt <- lm(cbind(sqrt_SDG10) ~ ConInt + UNC + UNT + Hum, data = mydata)

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG10_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG10_Tim_model)

# 5. Multicollinearity assumption
vif(SDG10_Tim_model)

myvars11 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG11")

rcorr(as.matrix(myvars11))

#correlation regression:
SDG11_Tim_model <- lm(cbind(SDG11) ~ UNN + SS, data=mydata)
summary(SDG11_Tim_model)
confint(SDG11_Tim_model, level = 0.95)
vif(SDG11_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG11_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: n
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG11_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG11_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG11_Tim_model$residuals, main = "Normal Q-Q Plot")

```

```

# Create histogram for SDG1
hist(SDG11_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "H
istogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG11_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG11_Tim_model)

# 5. Multicollinearity assumption
vif(SDG11_Tim_model)
# Select the columns of interest
myvars12 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG12")

rcorr(as.matrix(myvars12))

#correlation regression:
SDG12_Tim_model <- lm(cbind(SDG12) ~ UNN, data=mydata)
summary(SDG12_Tim_model)
confint(SDG12_Tim_model, level = 0.95)
vif(SDG12_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG12_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus liearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption
plot(SDG12_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG12_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG12_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG12
hist(SDG12_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "H
istogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG12_Tim_model))

```

```

summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG12_Tim_model)

# 5. Multicollinearity assumption
vif(SDG12_Tim_model)
myvars13 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG13")

rcorr(as.matrix(myvars13))

#correlation regression: UNN,
SDG13_Tim_model <- lm(cbind(SDG13) ~ UNC + UNN + UNT, data=mydata)
summary(SDG13_Tim_model)
confint(SDG13_Tim_model, level = 0.95)
vif(SDG13_Tim_model)
GLM13 <- glm(SDG13 ~ UNC + UNN + UNT, data = mydata, Gamma(link = "log"))
summary(GLM13)
confint(GLM13)
summary(SDG13_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG13_Tim_model, data=mydata)
summary(harv_test)

# Print the test results:
print(harv_test)

plot(fitted(SDG13_Tim_model), residuals(SDG13_Tim_model), xlab = "Fitted V
alues", ylab = "Residuals")
abline(h = 0, col = "red")

# Partial Regression Plot for UNC
plot(predict(SDG13_Tim_model, type = "terms", terms = 2), residuals(SDG13_
Tim_model), xlab = "UNC", ylab = "Residuals")
abline(h = 0, col = "red")

# 2. Homoscedasticity assumption -> assumption met
plot(SDG13_Tim_model, which = 1)
# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG13_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG13_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for UNC
hist(mydata$UNC, breaks = 15, col = "lightblue", main = "Histogram of UNC"

```

```

)
hist(SDG13_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "H
istogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG13_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG13_Tim_model)

# 5. Multicollinearity assumption
vif(SDG13_Tim_model)

# Select the columns of interest
myvars14 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG14")

rcorr(as.matrix(myvars14))

#correlation regression: Hum, UNN
SDG14_Tim_model <- lm(cbind(SDG14) ~ UNN, data=mydata)
summary(SDG14_Tim_model)
confint(SDG14_Tim_model, level = 0.95)
vif(SDG14_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG14_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG14_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG14_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG14_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG14_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "H
istogram of Res")

# Shapiro-Wilk test for normality

```

```

shapiro_test <- shapiro.test(resid(SDG14_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG14_Tim_model)

# 5. Multicollinearity assumption
vif(SDG14_Tim_model)

myvars15 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG15")

rcorr(as.matrix(myvars15))

#correlation regression:
SDG15_Tim_model <- lm(cbind(SDG15) ~ SDA + SDT + UNN, data=mydata)
summary(SDG15_Tim_model)
confint(SDG15_Tim_model, level = 0.95)
vif(SDG15_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG15_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG15_Tim_model, which = 1)

# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG15_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG15_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for SDG1
hist(SDG15_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG15_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG15_Tim_model)

```

```

# 5. Multicollinearity assumption
vif(SDG15_Tim_model)
myvars16 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG16")
rcorr(as.matrix(myvars16))

myvars17 <- mydata %>%
  select("M_SDT", "M_SDA", "M_Stimu", "M_Hedo", "M_Achiev",
         "M_Pdom", "M_Pres", "M_Face", "M_SP", "M_SS",
         "M_Trad", "M_ConRul", "M_ConInt", "M_Hum",
         "M_UNN", "M_UNC", "M_UNT", "M_BC", "M_BD", "SDG17")
rcorr(as.matrix(myvars17))

#correlation regression: SS, Hum, UNN
SDG17_Tim_model <- lm(cbind(SDG17) ~ SS + Hum, data=mydata)
summary(SDG17_Tim_model)
confint(SDG17_Tim_model, level = 0.95)
vif(SDG17_Tim_model)

# Harvey-Collier test for linearity on UNC
harv_test <- harvtest(SDG17_Tim_model, data=mydata)
summary(harv_test)

# Print the test results: not significant thus linearity confirmed
print(harv_test)

# 2. Homoscedasticity assumption -> assumption met
plot(SDG17_Tim_model, which = 1)
# Breusch-Pagan test for homoscedasticity
bp_test <- bptest(SDG17_Tim_model)
summary(bp_test)
print(bp_test)

# 3. Normality assumption
qqPlot(SDG17_Tim_model$residuals, main = "Normal Q-Q Plot")

# Create histogram for UNC
hist(mydata$UNC, breaks = 15, col = "lightblue", main = "Histogram of UNC"
)

# Create histogram for SDG1
hist(SDG17_Tim_model$residuals, breaks = 15, col = "lightgreen", main = "Histogram of Res")

# Shapiro-Wilk test for normality
shapiro_test <- shapiro.test(resid(SDG17_Tim_model))
summary(shapiro_test)
print(shapiro_test)

# 4. Independence assumption
durbinWatsonTest(SDG17_Tim_model)

```



```
# 5. Multicollinearity assumption
vif(SDG17_Tim_model)

# Perform paired t-test
result <- t.test(mydata$SDG2, mydata$SDG6, paired = TRUE)
# Print the result
print(result)
result <- t.test(mydata$SDG2, mydata$SDG3, paired = TRUE)
# Print the result
print(result)
result <- t.test(mydata$SDG6, mydata$SDG3, paired = TRUE)
# Print the result
print(result)
result <- t.test(mydata$SDG6, mydata$SDG13, paired = TRUE)
# Print the result
print(result)
#
mean_values <- colMeans(mydata[, paste0("SDG", 1:17)])

# Display the mean values
mean_values

SDG2 <- mydata$SDG2
SDG6 <- mydata$SDG6
SDG3 <- mydata$SDG3
SDG13 <- mydata$SDG13

# Perform t-tests
ttest_SDG2_SDG6 <- t.test(SDG2, SDG6)
ttest_SDG2_SDG3 <- t.test(SDG2, SDG3)
ttest_SDG2_SDG13 <- t.test(SDG2, SDG13)

# Print the results
print(ttest_SDG2_SDG6)
print(ttest_SDG2_SDG3)
print(ttest_SDG2_SDG13)
```