

Exploring Human-Nature Relationships amongst Young People: Findings of a Quantitative Survey between Germany and South Africa

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ABSTRACT

The environmental crisis needs to be challenged by fundamental socio-ecological transformation. Contemporary science education programs focus on influential factors like nature experience, emotional bonds with the natural environment and understanding of nature trying to promote pro-environmental behaviors amongst young people. In order to compare two contrasting countries this quantitative survey was carried out with the participation of 836 young people in Germany, and 846 in South Africa aged 12 to 19 ($M = 14.68$, $SD = .52$). We found that young South Africans spent more time in nature together with their schools and are more emotionally related to their natural world. In conclusion, the human-nature relationships amongst young people in both countries can be described as inconsistent, detached and disturbed.

Keywords: connectedness to nature, environmental identity, human-nature relationships, nature experience, pro-environmental behaviors, quantitative survey, understanding of nature

INTRODUCTION

The current global ecological crisis is one of the most important issues of modern societies. Undoubtedly, anthropogenic behaviors (e.g. climate change, environmental pollution, species extinction) severely damage ecological systems (IPBES, 2019) and eventually threaten humanity's basis of existence (Schellnhuber, Rahmstorf, & Winkelmann, 2016). Since there is a serious and urgent need for socio-economic transformation (Lockie, Sonnenfeld, & Fisher, 2014) concepts like Sustainability Development Goals (SDGs) (United Nations, 2017) were introduced trying to redirect humanity towards a sustainable path. In this context education programs focus on the potentials of young people (Stoltenberg, 2014; Von Braun, 2017) in order to foster future actions that might be useful to minimize the present ecological crisis (Schmitt, Akin, Axsen, & Shwom, 2018). Hence, numerous studies aimed at identifying beneficial factors that encourage the development of pro-environmental behaviors amongst young people (Capaldi, Dopoko, & Zelenski, 2014; Dornhoff, Hörnschemeyer, Fiebelkorn, & Menzel, 2018; Otto & Pensini, 2017). Following the conceptual framework of the nature awareness studies by the BMU (German Federal Ministry for Environment, 2017) only a limited number of factors should be included in the investigation of pro-environmental behaviors that can be condensed in the concept of human-nature relationships (Van Riper, Browning, & Becker, 2019). Meaningful nature experience (Bixler, Floyd, & Hammitt, 2002; Lude, 2014; Zylstra, 2014), affective interrelationships with the natural world (Otto & Pensini, 2017; Nisbet & Zelenski, 2013) and a consistent cognitive

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Table 1. The Understanding of Nature Model by Kattmann (1994)

Categories	Description
1. Required Nature	Nature as the foundation of human existence, e.g. source of nutrition
2. Beloved Nature	Emotional connection to nature caused by intimate encounters with living organisms, e.g. gardening, or domestic animals
3. Honored Nature	Religiously, spiritually, esoterically connoted perception of nature
4. Experienced Nature	Dichotomous understanding of nature, in which flora and fauna are perceived as unknown and untouched
5. Ruled Nature	Human-beings control nature
6. Threatened Nature	Anthropogenic influences result in ecological crisis
7. Lived Nature	Exposure to nature as an encounter with an individual's inner self

understanding of nature (Adams, Savahl, & Casas, 2015; Thondhlana & Hlatshwago, 2018) can be considered as valuable factors on the development of pro-environmental behaviors.

LITERATURE REVIEW

Previous research has revealed positive effects of meaningful nature experience on individual's levels of happiness (Capaldi, Dopoko, & Zelenski, 2014), cognitive health (Bragg, Wood, Barton, & Pretty, 2013; Young, 2012), as well as the development of emotional relationships with the natural world (Dornhoff, Sothmann, Fiebelkorn, & Menzel, 2019; Kals, Schumacher, & Montanda, 1998; Raudsepp, 2005). Though activities in nature cannot be considered as an inherent part of young people's daily-routine (Brämer, Koll, & Schild, 2016). Nowadays, children increasingly engage in free time activities that are linked to computers, smartphones or online-gaming (Alyssa & Nelson, 2017) drawing them further away from developing positive bonds with nature (BMU, 2017; Brämer, Koll, & Schild, 2016; Hefler, Cervinka, & Zeidler, 2009). Predominantly, young people experience activities in nature with their families or their peer group (Dornhoff, Sothmann, Fiebelkorn, & Menzel, 2019; Karlegger, 2010; Niesporek, 2009) which are linked to sportive interests, or recreational purposes (Brämer, Koll, & Schild, 2016; Karlegger, 2010). The biophilia hypothesis (Kellert & Wilson, 1993; Wilson, 1984) assumes a subconscious, passionate, inherent love of human-beings for their environment. Based on this theory, concepts like connectedness to nature (Mayer & Frantz, 2004) and environmental identity (Clayton, 2003) were introduced that similarly can be characterized as an individual's widened state of consciousness resulting in pro-environmental attitudes and behaviors (Clayton, 2012; Zylstra, 2014). Individuals that feel a strong connection to their natural environment spend more time on outdoor activities (Helfer, Zeidler, & Cervinka, 2009; Hinds & Sparks, 2009; Raudsepp, 2005). Additionally, connectedness to nature provides a comfortable feeling of freedom, lightheadedness and serenity (Kals, Schumacher, & Montanda, 1998), although negative reactions can be caused in these individuals by endangerment or destruction of nature (Raudsepp, 2005). Connectedness with nature and environmental identity are closely linked to specific regional and cultural contexts (Clayton, 2003). Accordingly, learners from emerging countries seem to be more connected to nature than those from highly industrialized countries (Dornhoff, Sothmann, Fiebelkorn, & Menzel, 2019; Karlegger, 2010). Several studies investigated individual's concepts of understanding of nature (Kollender & Zabel, 2013; Margadant-van-Arcken, 1995). Primarily, young people understand nature as their natural surroundings (e.g. trees, plants, animals, lakes, sun) thus as human being's counterpart (BMU, 2017; Pohl, 2006). Even though young individuals value nature as humanity's required basis of existence (Brämer, 2011) (e.g. as source of nutrition), they see the importance that the natural environment needs to be ruled and controlled by human beings (Brämer, Koll, & Schild, 2016). Nature is rarely associated with negative aspects like climate change, environmental pollution or species extinction caused by anthropogenic behaviors (BMU, 2017; Kollender & Zabel, 2013). Young people from South Africa predominantly understand nature as ruled, but still profoundly admired and honored (Adams, Savahl, & Casas, 2015). In conclusion, the human-nature relationship amongst young people can be described as inconsistent, detached, and disturbed (Brämer, Koll, & Schild, 2016; Kollender & Zabel, 2013; Lude, 2014; Thondhlana & Hlatshwago, 2018). Generally, learners are aware of the ecological crisis, though actual pro-environmental behaviors are rather scarce (Grunenberg, Küster, & Rode, 2012; Ljunggren, 2011; Thondhlana & Hlatshwago, 2018). These results are quite alarming since studies indicated that disturbed human-nature relationships are considered as a detrimental factor to the development of pro-environmental behaviors (Otto & Pensini, 2017; Schultz, 2001). Kattmann (1994) developed a model of understanding of nature which is divided by seven categories (see **Table 1**).

Table 2. Overview of the Standardized Questionnaire

Instruments	Items	Examples
Nature Experience	3	Do you engage in activities in nature together with your teachers?
CNS	13	I feel connected to nature.
EIS	24	In general, being part of the natural world is an important part of my self-image.
Understanding of Nature	1	What is nature for you?

PURPOSE OF THIS RESEARCH

The contrasting regional and cultural areas of Bremen (Germany) and Durban (South Africa) differ in population, climatic conditions (Statistisches Landesamt Bremen, 2018; Statistics South Africa, 2016), as well as status of a biodiversity hotspot (Forest et al., 2007; Myers et al., 2002; Roberts et al., 2002). Since 2004 the German environmental science education curriculum is outcome-based (KMK, 2004), focusing competences like problem-solving (DeHaan, 2008) and evaluation skills (Mittelsten Scheid, & Hößle, 2007; Riekmann, 2010). Similarly, South Africa's environmental education system tries to promote problem-solving strategies amongst their learners, particularly focusing on social and ecological issues (Department of Education, South Africa, 2005). Up until today there has been no investigative project comparing intercultural differences of human-nature relationships amongst young people of Germany and South Africa. To provide insight into this area, a standardized questionnaire with regard to nature experience, connectedness to nature, environmental identity, as well as understanding of nature was adopted. Three research questions were addressed:

- 1) Do German and South African young people spend time in nature on a regular basis?
- 2) How do German and South African young people differ in their connectedness to nature and environmental identity?
- 3) How do German and South African young people differ in their understanding of nature?

Since the investigation of intercultural differences is relatively unexplored, no literature-based hypothesis could be developed. Though we assumed that young people from Germany and South Africa show differences in their human-nature relationships.

METHODOLOGICAL FRAMEWORK

Participants and Procedures

The whole sample consisted of 1,682 anonymously surveyed learners from Germany ($n = 836$) and South Africa ($n = 846$) aged 12 to 19 ($M = 14.68$, $SD = .52$; female: 46.5%). Ten schools in Germany and eleven schools in South Africa participated. Data was collected using a standardized paper-and-pencil questionnaire. The participants needed 15 to 35 min to complete the questionnaire. Participation was voluntary. This study did not address racial or ethnic origin, political values, religious beliefs or sexual orientation. Ethical approval was obtained from responsible bodies in Germany (Senatorin für Bildung und Wissenschaft in Bremen) and South Africa (Department of Education of KwaZulu-Natal in Pietermaritzburg).

Materials

Nature experience was measured by three items asking if the participants spend time in nature on a regular basis with their families, their peer group and their school. As several studies have shown that the concept of nature is closely linked to regional and cultural contexts, no definition was provided. The Connectedness to Nature Scale (CNS) by Mayer and Frantz (2004) and the Environmental Identity Scale (EIS) by Clayton (2003) are established survey instruments measuring emotional connection to the natural world. Using a five-point Likert scale, participants rated the items of CNS and EIS from 1 (disagreed) to 5 (strongly agreed). Understanding of nature was measured by one open-ended item allowing multiple responses. The German, English and isiZulu versions of the questionnaire were translated by native speakers who were familiar with the used survey instruments. An overview of the standardized questionnaire is provided in **Table 2**.

Table 3. Nature Experience with Family, Peer Group, and School

	All	Germany	South Africa
	Family		
Yes	68% (1141)	62% (515)	74% (626)
No	32% (541)	38% (321)	26% (220)
	Peer Group		
Yes	62% (1051)	60% (499)	66% (552)
No	38% (631)	40% (337)	34% (294)
	School		
Yes	30% (501)	20% (171)	39% (330)
No	70% (631)	80% (664)	61% (513)

Table 4. Results Understanding of Nature in Germany and South Africa

	Germany	South Africa
Category	Number	Number
1. Required Nature	8% (66)	10% (77)
2. Beloved Nature	6% (48)	3% (21)
3. Honored Nature	1% (7)	20% (154)
4. Experienced Nature	15% (116)	20% (156)
5. Ruled Nature	0% (1)	2% (13)
6. Threatened Nature	3% (25)	6% (43)
7. Lived Nature	11% (84)	26% (201)
8. Untouched Nature	33% (255)	23% (181)
9. Recreational Nature	12% (95)	8% (61)
10. Flora and Fauna	60% (469)	41% (321)
11. Open and Free Nature	12% (97)	2% (17)
12. Green Nature	13% (101)	2% (17)
	176% (1369)	164% (1278)

Data Analyzing Techniques

For nature experience uncentered scores are reported. Confirmatory factor analysis was conducted in order to test the dimensionality of CNS and EIS verifying literature-based specifications (Clayton, 2003; Mayer & Frantz, 2004). Both scales were checked for reliability with Cronbach's alpha reporting good to excellent results. Although variables of CNS and EIS did not follow normal distribution, independent group *t*-tests were calculated to compare the German and the South African samples. For CNS and EIS only centered scores are provided. The effect sizes of group differences were calculated by Cohen's *d*, using mean scores, standard deviations and sample sizes. Understanding of nature was analyzed using the help of the model by Kattmann (1994).

RESULTS

The results show that the majority of learners in Germany (62%) and in South Africa (74%) regularly engage in nature activities with their family. In both countries young people frequently engage in nature activities with their peer group (Germany 60%; South Africa 66%). In South Africa 39% of all learners are regularly exposed to nature within their schooltime and 20% in Germany (see **Table 3**).

Regarding CNS the *t*-test showed differences with a mediocre effect size ($d = 0.76$) between German and South African individuals, with South Africans ($M = 3.59$; $SD = .54$) scoring higher than Germans ($M = 3.14$; $SD = .64$). Regarding EIS, South Africans ($M = 3.69$; $SD = .65$) scored higher than Germans ($M = 3.15$; $SD = .71$) with a mediocre effect size ($d = 0.79$). Regarding the understanding of nature 1,369 answers were given in Germany and 1,278 in South Africa. The understanding of nature model by Kattmann (1994) could be expanded by five new categories: 'Untouched Nature', 'Recreational Nature', 'Flora and Fauna', 'Open and Free Nature' and 'Green Nature' (see **Table 4**).

Examples for the category 'Untouched Nature' can be *nature without humans* [Natur ohne Menschen] or *no man-made structure* and for the category 'Recreational Nature' *relaxation, taking a deep breath* [Entspannung, durchatmen], also using *nature to heal my heart when I am sad*. Examples for the category

'Flora and Fauna' are trees, lakes, bushes, birds [Bäume, Seen, Büsche, Vögel] and everything around us, air, water, sand. In addition, for the category 'Open and Free Nature' no car exhaust fumes [keine Autoabgase] and a space where you get fresh air. Examples for the category Green Nature are green landscapes [grüne Landschaften] and green land. 60% in Germany and 41% in South Africa described nature using associations like plants, animals, lakes or mountains (Flora and Fauna). Both groups perceived their natural world as rather untouched (33% in Germany; 23% in South Africa). In South Africa 26% of all learners described their natural surroundings as 'Lived Nature', and 11% in Germany. There is a major difference between responses within the category 'Honored Nature' that was referred to by 20% participants in South Africa and by 1% in Germany.

DISCUSSION AND CONCLUSION

The findings of this present research project could reveal intercultural differences between German and South African young people. As expected, German and South African individuals regularly spent time in nature with their families and peer groups (Brämer, Koll, & Schild, 2016; Dornhoff, Sothmann, Fiebelkorn, & Menzel, 2019). Surprisingly, learners from Germany rarely experience outdoor activities with their school. German and South African young people differed in their connectedness to nature and environmental identity, thus they are more related to their natural environment. Available data suggests that emotional relationships with the natural world are more likely amongst young people who live in emerging countries (Dornhoff, Sothmann, Fiebelkorn, & Menzel, 2019). Similarly, German and South African young people understand nature as human beings untouched counterpart revealing a rather inconsistent, detached and disturbed concept of nature (Adams, Savahl, & Casas, 2015; BMU, 2017; Kollender & Zabel, 2013; Pohl, 2006; Thondhlana & Hlatshwago, 2018). In conclusion, in both countries pro-environmental behaviors amongst young people can be considered as unlikely (Grunenberg, Küster, & Rode, 2012; Thondhlana & Hlatshwago, 2018). Intercultural differences between German and South African young people can be explained by contrasting regional and cultural contexts. Durban's subtropical climatic conditions and its status as a biodiversity hotspot might have a positive impact on young people's experiential, affective and cognitive interrelationships with the natural world. Above all, progressive environmental education programs need to adjust their curriculum in order to provide meaningful, diverse and recurrent nature experience for young people who are rather detached from their natural world. With regard to children's affinity to electronic devices (Alyssa & Nelson, 2017; Lindau et al., 2018) different authors suggested utilizing GPS devices for outdoor activities allowing adventurous nature experiences. Pütz and Wittkowske (2012) focus on the potential of integrated gardening projects to realize meaningful encounters with nature. To sum up, there is an urgent need for redirecting young people's human-nature relationship towards a sustainable path. Several other influential factors, e.g. social and political circumstances, infrastructure, economic capital, personality traits or beliefs were not considered to analyzing human-nature relationships among young people. Particularly, a differentiated consideration of gender differences or socio-economic circumstances were not addressed in this paper. This article included only a limited selection of empirical data gathered from the research project conducted between 2014 and 2016.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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