Young People and Climate Change Communication

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Summary

One important group to include in efforts to combat climate change is young people. This group comprises the future leaders of society, besides being citizens of today, and they will be the ones handling the future negative consequences of this global problem. This article provides an overview of some research about climate change communication and young people. The aim is to gain a better understanding of how this group relates to and communicates about climate change in different contexts, and how to best promote knowledge, a sense of efficacy, and engagement concerning this problem. The focus is on young people who are between late childhood and young adulthood. Questions in focus are: How do media messages about climate change influence young people, and how do they themselves use media, for instance social networks, to engage with this issue? Can art-based and entertainment approaches to communication overcome the distant and complex character of climate change and make young people feel more empowered and engaged? Is it possible to communicate about climate change and raise awareness by promoting contact with nature and animals? How do young people cope with the negative emotions that are often evoked by information about this problem? In what way do young people communicate in everyday life with parents, peers, and teachers about climate change? Are participatory approaches to climate change communication a good way to prepare young people for future extreme climate events?

Keywords: children, adolescents, emerging adults, climate change, communication, education, media, participatory approaches, socialization, coping

Subjects: Communication

Introduction

The field of climate change communication research has boomed in recent years and the main goal of this multidisciplinary field is to gain a better understanding of the climate communication process in all its complexity (Moser, 2016). One important part in this effort is to understand how different subgroups of the population relate to and communicate about the problem. In this regard, one group that is especially important to focus on, and to include in communication efforts, comprises young people (see Corner et al., 2012).

The reason that young people are such an important group to include is manifold: (a) The young of today are the future leaders, decision-makers, and researchers of tomorrow. Thus, this group will have a great influence in the future, not only as laypeople, but also in various occupational roles. (b) From an ethical perspective, it is vital to listen to and learn from this group, as young people will most probably bear a larger burden of the negative consequences of climate change than older people (White, 2011). (c) Young people are, however, also consumers and citizens of

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today and are a part of the climate problem through their ways of living. (d) In addition, if more participatory and deliberative communication approaches are applied, different groups of young people could have unique knowledge about local places, for instance, knowledge that ought to be included in efforts to adapt to climate change (UNICEF, 2014). (e) There are researchers who argue that climate change is not only a societal and environmental problem, but also a psychological threat (Fritze, Blashki, Burke, & Wiseman, 2008; Searle & Gow, 2010; Swim et al., 2011). In this regard, young people, especially children, are perhaps more vulnerable to experiencing negative affect and low well-being in relation to climate change (Fritze et al., 2008). (f) Finally, young people are unique in that many are involved in the formal educational system and thus are relatively easy to reach with information about climate change. In addition, values, worldviews, and identities are still not wholly internalized in this age group, so young people, in general, are hopefully more open to new ways of responding to this problem (Stevenson, Peterson, Bondell, Moore, & Carrier, 2014).

To summarize, young people are an important group to understand and to target when it comes to communication about climate change. To reach this group one needs to understand how this group and specific subgroups within this group relate to this global challenge. The aim of this article is to gain a better understanding of how this group relates to and communicates about climate change in different contexts, and how to best promote knowledge, a sense of efficacy, and engagement concerning this problem. Communication is seen as both a one-way process of transmission and a two-way interaction (Ballantyne, 2016).

In this article, the term *young people* encompasses those people who are between about 11 years old and young adulthood, about 25 years of age. It is around late childhood and the early teens that young people start to think in a more abstract way and therefore become more interested in issues such as global problems (Evenshaug & Hallen, 2001; Holden, 2007). Thus, this could be an ideal time to start communicating with children about this issue (Chawla & Flanders Cushing, 2007). The upper limit is chosen because young people today, especially in the western world, get married and have children at an older age and continue their education far into their twenties. Therefore, the expression “emerging adulthood,” a period between the late teens and mid-to-late twenties has been coined (Arnett, 2000). This is a time for exploration, including creating an ideological part of one’s identity, where one’s connection to the larger society is developed. Hence, it is of interest to include emerging adults. The more specific terms of *children* (11–12 years of age), *adolescents* or *youths* (13–19 years of age), *emerging adults* (up to their mid- to late twenties), and *young people* (when referring to this group broadly) will be used. The focus in this article is mainly on young people living in the Western world. This is entirely due to the fact that most research is conducted with this group.

Young People and Climate Change—A Brief Overview

To communicate with young people about climate change in a constructive manner, it is vital to understand that, despite their heterogeneity (see Stanes & Klocker, 2016), young people as a group seem both to differ from and evince similarities with adults in their ways of relating to climate change. This section will present some examples.

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Climate Change Knowledge, Views, and Agency

Some studies show that age is inversely related to concern for climate change, that is, young people seem to be more concerned and, also, sometimes have more knowledge about this issue (European Commission, 2011; Flöttum, Dahl, & Rivenes, 2016; Gifford & Comeau, 2011).[1] Young people themselves think that new generations are more environmentally aware than their predecessors, and a commitment to environmental causes has become a part of the global identity of young people (Estévez, de Frutos, Ruth, & Moya, 2014). At the same time, young people's lifestyles are not more sustainable than those of older groups (Gifford & Comeau, 2011; Mead, Roser-Renouf, Rimal, Flora, Maibach, & Leiserowitz, 2012; Meneses & Palacio, 2005). Thus, the gap between values, attitudes, and competence, on the one hand, and behavior, on the other, is perhaps largest in this age group. However, more research that focuses specifically on this question is needed.

Although consciousness about this problem seem to be quite high at least among some groups of young people, there are still misunderstandings related to scientific knowledge when it comes to, for example, the difference between climate change and the hole in the ozone layer (Leiserowitz, Smith, & Marlon, 2011; Shepardson, Niyogi, Choi, & Charusombat, 2011; Shepardson, Niyogi, Choi, & Charusombat, 2009; Sternäng & Lundholm, 2012; Taber & Taylor, 2009). Thus, the knowledge young people have about this problem seems to be somewhat superficial.

There is also a huge gap between young people's view of the global future, including problems such as climate change, which is often quite bleak and pessimistic, and their view of their personal future, which is often quite optimistic (Eckersley, 1999; Holden, 2006; Threadgold, 2012). Thus, climate change is perceived as distant and separate from their own lives (Ballantyne, Wibeck, & Neset, 2016). This makes it important to explore how young people can engage with this problem in a personally relevant way.

Young people have less power to influence this issue than adults; the majority of teenagers cannot vote and still live at home, where they are dependent upon their parents when it comes to lifestyle choices. In accordance, studies point out a rather low sense of environmental efficacy among teenagers (Ballantyne et al. 2016; Hibberd & Nguyen, 2013; Özdem, Dal, Öztürk, Sönmez, & Alper, 2014; Pruneau, Liboiron, Vrain, Gravel, Bourque, & Langis, 2001). In a study by Pruneau et al. (2001), adolescents showed less confidence than adults in the possibility of mobilizing people to decrease their impact on the climate. A Swedish study revealed a limited sense of agency among adolescents, as they externalize responsibility for action to parents, politicians, and the international community and perceive climate change as something that does not directly relate to them (Ballantyne, Wibeck, & Neset, 2016). British youths expressed the view that the climate change issue did not play a major role in their day-to-day life (Hibberd & Nguyen, 2013). They did recognize the possibility of people fixing the problem but lacked a sense of empowerment to engage with it. Thus, the gap between interest in and the possibility, real as well as perceived, of influencing the situation is perhaps largest in this group.

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Emotions and Coping in Relation to Climate Change

It could be argued that putting too much responsibility for handling climate change on young people's shoulders could lead to distress among this group, due to the gap between what one would like to do and what one has the means to do (see Fritze et al., 2008) For instance, both children and adolescents who use problem-focused strategies to cope with this threat, that is, focusing on what they themselves can do at an individual level, on the one hand, feel a stronger sense of self-efficacy, but, on the other hand, are also more inclined to experience general negative affect than those young people who do not cope in this way to the same extent (Ojala, 2012a, 2013). Thus, feeling that you can influence the situation and experiencing a high degree of well-being is not always the same thing, perhaps because the young are aware that these kinds of problem cannot be solved solely at an individual level.

When it comes to age differences in the group *young people*, there is some Swedish research emphasizing that, since education about environmental problems is quite common in the pre-school and early years of education, high-school students are already bored when it comes to climate change (Österlind, 2012; SNASI, 2005). There are also studies showing that "climate change denial" is present not only in groups of adults but also among young people (Corner et al., 2015; Klöckner, Beisenkamp, & Hallmann, 2010; Leiserowitz et al., 2011; Ojala, 2015a; Stevenson et al., 2014). A suggested solution to this predicament is to not shy away from value dimensions in educational efforts, but to focus instead on complexity and value conflicts (Öhman & Öhman, 2013; see also Österlind, 2012). However, research about democratic education at the college level in the United States rather indicates that such an approach can overestimate emerging adults' ability to deal with uncertainty and complexity and thereby risk creating increased feelings of helplessness and hopelessness (Colby, Beaumont, Ehrlich, & Corngold, 2007). This is backed up by studies showing that adolescents and emerging adults feel more hopelessness and pessimism concerning climate change than children (Eckersley, 1999; Ojala, 2012b; Holden, 2006). At least one study has found that children are actually higher in self-efficacy concerning this issue than adults (Devine-Wright, Devine-Wright, & Fleming, 2004).

At the same time, as young people are seen as more vulnerable than adults when it comes to climate change, it is important to realize that studies show that young people actively cope in different ways by de-emphasizing the problem, distancing themselves from negative emotions felt, putting trust in various societal actors, and getting involved in different organizations (Ojala, 2012b; Pettersson, 2014). These are strategies that are more or less constructive when it comes to engagement and well-being (Ojala, 2012a, 2013, 2015b). Hence, taking account of emotions is not enough when communicating about climate change; one must also take into account different ways of regulating emotions/coping.

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Young People, the Media, and Climate Change

Due to the remote reality of climate change, the media are one of the main sources of information both for adults (Olausson, 2009) and a younger audience (Özdem, Dal, Öztürk, Sönmez, & Alper, 2014). Therefore, this section looks at how messages about climate change communicated through the traditional mass media influence young people, but also how young people use one-line media to communicate about this issue.

What Is in the Message?

Not only do the media provide factual scientific information about climate change, they also influence young people's understanding of the crisis as well as their sense of self-efficacy and willingness to engage. In a Swedish study, Ballantyne et al. (2016), analyzed high-school students' associations with climate change. The most common understanding of the crisis was expressed through such words as greenhouse effect and carbon dioxide. Interestingly, those associations somewhat mirror the Swedish mainstream media portrayal of climate change (Olausson, 2009).

A number of media-content studies have pointed out that media representation of climate change assumes a few predictable shapes, focusing merely on debaters and their claims, which leads to an exaggerated sense of uncertainty (Brulle, 2010), and scaremongering (Hulme, 2007). Such negative information by the media evokes emotional responses and could lead to disengagement from the crisis among young people across the world, which studies with emerging adults in South Africa (El Zoghbi & El Ansari, 2014) and the United Kingdom (Hibberd & Nguyen, 2013) indicate. El Zoghbi and El Ansari (2014) suggest that fear-inducing coverage evokes emotional response strategies to handle the crisis psychologically. Climate images in media can perhaps force young people to distance themselves from the climate situation through denial of its reality or externalization of responsibility.

However, there are some empirical studies indicating that visual information may have an impact on a young audience that is slightly different than the research reviewed above suggests. In an experiment Beattie, Sale, and McGuire (2011) analyzed how clips from the 2006 film *An Inconvenient Truth* affected university students' emotions and attitudes towards the issue. Watching several clips from the film produced a strong emotional response. Participants felt more empowered and motivated to do something to help mitigate the consequences right after watching the clips. The researchers could not say how enduring this effect would be, however. Ballantyne et al. (2016) analyzed how climate visualization affects young audiences' understanding of the phenomenon. Visual representations helped students to understand complex aspects and had an overall positive influence on their reception of the message.

The tone of the media coverage is only one of many factors that influence young people's attitudes towards the issue. Other features of climate change reporting that could impede young people's engagement include the complexity and jargon of the information provided (El Zoghbi & El Ansari, 2014), lack of media coverage in general and relevant and engaging messages in

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particular, abundance of conflicting messages (Hibberd & Nguyen, 2013), and celebratization of climate change (Hibberd & Nguyen, 2013). While reception studies point out that media are partly to blame for young people's disengagement, no evidence was found that news consumption had a direct effect on the level of climate change skepticism expressed by adolescents (Ojala, 2015a).

Very few studies have empirically explored media influence on young people's everyday environmental behavior or environmental activism. Skogen and Strandbu (2000) found that intellectual TV viewing (unlike commercial TV viewing) strongly predicted environmental concern and the likelihood of organization membership among Norwegian youth. Östman (2014) proposed a more detailed account of how the media influence young people's environmental behavior. In his study, Swedish adolescents were more likely to engage in pro-environmental behavior when they discussed what they heard on the news from both online and offline sources with their parents and friends.

How Do They Process Information?

Although the information youths receive from the media is quite similar in tone and content, not everyone responds to the information in the same way. Sadler, Chambers, and Zeidler (2004) analyzed how adolescents process and evaluate information with conflicting evidence about global warming. The results showed that prior beliefs play a major role in evaluating which position was the most convincing to them. Later studies confirm the idea that existing beliefs and prior attitudes predefine how young people process conflicting information (Corner, Whitmarsh, & Xenias, 2012). Corner et al. (2012) found that individuals with skeptical attitudes about climate change assimilate new information in line with their existing attitudes. However, skeptics did not perceive the skeptical science-based editorials as more convincing than pro-climate change editorials. This suggests that this biasing influence of prior attitudes may be less powerful "when the information under consideration is based on (relatively objective) facts and figures rather than political opinion and conjecture" (Corner et al., 2012, p. 475).

The personal relevance of information is another important factor. When presented with different opinions, adolescents are drawn more to a position that explains consequences to which they can relate. Moreover, personal relevance plays a greater role in their evaluation of information than the actual scientific knowledge that supports it (Sadler, Chambers, & Zeidler, 2004). Yang, Kahlor, and Griffin's (2014) study on American and Chinese youth also highlighted that respondents who viewed climate change as personally relevant were willing not only to pay attention to information about the issue but also to engage in conversations and exchange information about this topic. Those who considered it as a distant and incomprehensible risk, however, did not see a reason to share information on this issue. The lack of agency among Turkish adolescents was also connected with their perception of climate change as a global issue rather than a local and relatable one (Özdem et al., 2014).

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Online Media

The idea that young people often choose digital media as an alternative way to engage politically has firmly established itself in the political communication field. Despite the growing evidence of young people's alternative engagement choices, research on the role of digital media in climate change communication is rather sparse. To explore how young people make sense of climate change in the global flow of information, Rye (2013) studied Norwegian secondary-school students and their engagement with Internet for schoolwork. Climate change is often seen by youth as a distant reality that does not overlap with their everyday lives. Although the digital media have the potential to shrink time and space, Rye's (2013) study showed that adolescents' new digital spaces are largely local or national, as they have a limited capacity to evaluate the trustworthiness of distant information sources. Thus, students mainly use national sources to access information from distant places, and most of the global flows are out of their reach.

Sense of place indeed plays an important role concerning how online information is interpreted. Adams and Gynnild (2013) explored how university students in the United States and Norway respond to environmental messages using short online videos and an interactive Internet tool, an "ecological footprint calculator." The scholars emphasized the importance of place-based identity for the interpretations of the content—the better information was tailored to the social and geographical context to which the students could relate and identify, the more responsive they were to it. Adams and Gynnild (2013) concluded that a key to successful online communications is to permit users to interactively self-locate in ways that let it reflect their sense of "home" and minimally evoke national identity, so that the outcome is felt to be meaningful in their interpretative community.

Nevertheless, digital media not only provide access to more information about climate change, but also facilitate different forms of engagement. In their study on American teenagers, Allen, Wicks, and Schulte (2013) focused on online peer persuasion to be more environmental. The results showed that political interest, political consumerism, the use of purchasing power to support causes and organization, and environmental news consumption had the greatest influence on adolescents' behavior online rather than environment-related beliefs and attitudes. Andersson and Öhman (2016) also found that communicating about climate change in social media, in this case an online community, seemed to enable young people to develop a sophisticated and complex conversation around this issues.

A study by Robelia, Greenhow, and Burton (2011) highlighted that social networks may also provide the motivation for young people to behave in more environmentally friendly ways. This study focused on the Facebook application "Hot Dish," which was launched to enable students to post climate change news stories from other websites and comment on them. The users of the application were a self-selected group of environmentally oriented people who already behaved responsibly in everyday life. Nevertheless, a post-survey showed participation in online discussions resulted in increased pro-environmental habits. Although the study design only allowed participants to talk about short-term effects, the findings demonstrated that peer role modeling through interaction motivated the young to learn more about climate change and to do more to limit its impact.

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Sunstein (2007), however, warns that new media can lead to enhanced fractionalization, where users block themselves off from issues that are experienced as boring or emotionally upsetting, potentially leading to lower levels of engagement around climate change among young people who are not interested.

Communication Through Art-Based Approaches and Entertainment

Climate change is seen as a distant and abstract phenomenon by many people living in the Western world, both young and old. Therefore, researchers and practitioners have explored how to engage young people with this distant and complex issue through art-based and entertainment approaches.

Art-Based Approaches

One way to communicate climate change, to make young people more interested in and knowledgeable about this issue, is through art-based approaches, such as drama, literature, music, and pictures. Researchers in drama education have argued that using theatre projects is a good way to make climate change more salient and more relevant and interesting, thereby increasing motivation among young people (Buirski, 2013; Lehtonen, 2012; Österlind, 2012). In addition, it is also possible to envision and create alternative futures in these projects, which is especially important if the goal is transformative learning with a focus on preparing for change of an unsustainable present (Lehtonen, 2012). In process drama, where young people collaborate with, for instance, teachers and different experts in all parts of the theatre project—from taking decisions together, to writing the script, to playing the different characters on stage—they also develop skills and attitudes that are pivotal for engaging with complex problems such as climate change, both at a life-style level and as citizens (McNaughton, 2006). In addition, Österlind (2012) argued that drama pedagogy is an especially potent way to deal with the emotional dimension of climate change educationally. This approach overcomes the dilemma between, on the one hand, students who are bored by this issue, and, on the other hand, students who can become frightened because of the more apocalyptic dimensions of this problem. Emotions are an integral part of drama education and should be dealt with specifically through the whole learning process.

However, there are hardly any empirical studies that are designed in a way that allows the researchers to say something about the effects of these projects, on the learning process or on the outcome of the projects. In a literature review, Österlind (2012) compared three case studies about climate change education—one about whole-class teaching, one about interdisciplinary group work, and one about process drama—and she contended that the last approach dealt with emotions in a better way and the children got more involved and enjoyed the learning process more. The study was merely an illustration, however, and the design precludes drawing any real conclusions. There are also some qualitative in-depth case studies evaluating drama education about sustainable development, including problems such as climate change, indicating that these approaches help the children involved gain knowledge and positive attitudes, give them

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opportunities to practice and develop skills essential to behave pro-environmentally (McNaughton, 2006), and help young people become more hopeful about the future (Lehtonen, 2012). Still, studies are needed that focus specifically on climate change and that are designed to capture the effects of these teaching approaches in a more systematic empirical way.

When it comes to art and literature as ways to communicate with young people about climate change, there are hardly any studies. However, art is used in different research studies to evaluate educational programs and to capture young people's views about global futures and problems (Baker, Loxton, & Sherren, 2013; Chadborn, Gavin, Springett, & Robinson, 2013). This seems to be an especially effective way to reach younger children and give them an opportunity to communicate their views. Literature is claimed by educational philosophers, such as Martha Nussbaum (2002) for one, to be a way to motivate young people to take the perspectives of other people living far away or even in the future. However, research in this field is mostly critical research about how sustainability and climate change are framed in texts aimed at young people (Ideland & Malmberg, 2015; Larsson, 2012). One exception is a study with children from Zimbabwe that used poetry as a way for children to communicate their concerns about climate change (Makwanya & Dick, 2014). The researcher emphasized that children become more empowered by this participatory poetry approach, but no structured evaluation was done.

A doctoral dissertation investigated learning for sustainable development, including climate change, among English children, through music education. This approach included listening to, composing, and performing music. The researcher argued that some groups of the young people involved benefitted from the approach since they became more active and enthusiastic in the learning process (Cheng, 2015). However, just as in the study about poetry, no investigation of outcomes of the approach was performed. Hence, both qualitative and quantitative studies are needed that evaluate the learning processes involved and the outcomes of art-based approaches on young people's perception and engagement around climate change.

Entertainment and Visualization as Ways to Communicate

In the United States, Flora, Saphir, Lappé, Roser-Renouf, Maibach, and Leiserowitz (2013) evaluated an entertainment-educational program/gathering based on multi-sensory learning and aimed at all high-school grade levels. The program was led by young adult educators who provided information about climate change—causes, potential effects, what one can do—in a "fast-paced performance." This performance included music, compelling graphics that tell a story, and background music. The extent to which the program influenced climate knowledge, attitudes, and behavioral intentions among the young was investigated through pre- and post-surveys. Especially knowledge of climate science, but also self-efficacy, pro-environmental intention and behaviors (short term), and positive engagement increased significantly after attending the program/gathering.

There are also some studies that investigate if one can motivate young people to take part in climate change mitigation through new technology that include entertainment aspects or/and that use capturing visualization (Ballantyne et al., 2016; Feldpausch-Parker, O'Byrne, Endres, &

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Peterson, 2012; Schrot, Angel, Sheppard, & Dulic, 2014; Walsh, Jenkins, & Cordero, 2016). Walsh et al. (2016) studied what impact a "Green Ninja Energy" tracker had on youth's engagement with climate change and energy-saving behaviors. The Green Ninja is a humorous superhero that in different ways shows youths how to live in a more sustainable and climate-friendly manner. The youths entered their home's energy data into online software, allowing them to keep track of their energy use. Through focus group interviews, they found out that the most highly motivating aspect was the ability to concretely connect energy use with economic costs. Agency connected to energy-saving behaviors increased due to more knowledge about what to do, but the feeling of being able to influence climate change did not intensify.

Feldpausch-Parker et al. (2012) developed a video game that used a melodramatic frame, CO^2 as the villain, and humans as heroes, to teach children and young adolescents about climate change and how to participate in mitigation. Pre- and post-game surveys showed that basic knowledge about climate change increased significantly. The young also indicated that they enjoyed playing the game and would like to do it again. In a similar manner, Schrot et al. (2014) investigated the effect of a visualization and simulation game on communication and action concerning climate change among a group of emerging adults. The participants filled in pre-/post-questionnaires, and the analyses revealed that the only statistically significant results were that concern about local impacts of climate change increased and that the young adults put more responsibility on local authorities than before the game. Attitudes, self-reported knowledge, and support for general climate change actions, however, did not increase, which could perhaps be explained by the small sample size. Thus, both these studies showed that games that use visualization techniques to a certain extent have an effect on young people's relation to climate change, albeit in different domains.

Because climate change can be difficult to make sense of, Ballantyne et al. (2016) used information and communications technology (ICT)-based climate visualization, in a 2012 movie called *A Warmer World*, to address this challenge among a group of adolescents. The movie, with the help of different kinds of visualizations, provided information about causes and impacts of climate change as well as mitigation options, emphasizing the need to adapt. Through focus groups, the researchers explored how the young made meaning of the messages. These results were compared with mind-maps about climate change done before the movie was broadcasted. The study showed that, when asked directly, the young people perceived that they had a better understanding after they viewed the film, and they also perceived personal responsibility as an important aspect. However, a deeper analysis revealed that the young people clung to previous preconceptions such as doomsday scenarios and felt low agency, aspects that go against the intention of the film. The conclusion was that ICT visualization can make climate change aspects more concrete, but this is not enough; one also needs to include young people in more participatory practices to increase feelings of agency.

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Nature and Animal Contact as a Way of Communicating Climate Change

At the same time as many young people perceive climate change as an ethical issue (Flöttum et al., 2016; Markowitz, 2012; Mäkiniemi & Vainio, 2013), studies among adults show that to emphasize the moral dimension, that is, effects on other creatures, can increase pro-environmental engagement (Schultz, 2000; Swim & Bloodhart, 2014). Therefore, this section focuses on whether nature and animal contact (natural and mediated) can function as a way to communicate the urgency of climate change to young people.

Botanical Gardens and Nature Contact

Some studies indicate that environmental education in botanical and school gardens can increase young people's environmental awareness (Conlon Morgan, Hamilton, Bentley, & Myrie, 2009; Waliczek & Zajicek, 1999). For instance, young people who took part in the "Brooklyn Botanic Garden's Project Green Reach," a garden-based youth-education program, described in qualitative interviews that they became more environmentally aware and appreciated nature more after the program (Conlon Morgan et al., 2009). In accordance, a quantitative study in the United States showed that some positive attitudes toward environmental issues grew significantly stronger after a school-garden program among the youths involved (Waliczek & Zajicek, 1999).

The studies reviewed above did not focus on climate change, however. One exception is a quantitative German study on adolescents (Sellman & Bogner, 2013a, 2013b). Sellman and Bogner investigated whether a one-day educational program about climate change taking place in a botanical garden would influence young people's knowledge about this issue as well as their environmental attitudes and connectedness with nature, in both a short- and long-term perspective. Botanical gardens provide a unique opportunity to educate about the complexity of climate change and its consequences for ecosystems and plants in a concrete manner. The study had a pre-post design with a control group, and the intervention included moments where the young people were able to interact with each other. The results showed that knowledge about climate change increased and environmentally unfriendly attitudes become less prominent after the intervention in both a short- and long-term perspective (Sellman & Bogner, 2013a, 2013b). Connectedness with nature increased only directly after the intervention, but not in a long-term perspective (Sellman & Bogner, 2013b). Thus, these results show that a short educational program including nature contact can have an effect on both attitudes and knowledge in relation to climate change.

Zoos and Animal Contact

Coming in contact with animals through visits to zoos, for instance, could perhaps also be a way for young people to become engaged in the environment and the climate. Fraser (2009) asked parents why they were taking their children to the zoo, and he found out that promoting environmental values among their children was one important theme. However, yet again

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research focusing on youths and learning about climate change through visits to zoos is very rare. One report about a project where adolescents worked as facilitators of learning about climate change at two zoos in the United States showed that working as a facilitator strengthened the young people's conviction that climate change is happening and also increased their pro-environmental behaviors (Matiasek et al., 2013). In addition, Otieno, Spada, Liebler, Ludemann, Deil, and Renkl (2014) found that, when emerging adults read brochures about one local effect of climate change—invasive species—which was framed in a sensational style, they experienced more negative emotions but also learned more than a group who got information framed in a more neutral style. However, their knowledge was also more one-sidedly negative, which could be due to their higher level of negative emotions. These studies indicate, in different ways, that animals can be used to increase climate change concern and knowledge among young people.

Communication About Climate Change With Parents, Friends, and Teachers

Besides media and more staged communication efforts, young people also communicate about climate change together with, for example, friends, parents, and teachers, which could influence their own engagement. In addition to direct communication with others about this issue, important socialization agents can communicate their views about environmental issues in a non-verbal way through how they act. Through interacting with these agents, young people develop descriptive norms about how to relate to these issues (Cialdini, 2007). Thus, both direct verbal communication with young people and modeling (communication through action) can perhaps explain how socialization agents transmit their views on climate change to others. In addition, this section focuses on studies exploring reverse, reciprocal, and complex influences in young people's communication with parents, friends, and teachers.

Unidirectional Influence

Traditionally socialization research adhered to a unidirectional transmission paradigm, where parents and other authority figures influence their children's attitudes and behavior. A number of studies performed in different countries such as the United States, Denmark, Belgium, Austria, and Germany, have confirmed that the immediate family, foremost parents, matters when it comes to young people's general environmental attitudes and concerns as well as pro-environmental behavior (Allen et al., 2013; Grønhøj, 2007; Grønhøj & Thøgersen, 2009). In some cases the investigated pro-environmental behaviors, such as energy use, are of direct relevance for climate change (Boudet, Ardoin, Flora, Armel, Desai, & Robinson, 2014; Grønhøj & Thøgersen, 2009, 2012; Kleinschafer & Morrison, 2014). In addition, some of these studies focused directly on communication with parents about environmental issues, not only social norms or parents' views about these matters (Boudet et al., 2014; Meeusen, 2014). For instance, Meeusen (2014) found that both fathers and mothers were important socialization agents when it comes to their children's environmental concern, and that communication about the environment mediated the influence of parents' own concern on their children's concern.

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When it comes to research that is specifically about socialization and climate change, there are fewer studies. Stevenson and colleagues found in a study performed in the United States that climate change concern among adolescents was predicted both by frequency of discussion with, and perceived level of acceptance of global climate change among, parents (Stevenson et al., 2016). Likewise, Ojala, in studies with adolescents in Sweden, found that the more the young discussed climate change with their parents, the less inclined they were to de-emphasize the seriousness of this problem (Ojala, 2013), and that the more the young perceived their parents as being skeptical concerning the seriousness of climate change, the more they were skeptical themselves (Ojala, 2015a). The adolescents who were most inclined to discuss climate change a lot with their parents (and peers) also used more constructive coping strategies concerning climate change, such as problem-focused coping (for instance, searching for information) and meaning-focused coping; strategies that in turn related positively to self-efficacy concerning this problem (Ojala, 2013). In line with this, Mead et al. (2012) found that the more a group of American youths discussed climate change in the family, the higher their risk perception was, the more they searched for information about climate change, and the more response efficacy they experienced. To summarize, both direct communication and social norms related to the family seem to matter when it comes to how young people engage with climate change.

In addition to family influence, youth researchers point out that during adolescence peer influence becomes more and more important (Amnå, Ekström, Kerr, & Stattin, 2009; Dostie-Goulet, 2009). In support of this, studies have found that communicating and interacting with peers seem to influence young people's relation to both climate change (Öhman & Öhman, 2013; Ojala, 2013, 2015a; Senbel, Ngo, & Blair, 2014; Stevenson et al., 2016) and broader environmental issues (Boudet et al., 2014; Gotschi, Vogel, Lindenthal, & Larcher, 2009). However, studies performed in Sweden and the United States indicate that parents still seem to be the more important socialization agents for adolescents when it comes to climate change (Ojala, 2013, 2015a; Stevenson et al., 2016). It should be noted that most of the studies on communication with family and friends are cross-sectional in design, the exception being Ojala's study (2015a), which is longitudinal although in a quite short time perspective (one year).

Besides being a way of communicating, often non-verbally, interest and values in relation to climate change, social norms of what is "cool," and what the proper ways of expressing emotions are could also influence whether and how one communicates about this issue (Geiger & Swim, 2016; Norgaard, 2011). Norgaard (2011) found in a Norwegian study that adolescents in particular felt the pressure to always remain "cool" and not communicate about this issue. In this regard, Ojala (2012b) found that Swedish children, adolescents, and emerging adults who were worried about climate change did not seek social support to any major extent, that is, they did not talk about their worries with their parents, for instance. In addition, Yang et al. (2014) explored why undergraduate students in the United States and China choose, or not, to share information about climate change with others. Concerns about one's reputation or social standing among peers seemed to drive information sharing. When getting information about climate change is a socially popular and responsible thing to do, young people are more willing to engage in such a behavior.

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Finally, communication with teachers about climate change could perhaps also have an effect on young people. In a Swedish quantitative study on adolescents, those who perceived their teachers as communicating in a more solution-oriented and positive way were more inclined to feel constructive hope, based on trust and positive reappraisal, about climate change; a hope that was positively related to perceived efficacy and pro-environmental behavior (Ojala, 2015b). If the adolescents perceived that their teachers talked about societal problems in a gloom-and-doom way, they were more inclined to feel hope based on denial; a kind of hope that was negatively related to efficacy and engagement. In addition, Busch (2016) found that U.S. teachers framed climate change in two main ways: they used a science discourse or a social discourse. The science framing was more common, and the author argues that this could have a negative effect on young people's engagement concerning this issue. However, no effect study was conducted.

Reverse, Reciprocal, and Complex Influences

Recently, research on youth socialization has taken a new turn, highlighting the centrality of communication at home, at school, among peers, and through the media in its totality rather than as a sequence (McDevitt, 2006; McDevitt & Chaffee, 2002). This turn also emphasizes mutual parent-child influences in socialization (Kuczynski & Parkin, 2007).

However, very few studies have addressed reverse or reciprocal family influences when it comes to environmental issues. One study showed that children can influence household practices through discussions with parents about the environmental issues learnt in school (Ballantyne, Fien, & Packer, 2001). Another study carried out by Easterling, Miller, and Weinberger (1995) suggested that children's environmental concerns can be a catalyst for parents' environmental learning and re-socialization. Grønhøj (2007) also found some instances of reciprocal and reverse influence in everyday household practices like electricity consumption, a behavior that is directly related to climate change.

Swedish research indicates that, to understand how young people communicate about climate change with friends in all its complexity, on the one hand, researchers need to use qualitative approaches where they observe these conversations in vivo and, on the other hand, these studies need to be conducted in different contexts (Andersson & Öhman, 2016; Öhman & Öhman, 2013). In a school context, these discussions were more consensus oriented, which is not solely positive, although most arguments were climate friendly, since in order to deal with a complex issue such as climate change it is valuable for youths to learn how to deal with different, sometimes clashing, opinions (Öhman & Öhman, 2013). However, in an online community context, the young people involved in the conversation about climate change seemed to be freer to voice a broader dimension of values and attitudes (Andersson & Öhman, 2016). According to the authors, the conversation was complex and sophisticated, and they argue that the results therefore have implications for formal climate change education. Educators need to ponder how to promote pluralistic learning without ending up in unconstructive conflicts (see also Wals, 2010). However, the different results could, to a certain extent, be due to the fact that the study in a school context included only youths going to a school with a focus on sustainability and that most probably are quite similar in value-orientation.

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In recent years, researchers have started to focus more on the intricate interaction between different spheres of communication among young people. Östman (2014) showed that the media influence young people's behaviors foremost through communication with parents and friends. Satchwell (2013) revealed a complex interaction between family and school in influencing young people's knowledge about climate change. Yanascavage (2012) demonstrated that education about climate change in school had an impact on how young people communicate about this issue in other settings. Communication in the classroom offers a "seedbed," but it is in interaction with friends and parents that values and norms evolve about "the good citizen" (Hayward, Selboe, & Plew, 2015). In this regard, Collins (2015) demonstrated a complex interaction between youths and their parents—including contestations, negotiations, and compromises—when it comes to household sustainability. What all these studies indicate is that, for communication efforts around climate change to work, there is a need to understand the complex social contexts, interactions, and practices that young people are part of.

Participatory Approaches to Climate Change Communication

This section emphasizes the importance of involving young people in active forms of learning to enhance their knowledge about climate change and the value of including them in mitigation efforts. The studies reviewed are focused on adaptation to future climate change and the importance of including young people in participatory approaches to communication.

Adapting to a Changing Climate

When it comes to adaption to future changes and potential catastrophes related to climate change, young people have traditionally been seen as an especially vulnerable group that needs to be protected. However, in recent years, this discourse has been complemented with a view of young people as active agents who are important to include in participatory approaches to prevent, prepare, and adjust to future extreme events (Hart, Fisher, & Kimiagar, 2014; Haynes & Tanner, 2015; Tanner, 2010). It is argued that this will better prepare them for the future. Their right to participate is also emphasized, and not least, young people have unique knowledge and competences that could be invaluable in attempts to adapt to future climate change. Sites for involving young people could be schools, various organizations, and other community settings (Hart et al., 2014).

Some examples of how this participatory approach to communication can benefit adjustment to climate change are enumerated here. Walker, Whittle, Medd, Burningham, Moran-Ellis, and Tapsell, (2012) found that children's narratives about floods can be valuable to include in efforts to deal with potential future flooding. Haynes and Tanner (2015) evaluated, in an action-research program, whether a "participatory video" where different actors interacted in the process of filming, editing, and finally broadcasting the film could be a method to include youths in the Philippines in climate change adaptation and disaster reduction. In this way, messages can be sent without using writing and reading. The program led to the youths involved receiving more knowledge, feeling more empowered, and also giving voice to slightly different aspects than adults, such as the social causes of disasters. The researchers also emphasized that the inclusion

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of the young benefitted the whole community in a number of ways. In this regard, Tanner (2010), based in studies in El Salvador and the Philippines, argued that it is important to understand that young people are risk communicators in themselves, influencing others, and that there is a need for more studies to understand the complex communication processes taking place in and among households, communities, and families.

Conclusion

This section presents some conclusions. First, studies of young people are still relatively rare in the field of climate change communication in a narrow sense. Thus, there is a need for more studies with this age group. To take one concrete example: Many argue that art-based approaches are an especially fruitful way to communicate climate change to young people; however, there are hardly any studies that rigorously evaluate the learning processes involved in these approaches, and there is even less research that quantitatively measures the outcome of these approaches. Perhaps this has to do with the fact that those who conduct these art-based interventions are mainly researchers from the humanities who are not used to dealing with quantitative studies. Thus, multidisciplinary collaboration is needed in this field.

Second, when designing communication programs to reach young people, it seems easier to increase their knowledge about climate change than to reach this group at a deeper level and to make them more engaged around this issue and more confident about their ability to contribute. This is a challenge that can perhaps be solved by involving young people more in participatory approaches when it comes to mitigation efforts, not only regarding adaptation (Ballantyne et al., 2016; see also Devine-Wright et al., 2004).

Third, the role that the mass media play in young people's climate change awareness and engagement differs across media channels and across different audiences. For example, studies provide empirical evidence that media messages are processed differently by skeptical and non-skeptical youth (Corner et al., 2012). However, more research is needed to identify other relevant individual differences that can help explain which groups of young people are more susceptible to media influence and which individuals remain out of the reach of the media. In addition, although studies show the positive influence of online spaces on young people's motivation and engagement (e.g., Andersson & Öhman, 2016), it is also important to gain a greater understanding of potential negative consequences (Sunstein, 2007).

Fourth, young people seem not to talk and communicate much about climate change, even though they in fact care and are worried (Leombruni, 2015; Norgaard, 2011; Ojala, 2012b). However, when they do talk with friends and family, it can be something positive for engagement (Mead et al., 2012; Ojala, 2013; Stevenson et al., 2016). Thus, there is a need to promote communication across different groups in everyday life around this issue. Here, the new media and communication online could play constructive roles, especially if they are integrated into a school context, as Andersson and Öhman (2016) have suggested.

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Another theme involves thoughts about how to communicate about this issue without scaring young people. Studies reveal a rather mixed pattern when it comes to the constructive or unconstructive role of negative emotions evoked by communicating about this issue. Another way to approach this issue is to acknowledge that young people are not passive victims of negative emotions; they instead actively cope with these emotions in different ways, and these coping strategies ought to be taken into account in communication efforts (see Ojala, 2012b).

An additional aspect that is vital to consider is that young people do not make meaning regarding this issue only as individuals but also as parts of different groups, such as peer groups and family. Although friends become more important in adolescence, parents still seem to be very important socialization agents. Grønhøj and Thøgersen (2012) argue that parents should be made more aware of their role in promoting environmental awareness in their children. Perhaps the individual should not be the main focus in communication efforts but rather the whole household (see Collins, 2015) and other social networks that young people belong to.

Finally, the review indicates that young people have a rather bleak and distant vision of the global future. A "hot" field in social science in general is *anticipation as a driving force* for societies and individuals (Poli, 2010; Seligman, Railton, Baumeister, & Sripada, 2013). Researchers have also started to perceive future dimensions as important when it comes to climate change engagement (Milfont & Demarque, 2015). Concerning to communicate about future dimensions and climate change, it could be valuable to learn from an educational researcher such as David Hicks (2014), who has long argued for the need to discuss probable, preferable, and possible global futures in a critical, realistic, but also hopeful way with young people (see also Climate Outreach & Information Network, 2014).

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Notes

1. Yet, there also exist studies about young people and parents showing that parents have a higher degree of broad environmental concern (Grønhøj & Thøgersen, 2009; Leppanen, Haahle, Lensu, & Kuitunen, 2012)

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