Iran Agricultural Research (2023) 42 (2) 14-25.

Shiraz University

Iran Agricultural Research

Journal homepage: https://iar.shirazu.ac.ir

Research Article

Towards conservation behavioral change through connectedness to nature: A qualitative content analysis

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ARTICLE INFO

Keywords:
Critical theory
Environmental conservation
Human-nature connectedness
Pro-environmental behaviors
Qualitative content analysis

ABSTRACT- In order to deal with the environmental risks caused by human behavior and change it towards sustainable pro-environmental behaviors, it is suggested to re-establish the connection between humans and the natural world. The purpose of this research was to identify the components affecting connectedness to nature (CTN) in order to strengthen conservation behaviors in the context of critical theory paradigm. To analyze the selected final articles, qualitative content analysis technique with inductive approach was used as the research method. The articles related to CTN are considered as the statistical population and sample in this technique. Selection of the article from population was fulfilled using a purposeful approach. Based on the results of content analysis, a model was developed and proposed for components affecting CTN. The results showed that the three main components including "situational-contextual (experience with nature and activities affecting CTN)", "individual (worldviews and individual factors)", and "psychological (mindfulness, identity, and empathy)" dimensions affecting CTN. Each of the sub-components also encompasses several variables that, when given attention, can enhance CTN and pro-environmental conservation behaviors. The model developed and proposed in the present study can be utilized by policymakers and stakeholders interested in facilitating change and planning for decision-making processes among natural resource users.

INTRODUCTION

The global environment has experienced significant changes in recent years, and most of these changes are caused by human activities (Warner & Diaz, 2021). Global warming, water and air pollution, deforestation, and loss of biodiversity are examples of environmental changes resulting from human activities (Mohammadi et al., 2024). In this regard, "connectedness to nature (CTN)" and "persons' relationship with nature" are among the most important exit environmental strategies that have been continuously discussed by experts during the past decades. CTN is considered as a solution for environmental sustainability that may have great potential to strengthen the pro-environmental behaviors. As per researchers (Beery & Daniel Wolf-Watz, 2014; Warner & Diaz, 2021), this capacity is grounded in individuals' previous encounters with nature, along with their attitudes and values toward the natural world, fostering a stronger inclination to nurture and safeguard nature.

Today, CTN is used to explain many pro-environmental behaviors and is operationalized as the feeling degree of individuals towards the nature as a part of the natural world. The concept of CTN was first proposed by Schultz, who designed a scale to examine a person's sense of self as a part of the nature (Schultz, 2001, 2002). CTN refers to an individual's sense of being part of an interconnected with the natural world. This concept encompasses a deep emotional and psychological bond with nature, leading to feelings of awe, respect, and responsibility towards the environment. CTN is often associated with positive outcomes such as increased well-being, environmental conservation behaviors, and a sense of purpose and belonging in the world (Schultz, 2002). The concept of CTN highlights that individuals who feel a stronger connection to nature are less likely to harm the environment, as they view themselves as an integral part of nature (Warner & Diaz, 2021). In this regard, a person's CTN may be the motivation for his/her participation in conservation and pro-environmental behaviors. In contrast, the lack of this connectedness may be the cause of people's indifference to the environmental destruction (Whitburn et al., 2020). Some studies (see Barbaro & Pickett, 2016; Hughes et al., 2018) indicate that establishing CTN can play an effective role in strengthening and increasing the individuals' conservation behavior towards the environment and natural resources. Therefore, CTN is considered very important for the future of nature

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https://doi.org/ 10.22099/iar.2024.49926.1583
Received 09 April 2024; Received in revised form 08 May 2024; Accepted 13 May 2024
Available online: 27 May 2024

conservation. It is also important to note that a decrease in CTN is one of the factors contributing to why some individuals are not fully dedicated to the environmental conservation efforts (Miller, 2005). In fact, these researchers consider the concept of CTN to be significantly related to pro-environmental behaviors (Barbaro & Pickett, 2016) and argue that commitment to pro-environmental behaviors increases when people internalize environmental conservation and connectedness to nature (DeCicco & Stroink , 2007).

With the expansion of the concept of CTN in recent years, this concept and its relationship with environmental conservation behaviors have been investigated in numerous studies, and various aspects of this concept have been introduced. In other words, different factors and components have been developed for the connection between human and nature in these studies. However, the extent and diversity of these components and the factors influencing CTN makes researchers, decision-makers, managers, and other users of the environment unable to effectively use this concept to create appropriate behavioral changes. Therefore, the purpose of the current inquiry was to identify the components and dimensions of CTN. To this end, a qualitative content analysis was employed to review and synthesize the studies conducted in the field of CTN. The primary novelty of this research lies in the systematic content analysis-based review of the existing literature on CTN and its correlation with pro-environmental conservation behavior (PECB). Additionally, based on the findings of the literature review regarding the impact of CTN on conservation behaviors, the present study argues that CTN can be leveraged to alter and guide human behavior towards the environmental stewardship.

Analyzing CTN from a paradigmatic perspective

A paradigm is a set of fundamental beliefs that provide a worldview and define the nature of the world and the individuals' place and action in the environment. In other words, a paradigm is a single set of beliefs about science and scientific knowledge, an overarching conceptual structure and a particular way in which the world or a part of the world can be understood and described. A paradigm also encompasses the researchers' assumptions not only about the methodology of research but also about their definitions of truth and reality (ontology) and how they attain that truth or reality (epistemology) (Plack, 2005).

Throughout history, different paradigms have been presented. These paradigms were often derived from existing and accepted intellectual views at that time (Plack, 2005). Among the dominant paradigms, we can mention positivism, constructivism, and critical theory. In the CTN paradigmatic review, basic questions based on the components of ontology, epistemology, and methodology are raised as follows:

- What is the reality of nature?
- How can nature be known? How should the epistemology of nature be?
- What are the methods of facing (crises) problems in nature and how should it be?

In terms of "ontology", in positivism, nature refers to the material world that surrounds something. Likewise, the natural world is often synonymous with the environment, which is objective. This definition is rooted in the ideas of the positivism school of thought and is reminiscent of an environment or a space devoid of human beings. In constructivism, nature represents life conditions and all plant and material objects. For this reason, they use nature to identify what is related to humans and affected by human intervention. Also, nature is not considered to be devoid of humans since it is impossible to talk about humans and not talk about human nature. Critical theory considers nature to be subject to social conditions. Because their culture, nature, and relationship are variable, the definition of nature also changes with the passage of time. Thus, nature contains a set of historical/structural insights that change and evolve over time. According to advocators of critical theory paradigm, nature includes humans, the environment, and interactions between them (Heron & Reason, 1997).

From epistemological perspective in positivism, it implies the segregation of human from the nature. Modernization is a model of social development that appears with the western perspective of progress and development, which forms the exploitative relationship of man or society with the nature. In fact, progress is made with continuous increase in manufacturing and use of material goods and services, followed by wider operation of resources. Constructivists believe man's technical mastery over nature leads to social, psychological, and environmental costs, which is due to the transformations that humans have collectively created from the past until now. According to this paradigm, it is not possible to describe nature without referring to the sublime living beings and its concept. There is no living organism without a natural environment and no natural environment without the living organisms. Therefore, living organisms change and shape it by influencing their natural environment. It is worth mentioning that at the same time, nature also affects the behavior of living organisms. Advocators of critical theory consider an interactive relation between human and the nature around him/her. Human's role is a facilitator to create awareness about the sustainability barriers in the nature. Hence, individuals should be cognizant of the barriers to sustainability in the environment in order to determine the necessary transformations that need to be implemented. Also, judgment about the needed changes should be done by the people who are affected by them (Shahvali, 2010).

From methodological perspective of positivism, scientific method is the best way to gain knowledge from nature, so science should be considered the most valuable tool for improving nature's deficiencies. This paradigm also believes that problems affecting nature can be solved with new technologies. In constructivism, there is no definite answer to solve the obstacles to sustainability in nature. Each answer should be revised to improve as science and technology evolve. Progress occurs when all individuals are able to provide a more sophisticated and informed response to the nature. Therefore, understanding how to overcome obstacles to environmental sustainability involves identifying areas where there is a consensus or ongoing efforts to reach an agreement on potential solutions. The transformation of nature is created through tangible experiences that can be obtained through case

studies to be understood by others. Critical theorists consider the content of science to be subject to social conditions in order to remove the sustainability barriers in the nature. Therefore, individuals are confronted with a scientific process tailored to social conditions to address these obstacles. Furthermore, science is not static and the scientific paradigm underscores human intervention in nature, with technology being no exception to this principle; the focal point of scientific and technological contemplation of nature is humanity, which relies on its circumstances. This is despite the fact that human values naturally affect solving nature's problems (Heron & Reason, 1997; Shahvali, 2010).

Based on the above-mentioned literature, in the current study, it will be fruitful to use a paradigm that considers man and nature together and dependent on each other and believes in the role of interaction between man and nature in order to facilitate the creation of awareness about sustainability obstacles. Therefore, the paradigm of "Critical Theory", which seeks to remove obstacles to sustainability in nature and solve environmental problems using mixed methods and with the help of scientific processes, is a paradigm appropriate to the current study.

MATERIALS AND METHODS

In this research, in order to identify the dimensions and components of CTN, qualitative content analysis method with an inductive approach was used. Content analysis is a method based on which the linguistic features of a spoken or written text can be recognized realistically, objectively, and systematically (Razzaghi-asl et al., 2016). Based on the definition, content analysis is a method of interpreting a message with a purposeful and systematic definition of its characteristics (Stemler, 2000). Content analysis can be done qualitatively and quantitatively. In qualitative content analysis, meaning is extracted from the text, and in quantitative content analysis, text elements are counted (Tabrizi, 2014). Also, experts in content analysis, along with quantitative and qualitative approaches, have mentioned deductive and inductive approaches. The use of inductive approach becomes necessary when there is not enough information about the investigative phenomenon and the researcher has to provide the required knowledge. This kind of content analysis seeks reducing and categorizing information and provides a detailed description about a topic. Here, the goal of inductive research is to help the emergence of research findings by paying attention to common and dominant themes (Thomas, 2006). It means that the scholar by referring to the gathered data summarizes them in order to finally reach the main themes and concepts regarding to the research topic.

Conducting scientific research without checking its scientific accuracy loses its usefulness. This issue includes quantitative and qualitative research. Since in the case of quantitative research, this issue is examined through validity and reliability, it is also necessary to address this issue in qualitative studies. According to many researchers in the field of qualitative studies, validity and reliability are specific to quantitative methods and their application for qualitative studies is not valid. Therefore, the concept of "dependability" (Guba & Lincoln, 1994) was introduced as a criterion suitable for qualitative research and an alternative approach to validity and reliability analysis in qualitative studies. This concept itself consists of four elements: credibility, transferability, dependability, and confirmability (Fallah Haghighi et al., 2018).

Credibility includes activities that increase the likelihood of obtaining valid findings. The methods of obtaining credibility are long-term or continuous engagement, peer review, review by participants, and triangulation method. Conceptually, transferability is equivalent to generalizability in quantitative studies. It refers to the fact that the data of the study creates a similar meaning for others in similar situations. This criterion is used to answer the question that the findings of the study can be transferred to other users. Dependability is similar in concept to internal consistency and retest reliability in quantitative approaches and refers to the stability or instability of the data pattern in another situation or time. Dependability is achieved when the researcher has proven the scientific accuracy of the findings. Confirmability is a gradual and continuous process. Recording activities by the researcher over time so that others can follow them is a way to verify research findings (Tabatabaee et al., 2013; Fallah Haghighi et al., 2018). In order to implement these criteria in this research, the following measures were taken:

- Creditability: The inquiry questions were approved by a panel of experts.
- Dependability: In order to obtain the reliability of the study findings, the interviews were recorded and then implemented in the form of notes.
- Transferability: To accrue the findings transferability, five specialists (who were not involved in the research) were consulted.
- Confirmability: Different methods including detailed examination of interviews, documents, and recording of interviews about selected documents with experts were used to verify the findings.

Statistical population and sampling to identify the components and dimensions of CTN

The statistical population and sample for this research comprised articles on the topic of CTN published in reputable journals within the fields of environmental psychology, environmental research, global environmental changes, and environmental conservation. A purposeful sampling method was employed to select the sample articles. Keywords including nature connectedness, connection to nature, nature relatedness, human-nature bond, and connection with nature were utilized in search engines and databases such as Google Scholar, Web of Science, ScienceDirect, and ResearchGate to identify relevant articles. Initially, 238 articles were identified and screened based on their titles, abstracts, and keywords. Subsequently, 84 articles were excluded during this stage. Additionally, articles lacking a valid publisher were not considered for further analysis. Ultimately, 59 articles and one book were included in the content analysis process (Table 1).

Table 1. Sources of content analysis in the explanation of factors affecting the CTN

No.	Journal	IF (2021)	Publisher	h-index	Country	Subject area	No. of Articles	No. of Pages	Sources
1	Environmental Psychology	7.649	Elsevier	151	United States	Psychology (Applied Psychology, Social Psychology)	12	109	Mayer & Frantz (2004); Schultz et al. (2004); Frantz et al. (2005); Bruni & Schultz (2010); Davis et al. (2011); Collado et al. (2013); Tam (2013); Sanguinetti (2014); Zhang et al. (2014b); Zeleneski et al. (2015); Collado et al. (2015); Dopko et al. (2019)
2	Environment & Behavior	6.548	SAGE Publications	125	United Kingdom	Environmental Science	8	196	Kals et al. (1999); Dutcher et al. (2007); Mayer et al. (2009); Nisbet et al. (2009); Cheng & Monro (2012); Brick & Lewis (2014); Crawford et al. (2017); Larson et al. (2018)
3	Ecopsychology	No IF Scopus	Mary Ann Liebert	28	United States	Applied Psychology/ Social Psychology	8	77	Hinds & Spark (2009); Amel et al (2009); Scott (2010); Clayton et al. (2011); Richardson & Sheffield (2015); Harvey et al. (2016); Diessner et al. (2018); Nisbet et al. (2019)
4	Frontiers in psychology	4.232	Frontiers Media S.A.	133	Switzerland	Psychology	5	63	Capaldi et al. (2014); Lee et al. (2015); Di Fabio & Bucci (2016); Rosa et al. (2018); Lengieza & Swim (2021)
5	Environmental Education Research	3.512	Taylor & Francis	79	United Kingdom	Social Sciences/ Education	6	95	Chawla & Cushing (2007); Beery (2013); Liefländer et al. (2013); Braun & Dierkes (2017); Lankenau (2018); Cho & Lee (2018)
6	Personality and Individual Differences	3.95	Elsevier	181	United Kingdom	Psychology	3	17	Howell et al. (2011); Barbaro & Pickett (2016); Schutte & Malouff (2018)
7	PLOS ONE	3.752	Public Library of Science	367	United States	Multidisciplinary	2	37	Richardson et al. (2016); Lumber et al. (2017)
8	Journal of Personality and Social Psychology	10.4	American Psychological Association	392	United States	Psychology/ Social science	1	26	Brown & Ryan (2003)
9	Psychological science	10.172	SAGE Publications	277	United States	Psychology	1	6	Nisbet & Zelenski (2011)
10	Biological Conservation	7.497	Elsevier	213	Netherlands	Agricultural and Biological Sciences/ Environmental Science	1	9	Zhang et al. (2014a)
11	Personality and Social Psychology Bulletin	4.56	SAGE Publications	205	United States	Psychology	1	16	Chatzisarantis & Hagger (2007)
12	Global Environmental Change	11.16	Elsevier	192	United Kingdom	Environmental Science, Social Sciences	1	6	Otto & Spensini (2017)
13	International journal of environmental research and public health	4.614	MDPI	138	Switzerland	Environmental Science/ Medicine	1	20	Musitu-Ferrer et al. (2019)
14	Journal of applied social psychology	2.654	Wiley Online Library	118	United States	Psychology Social /Psychology	1	29	Schultz & Tabanico (2007)
15	Sustainability	3.889	MDPI	109	Switzerland	Environmental Science/ Social Sciences/ Energy	1	21	Ienna et al. (2020)
16	Body Image	5.58	Elsevier	89	Netherlands	Psychology	1	16	Swami et al. (2016)
17	Mindfulness	3.801	Springer Verlag	68	Germany	Social Sciences/ Psychology	1	31	Unsworth et al. (2016)
18	Journal of Psychoactive Drugs	3.289	Taylor and Francis	63	United Kingdom	Medicine/ Psychology	1	9	Nour et al. (2017)
19	European Journal of Psychology of Education	2.821	Springer Netherlands	57	Netherlands	Psychology/ Social Sciences	1	9	Sellmann & Bogner (2013)
20	Current Psychology	2.387	Springer	46	United States	Psychology	1	12	Di Fabio & Kenny (2018)
21	SAGE Open	2.032	SAGE Publications	41	United States	Social Sciences	1	12	Balunde et al (2019)
22	Journal of Media Psychology	2.31	HogrefePublishing	33	Germany	Psychology/ Social Sciences	1	9	Soliman (2017)
23	**Book**: Conservation Psychology: Understanding and Promoting Human Care for Nature.		Wiley Blackwell	---	United States	----	1	263	Clayton & Mayers (2015)
Total							59 articles + 1 Book	825 + 263	

RESULTS AND DISCUSSION

The articles were reviewed based on the research question of identifying the dimensions and components of CTN. At the end, all the extracted factors were re-examined for the purpose of categorization, which led to the identification of main components, factors and variables. Finally, three main components including "situational-contextual", "individual (individual differences)", and "psychological (internal psychological states)" components were identified. These components included factors such as experience in nature, activities affecting CTN, worldviews, demographics, mindfulness, and empathy. In Table 2 and Fig. 1, the extracted components as well as the factors and variables of each has been summarized. In addition, the frequency of different variables in the articles are specified as well.

The results showed that the highest frequency is related to being exposed to the nature or having an experience with the nature, which is in the form of direct and indirect contacts with the nature. Direct contact refers to items such as walking in the nature (forested, rural areas), gardening, picnics, and photography in the nature. Indirect contact with nature includes items such as watching nature videos and virtual contact like playing nature-themed computer games. Experience of being in the nature and exposure to the nature in adults and in children are among the most important factors affecting CTN. Researchers believe that these experiences (exposure to the nature and the experience of spending more time in the nature) strengthen the desire to conserve the natural environment and increase sustainable intentions and behavior.

After the worldview component, factors such as environmental knowledge and education as well as participation in environmental-educational activities had the highest frequency. These factors were categorized under the title of "activities affecting CTN" component. Environmental knowledge is the ability to identify concepts and behavioral symbols and patterns towards environmental conservation according to the received surrounding information (Liobikienė & Puskus, 2019). Also, some researchers refer to that as awareness of problems and possible solutions about the environment (Zsóka et al., 2013). Environmental knowledge is important in developing pro-environmental behaviors because one needs to know what kind of behaviors to take. Therefore, knowledge is a prerequisite for pro-environmental behavior. The combination of knowledge and connection to nature acts as a driver of individuals' ecological behavior (Kaiser et al., 2008). Given the interconnectedness of these components, acquiring knowledge about the nature may confront people with the interconnectedness of all life and influence their relationship with natural environment. An increase in knowledge about environment may also result from contact with nature. By connecting to the nature, a person may be interested in learning about the environment and how to preserve it. According to some researchers, participation in natural education programs usually has positive influences on environmental knowledge; nevertheless, environmental knowledge does not necessarily lead to environmental behaviors and may be affected by other factors such as motivational variables in the form of individual values and attitudes (Otto & Pensini, 2017).

In children, having enjoyable experiences when in contact with the nature causes interaction with nature in adulthood and as a result, causes more acceptance of pro-environmental actions. Contact with the nature from childhood to adulthood seems to have a lasting effect, perpetuating these experiences into later stages of life, which can ultimately lead to the extension of environmental actions.

Worldview is the second component influencing CTN. This component includes variables such as values, beliefs, attitudes, and environmental concerns. Environmental beliefs of individuals regarding their natural environment are considered as a potential predictor of conservation behavior. Gray (1985) considers environmental beliefs to be the basis of a system of attitudes and general beliefs that determine behavior towards the environment. In the past, the Human Exceptionalism Paradigm (HEP) (Dunlap & Van Liere, 1978) was the most widely used tool for assessing general environmental beliefs. This paradigm prevents the development of pro-ecological behaviors and has a fundamental belief that humans are beyond nature and therefore do not have to pay attention to it when consuming natural resources (Bechtel et al., 1999). However, in the New Environmental Paradigm (NEP), there are pro-ecological beliefs that are the background of environmental actions. Based on this paradigm, the mutual and reciprocal relationship between humans and the environment and the preservation of resources through ecological beliefs are emphasized. This paradigm prevents the unlimited use of natural resources. This is also in line with the principles of critical theory. Environmental attitude is a set of feelings (pleasant or unpleasant) towards environmental features. Humans have the right to alter the natural environment to meet their needs, as seen from a Human Exceptionalism Paradigm (HEP) perspective. On the other hand, it is also believed that the destruction of the earth can be averted by leveraging human abilities and fostering a reciprocal relationship with nature, as per the New Ecological Paradigm (NEP) (Hemayatkhah Jahromi et al., 2017). Environmental values lead to the formation of attitudes and actions. Of course, values do not always lead to behavior, and by influencing people's thoughts and feelings, they cause changes in environmental behavior.

Values can be seen as criteria by which an individual, group, or society can measure and evaluate the importance of the environment (Hemayatkhah Jahromi et al., 2017).

In the investigation of effective factors, individual factors as well as psychological factors with similar frequencies are in the next priorities in terms of repetition. Mindfulness is a moment-to-moment and non-judgmental awareness that is cultivated in a particular way, i.e., in the present moment and in a non-reactive and non-judgmental way (Kabat-Zinn, 2005). These factors may allow people to connect more with

the nature, and communication with natural environments may also help to strengthen mindfulness. Empathy is another factor that is in the concept of psychological factors. Empathy with nature is a continuation of interpersonal empathy, although it is a different construct and can never be used as interpersonal empathy. In this regard, similar expressions such as empathic concern, sympathy or compassion are used, all with the same common denominator, sharing feelings with others or with nature (Di Fabio & Kenny, 2018). According to the research, high levels of connection with the nature are found among people who understand the value of the beauty of nature and are more empathetic with nature.

Table 2. Results of content analysis: components affecting connectedness to nature (CTN)

Components	Factors	Variables		Frequency	Sources
Situational contexts	**Experience with nature**	Contact with nature in adulthood	Actual contact with nature	21	Kals et al. (1999); Mayer & Frantz (2004); Schultz & Tabanico (2007); Mayer et al. (2009); Hinds & Spark (2009); Müller et al. (2009); Scott (2010); Nisbet & Zelenski (2011); Cheng & Monro (2012); White (2012); Beery (2013); Zhang et al. (2014a); Harvey et al. (2016); Richardson et al. (2016); Swami et al. (2016); Lumber et al. (2017); Rosa et al. (2018); Larson et al. (2018); Balunde et al. (2019); Nisbet et al. (2019)
			Mediated contact with nature	6	Hinds & Spark (2009); Mayer et al. (2009); Scott (2010); Richardson & Sheffield (2015); Zeleneski et al. (2015); Soliman (2017)
			Virtual reality as contact with nature	1	Larson et al. (2018)
		Childhood contacts with nature		9	Kals et al. (1999); Chawla & Cushing (2007); Hinds & Sparks (2008); Cheng & Monroe (2012); Beery (2013); Tam (2013); Collado et al. (2013); Rosa et al. (2018); Dopko et al. (2019)
	Activities affecting CTN	Participation in environmental programs		11	Mayer & Frantz (2004); Clayton et al. (2011); Richardson et al. (2016); Dopko et al. (2019)
		Environmental knowledge Environmental education			Liefländer et al. (2013); Sellmann & Bogner (2013); Braun & Dierkes (2017); Crawford et al. (2017); Otto & Spensini (2017); Lankenau (2018); Cho & Lee (2018)
Individual (individual differences)	**Worldviews**	Environmental values		14	Clayton & Mayers (2015)
		Environmental beliefs			Mayer & Frantz (2004); Frantz et al. (2005); Nisbet et al. (2009); Bruni & Schultz (2010); Clayton et al. (2011); Davis et al. (2011); Brick & Lewis (2014); Lee et al. (2015)
		Environmental attitudes			Sellmann & Bogner (2013); Collado et al. (2015)
		Environmental concerns			Schultz et al. (2004); Mayer & Frantz (2004); Dutcher et al. (2007)
	Individual factors	Age in adults		8	Burbach et al. (2012); Beery (2013); Sanguinetti (2014); Zhang et al. (2014b); Harvey et al. (2016); Lumber et al. (2017); Nour et al. (2017); Diessner et al. (2018)
		Age in children		4	Liefländer et al. (2013); Braun & Dierkes (2017); Crawford et al. (2017); Larson et al. (2018)
		Gender		1	Lengieza & Swim (2021)
Psychological (internal psychological states)	**Mindfulness**	Mindfulness		8	Brown & Ryan (2003); Chatzisarantis & Hagger (2007); Amel et al (2009); Howell et al. (2011); Richardson & Sheffield (2015); Barbaro & Pickett (2016); Unsworth et al. (2016); Schutte & Malouff (2018)
	Identity	Environmental identity Place identity (place attachment)		2	Clayton et al. (2011); Richardson & Sheffield (2015)
	Empathy			4	Di Fabio & Bucci (2016); Di Fabio & Kenny (2018); Musitu-Ferrer et al. (2019); Ienna et al. (2020)

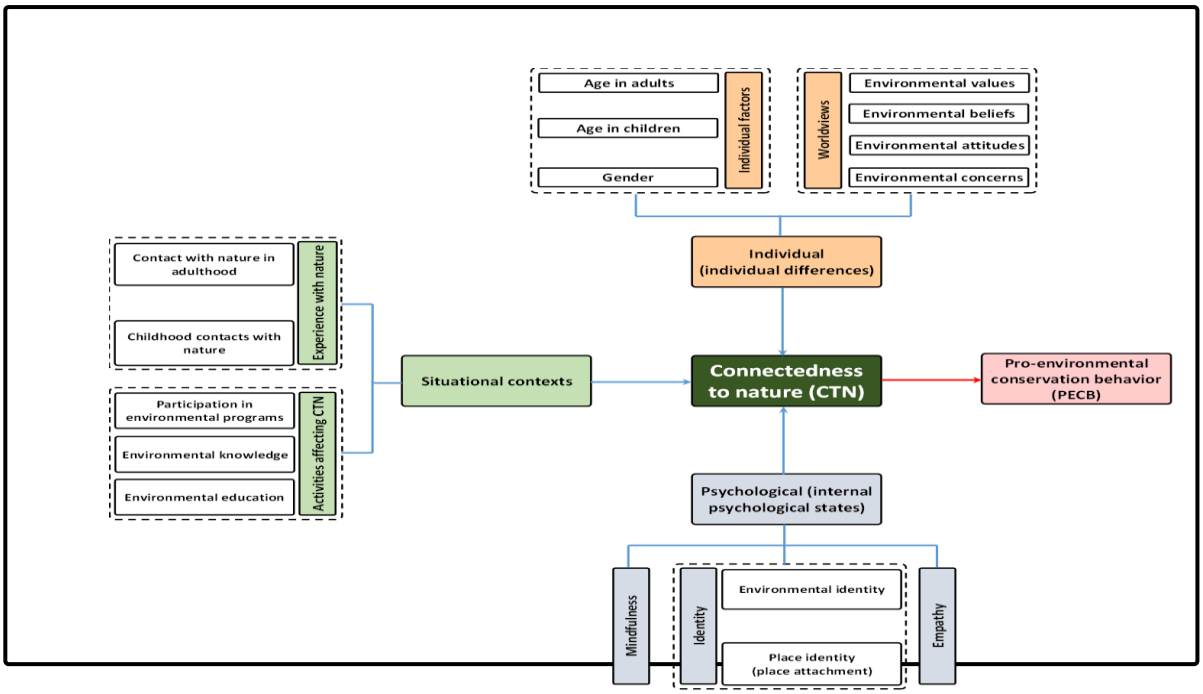

Fig. 1. The model of components affecting connectedness to nature (CTN).

Environmental identity and place attachment are other factors influencing CTN that are derived from the review of resources. Place attachment indicates an emotional bond between a person and a specific place, and in the literature, place identity is associated with environmentally responsible behaviors. In the literature, environmental identity is defined as how you see yourself as someone who loves the environment. A person with a strong environmental identity will see himself/herself as someone who likes the environment and, as a result, is more likely to be pro-environment. Since identities are formed in a social context, they can give meaning to the connection between man and nature.

Another factor extracted from content analysis is gender. When gender differences in CTN are examined, women appear to feel more connected to nature than men (Schultz & Tabanico, 2007). However, some other researchers (Tam, 2013) believe that the results related to gender are not completely certain and that these researches in environmentalism are still in their early stages and more work needs to be done.

CONCLUSION

Considering the current environmental conditions in the world and the emergence of issues and problems in this field, it can be said that the positivist approach to the issue of environmental protection cannot be a solution. Because the positivists generally consider nature to be separate from man and have viewed nature as a tool, they have always considered man to be dominant over nature. In fact, positivists are trying to introduce tools that facilitate human control over nature in order to improve human well-being. According to this paradigm, nature does not have an independent value and becomes a resource that is used and interfered with by human will. Also, the paradigm of structuralism has been criticized for not paying attention to the role of humans in changing the status quo. Therefore, it seems to be unable to investigate and solve a problem such as improving the relationship between humans and nature as well as protecting the environment (Harrington, 2014). Since the connection between human and nature is an interactive relationship and man works to change and escape from the obstacles of nature's stability with awareness (Shahvali, 2013); therefore, the separation of human and nature as seen in other paradigms is not considered in the critical theory. Humans usually have the opportunity to choose and change their natural environment.

In the paradigm of critical theory, the concept of CTN can overcome the shortcomings mentioned about the paradigms of positivism and structuralism. Because, in a philosophical view, this paradigm not only does not separate nature from humans, but considers them as parts of a complex system that includes production methods, social values, and environmental relationships. The issue of environmental protection, as a subject to ponder, requires to be examined from a critical point of view. Due to the fact that actions and behaviors of human origin have caused environmental problems and the measures taken to solve these problems have not been effective so far, dealing with current environmental issues through the lens of critical theory can cause reflection on current issues and thinking about the paths taken in the past. This is because of the critical view it has on issues and also, examining and comparing the paths that have been used so far to solve environmental crises, and as a result, it creates motivation and purpose in people to reach effective solutions. Therefore, in this research, based on the approach that prevails in the paradigm of critical theory, the issue of environmental concertation was discussed so that by examining the current situation in the field of natural resources preservation, CTN can be used in order to improve conservation behaviors.

By reflecting on what was said and based on the content analysis findings a model was developed for component and factors affecting CTN (Fig. 1). This model shows the components and factors affecting CTN, but considering that the purpose of CTN analysis is to promote PECB, future studies are recommended to investigate the effect of CTN on PECB. Of course, it should be noted that some studies confirming the effect of CTN on PECB (i.e., Collado et al., 2013; Barrera-Hernandez et al., 2020) can be as a starting point for the researchers interested in investigating this research gap. Although the complexity of the issues in the field of PECB challenges different professionals on a global scale to be able to create behavioral changes among different audiences and this work requires the analysis of different components, but one of the most important of them is CTN analysis. Analyzing CTN can be responsible for explaining many aspects of PECB. This research was done with the method of qualitative content analysis. It is very clear that this topic can be explored with opposite quantitative, qualitative, or mixed methods from the angle of different scientific disciplines. The results of this study, which itself originates from many previous researches, can be used in providing comprehensive scientific insights for other researchers.

In conclusion, the critical theory paradigm offers a holistic perspective on the relationship between humans and nature, emphasizing the interconnectedness and interdependence of both. By embracing this paradigm, we can foster a deeper understanding of conservation behaviors and drive meaningful change towards sustainable environmental practices. Based on this, the following practical and policy proposals are recommended:

Practical suggestions

- Encourage the incorporation of experiential learning opportunities in nature to enhance individuals' connectedness to the environment.
- Suggest the inclusion of mindfulness practices and empathy-building exercises in educational programs to cultivate a sense of responsibility towards nature.
- Advocate for community engagement in conservation efforts through collaborative projects and initiatives that emphasize the value of nature.

Policy suggestions

- Recommend the development of policies that prioritize the preservation of natural habitats and ecosystems through sustainable land management practices.
- Propose the integration of environmental education into formal curricula at all educational levels to instill a sense of environmental stewardship from a young age.
- Encourage the establishment of incentives for businesses and individuals to adopt pro-environmental behaviors and practices, such as tax breaks for sustainable initiatives and eco-friendly investments.

FUNDING

This research was funded by Tarbiat Modares University.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

Conceptualization, M. Mohammad, M. Bijani and N. Valizadeh.; methodology, M. Mohammadi and M. Bijani; software, M. Mohammadi.; validation, Bijani, A. Naeimi, N. Valizadeh. and A. Setti; formal analysis, M. Mohammadi; investigation, M. Mohammadi; resources, M. Mohammadi and N. Valizadeh.; data curation, M. Mohammadi and M. Bijani; writing-original draft preparation, M. Mohammadi; writing-review and editing, Bijani, A. Naeimi, N. Valizadeh. and A. Setti; visualization, Mohammadi and M. Bijani; supervision, Bijani, A. Naeimi, N. Valizadeh. and A. Setti; project administration, M. Bijani; funding acquisition, M. Bijani.

DECLARATION OF COMPETING INTEREST

The authors declare no conflicts of interest.

ETHICAL STATEMENT

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Research Ethics Committees of Tarbiat Modares University (TMU) (Date 2024-01-28 /No 1402.212).

DATA AVAILABILITY

The data utilized in this study are outlined within the article.

ACKNOWLEDGMENTS

Part of the cost of this research has been provided by Tarbiat Modares University, thereby appreciating the relevant officials.

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