

# **A Review of the Underlying Constructs of Connectedness to Nature among Children**

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## **Abstract**

A strong connectedness to nature that developed during childhood forms a basis for human to have a positive attitude and behaviour towards nature in adulthood later. Acknowledging the importance of connectedness to nature during childhood, environmental psychologists have introduced various concepts of connectedness to nature, and various instruments have been employed to measure the concept. However, the underlying constructs to measure connectedness to nature among children seem unclear. Hence, it is worth to formulate a proper understanding on the underlying constructs of children's connectedness to nature. Based on a systematic review, this paper aims to delineate the constructs of connectedness to nature referring to the existing adult and children instruments. Issues pertaining to connectedness to nature conceptualization and uni-dimensional versus multi-dimensional also will be discussed. This paper further suggests the direction for future research.

Keywords: Children, connectedness to nature, construct

## **1. Introduction**

Studies have demonstrated that developing a connectedness to nature during childhood is vital as a foundation for a human to have a positive attitude and behaviour towards nature in adulthood later (Chawla 2007; Wells and Lekies, 2006). However, nowadays, children seem to be separated from nature due to rapid population and urbanization (Louv 2005). This phenomenon may influence their connectedness to nature and the way they treat nature in the future. They might treat nature as something to be controlled rather than protected or preserved. Biophilia hypothesis has suggested that people who have a strong connection to nature have strong intention to protect the nature (Wilson, 1984). A renowned ecologist, Aldo Leopold once wrote, "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect". Therefore, connectedness to nature should be nurtured and measured since early ages to ensure the sustainability of future generation.

Acknowledging the importance of connectedness to nature during childhood, environmental psychologists have introduced various concepts and instruments to measure the concept. However, those concepts have been discussed separately and the underlying constructs to measure connectedness to nature among children seem unclear. The earliest works on connectedness to nature mostly have been conducted with adult. A review by Tam (2013) provides a good reference on the similarities and differences of connectedness to nature concepts, but the review did not highlight the constructs involved. Furthermore, the review did not make a comparison with children's connectedness to nature instruments. As the children see the world differently from adult, discussion on connectedness to nature particularly on children is needed. Therefore, this paper aims to provide a proper understanding on the underlying constructs of connectedness to nature, specifically on children, referring to the existing adult and children instruments. The underlying constructs

of children's connectedness to nature will be summarized. Issues related to conceptualization and uni-dimensional versus multi-dimensional approach will also be discussed.

## **2. Methodology**

Literature searches on connectedness to nature were conducted from online databases including Taylor & Francis, Science Direct and SAGE. Fifty three papers related to the topic were identified using the keywords of connectedness to nature, connection to nature and nature relatedness. The papers are from various fields such as environment and behaviour, environmental psychology and environmental education. Out of 53 papers, five papers (9.4%) are related to development of connectedness to nature instruments, three papers (5.7%) are review paper and 45 papers (85%) are empirical papers that investigated the relationship of connectedness to nature with other variables in various contexts. Since this paper aims to delineate the underlying constructs of connectedness to nature, only eight papers related to the development of instruments and review papers were selected. The empirical papers that adopted the existing instruments to explore the relationship between connectedness to nature and other variables were excluded.

During the review of the eight papers, other terms such as environmental paradigm and environmental perception were found to be used in measuring children's connectedness to nature. The terms of nature and environment also have been used interchangeably in measuring children's connectedness to nature. Although these instruments named as 'environmental', some of the constructs and items are similar as in the previous connectedness to nature instruments. Thus, another search was conducted using the keywords of environmental paradigm and environmental perception. Another three papers related to the environmental instruments have been identified and were included in this review paper in order to triangulate the possible constructs for connectedness to nature.

Therefore, the final reviewed paper comprised of 11 papers. Using a systematic review, the constructs of connectedness to nature were delineated. Before discussing the constructs, the concept of connectedness to nature that describing the domain involved, as well as uni-dimensional and multi-dimensional approaches used were first explained.

## **3. Results**

### **3.1 Connectedness to Nature Concept and Measurement**

Connectedness to nature has been operationalized in various ways that involve three psychological domains which are cognitive, affective and behavioural psychological domains. Cognitive domain includes memories, meaning, belief, thoughts and knowledge (Kyle, Mowen and Tarrant, 2004), responses that reflect perceptions of, and information about the attitude objects (Pratkanis et al. 1989). Affective domain includes feelings and emotions related to the attitude objects (Millar and Tesser 1989). Meanwhile, behavioural is defined as behavioural inclinations, intentions, commitment, and actions with respect to the attitude object (Pratkanis, Breckler and Greenwald, 1989). Behavioural domain can be referred to past behaviours or behavioural intentions related to the attitude object (Huskinson and Haddock 2006).

Some operational definition of connectedness to nature is a combination of the three psychological domains while others highlight only one or two of them. The name of the concepts used and the instruments developed by the previous researchers were influenced by the way they conceptualised connectedness to nature. From the review, this paper revealed nine concepts and instruments that have been used to measure connectedness to nature. Those concepts and instruments have similarities and differences in term of domains, approaches and constructs involved as shown in Table 1.

Table 1: Summary of the approaches, domains and constructs from previous instruments

<b>Instruments (Sample)</b>	<b>Authors</b>	<b>Approaches</b>	<b>Domains</b>	<b>Constructs</b>
Emotional Affinity towards Nature (Adult)	(Kals , Schumacher and Montada, 1999)	Multi-dimensional	Affective Behavioural	<ul style="list-style-type: none"> <li>• Enjoyment in nature</li> <li>• Experience in nature</li> <li>• Interest towards nature activities</li> </ul>
Nature relatedness (Adult)	(Nisbet, Zelensky and Murphy, 2008)	Multi-dimensional	Cognitive Affective Behavioural	<ul style="list-style-type: none"> <li>• Environmental identity</li> <li>• Nature awareness</li> <li>• Enjoyment in nature</li> <li>• Experience in nature</li> </ul>
Environmental Identity Scale (Adult)	(Clayton 2003)	Multi-dimensional	Cognitive Affective Behavioural	<ul style="list-style-type: none"> <li>• Environmental identity</li> <li>• Nature awareness</li> <li>• Enjoyment of nature</li> <li>• Experience in nature</li> <li>• Interest towards nature activities</li> <li>• Interest towards natural spaces</li> </ul>
Connectedness to Nature (Adult)	(Mayer and Frantz 2004)	Uni-dimensional	Cognitive	<ul style="list-style-type: none"> <li>• Environmental identity</li> </ul>
Children's Environmental Paradigm (Children)	(Manoli, Johnson and Dunlap, 2007)	Uni-dimensional	Cognitive	<ul style="list-style-type: none"> <li>• Nature awareness</li> </ul>
Children's Environmental Perception (Children)	(Larson, Green and Castleberry, 2009)	Multi-dimensional	Cognitive Behavioural	<ul style="list-style-type: none"> <li>• Nature awareness</li> <li>• Interest towards nature activities</li> </ul>
2-MEV (Children)	(Johnson and Manoli , 2010)	Multi-dimensional	Cognitive Affective Behavioural	<ul style="list-style-type: none"> <li>• Nature awareness</li> <li>• Enjoyment in nature</li> <li>• Interest towards nature activities</li> </ul>
Connection to Nature Index (Children)	(Cheng and Monroe 2010)	Multi-dimensional	Cognitive Affective	<ul style="list-style-type: none"> <li>• Environmental identity</li> <li>• Nature awareness</li> <li>• Enjoyment in nature</li> <li>• Empathy towards nature</li> </ul>
Inclusion of Self in Nature (Children)	(Liefländer et al. 2013)	Uni-dimensional	Cognitive	<ul style="list-style-type: none"> <li>• Environmental identity</li> </ul>

Kals, Schumacher, and Montada (1999) work is among the earliest. They have introduced the concept of Emotional Affinity towards Nature that represents human inclination towards nature, emphasized the affective and behavioural domain. Meanwhile, Environmental Identity (Clayton 2003) and Nature Relatedness (Nisbet et al. 2008) emphasized all three psychological domains. While those aforementioned concepts emphasized a combination of two or three domains, Mayer and Frantz (2004) have defined connectedness to nature only in one domain, the affective domain. They have described connectedness to nature as a feeling of community with nature. However, this paper suggests that Mayer and Frantz's instrument measures the cognitive domain of a person's belief of him or herself connection to nature, similarly with what have been recommended by Perrin and Benassi (2009). According to Perrin and Benassi (2009), including the word *feel* in some of the items such as "I often feel a kinship with animals and plants" does not imply the items is in the affective domain, but rather it is in the cognitive domain. The word *feel* can be replaced by other words such as *believe* or *think* (Perrin & Benassi 2009).

Other concepts that emphasize on the affective domain is Connection to Nature (Cheng & Monroe 2010). Cheng and Monroe (2010) measure children's connection to nature as an affective attitude towards nature. However, some of the constructs in Connection to Nature Index present the cognitive domain. Recently, Liefländer, Fröhlich, Bogner and Schultz (2013) have revised the adult single item instrument Inclusion of Self in Nature by Schultz (2000) to measure children's connectedness to nature. Inclusion of Self in Nature highlighted the cognitive domain which refers to the cognitive belief of a person to be part of nature. Only these two, Connection to Nature Index and Inclusion of Self in Nature have been used to measure connectedness to nature among children.

The additional environmental instruments that measure connectedness to nature among children are New Environmental Paradigm Scale, Children's Environmental Perception and Two-dimensional Model of Ecological Value (2-MEV). New Environmental Paradigm was developed by Manoli, Johnson, and Dunlap (2007) which measure the cognitive domain, whereas, Children's Environmental Perception developed by Larson, Green, and Castleberry (2009) measures the cognitive and affective domain of children's connectedness to nature. The last one is Two-dimensional Model of Ecological Values (2-MEV) which measures the cognitive, affective and behavioural domains of children's environmental value.

Out of nine instruments mentioned above, three of them, Connectedness to Nature, Children's Environmental Paradigm and Inclusion of Self in Nature are uni-dimensional instrument which has only one construct. Meanwhile, six others are multi-dimensional instrument that have more than one constructs. This includes Emotional Affinity towards Nature, Nature Relatedness, Environmental Identity, Children's Environmental Perception, Two-dimensional Model of Ecological Values (2-MEV) and Connection to Nature Index.

### **3.2 Children's Connectedness to Nature Constructs**

This paper revealed that there are seven constructs previously have been used to measure connectedness to nature. The constructs are as shown in Table 1; environmental identity, nature awareness, enjoyment in nature, empathy towards nature, interest towards nature activities, interest towards natural places and experience in nature. These constructs can be categorized under three domains; cognitive, affective and behavioural. However, only six constructs have been chosen as the potential constructs to exhibit children's connectedness to nature. Experience in nature construct is excluded because studies have demonstrated that it is one of the predictive factors that contribute to connectedness to nature (Cheng & Monroe 2010; Collado et al. 2013). Thus, to include experience in nature as a construct in connectedness to nature is not appropriate. The summarized constructs of connectedness to

nature under cognitive, affective and behavioural domains from previous instruments are listed in Table 2.

Table 2: The constructs of connectedness to nature under cognitive, affective and behavioural domains

Domain	Constructs	Description
Cognitive	<ul style="list-style-type: none"> <li>Environmental identity</li> </ul>	<ul style="list-style-type: none"> <li>Belief of our self as part of nature</li> </ul>
Affective	<ul style="list-style-type: none"> <li>Nature awareness</li> <li>Enjoyment in nature</li> </ul>	<ul style="list-style-type: none"> <li>Awareness on the importance of nature and care for nature</li> <li>Emotions of being in nature</li> </ul>
Behavioural	<ul style="list-style-type: none"> <li>Empathy towards nature</li> <li>Interest towards nature activities</li> <li>Interest towards natural spaces</li> </ul>	<ul style="list-style-type: none"> <li>Sharing of another person's or object's emotional feelings</li> <li>Inclination to involve in nature activities</li> <li>Inclination to have natural elements in spaces</li> </ul>

### 3.2.1 Environmental Identity

Environmental identity represents a cognitive domain of a person belief of her or him as part of nature (Clayton, 2003). Another concept that has similar meaning as environmental identity is inclusion of self in nature. A person who defines him- or herself as part of nature has a cognitive representation of self that overlaps extensively with his or her cognitive representation of nature (Schultz 2000). Both can be measured under the same construct. A stronger environmental identity indicates that the person has positive attitude and behaviour towards nature and environment. People who include nature as part of her or himself concept are more likely to act in an eco-friendly manner towards the environment (Clayton 2003). Therefore, children's connectedness to nature can be indicated by their environmental identity. Some author named this construct as sense of oneness with nature (Cheng & Monroe 2010). Examples of items in this construct are "I am part of nature" and "Human are part of the natural world".

### 3.2.2 Nature Awareness

Nature awareness is part of the cognitive domain that reflects children's awareness on the importance of nature and care for nature. Some instruments named this construct as sense of responsibility (e.g. Cheng & Monroe 2010) which represents a person's belief in the responsibility to take care, protect, respect and help the nature and environment (Jeronen & Kaikkonen 2002). Since both constructs have similar items, they can be included under one construct. Schultz (2000) claimed that if a person feels good about the environment, they value, care, respect and, in turn protect the nature. Thus, connectedness to nature can be represented through nature awareness. Examples of items that have been included in previous instruments under this construct are "Nature is important for my life", "Taking care of nature is important for me" and "My actions will make the natural world different".

### **3.2.3 Enjoyment in nature**

Enjoyment in nature is an affective domain on people's emotion and feelings of being in nature. As for children, they may have both positive (happy, fascination, curiosity, joy) and negative (fear, disgust) emotions towards nature (Kals & Ittner, 2003). Some of the items included in previous instruments are "Being in nature makes me happy", "Being in natural environment makes me feel peaceful" and "When I feel sad, I like to go outside and enjoy nature". This construct also includes an item of enjoyment to spend time in nature, such as "I would like to go on trips to places like forests away from cities".

### **3.2.4 Empathy towards Nature**

Another construct in affective domain is empathy. Empathy has been defined as the understanding and sharing of another person's or object's emotional experience. Previous studies have suggested that empathy plays a role in influencing people's attitude and behaviour towards nature. Studies revealed that children expressed sadness when seeing people cutting down the trees. They also stated that they are worried and feel bad on environmental issues such as car pollution (McCallister et al. 2012). In another study, children's expressed 'ecophobia', fear, sadness and anger about environmental issues (Strife 2012). Those studies showed that children can express their empathy towards nature. An example of the item in this construct is "I feel sad when wild animals are hurt".

### **3.2.5 Interest towards nature activities**

Nature oriented people can be seen from their interest to involve in nature activities such as hiking, camping, fishing, gardening, watch birds, learn about nature, visit nature places such as beach, lake and mountain (Cheng & Monroe 2010; Nisbet et al. 2008). A study by Johnson & Monali (2010) has included children interest to play in the outdoor in natural setting and their interest to live nearby nature in their environmental orientation 2-MEV instrument. Similar to a study by Aaron and Witt (2011) where they found children have desire to be in the outdoor and willing to spend more time in the outdoor when they are connected to nature. Examples of items in previous instruments are "I like to garden" and "I really enjoy camping outdoors".

### **3.2.6 Interest towards natural spaces**

This construct presents children's inclination towards spaces that have natural elements. Previous studies have found that some children appreciated natural spaces whereas others expressed negative feeling towards natural spaces (McCallister et al. 2012; Wals 1994). Clayton (2003) has included an item such as "I would rather live in a small room or house with a nice view than a bigger room or house with a view of other buildings" to measure adult's connectedness to nature. However, this construct has not been included in any of the instruments that measure children's connectedness to nature. Hence, this construct should be considered in measuring children connectedness to nature in the future.

## **4. Discussion**

A number of concepts and instruments have been introduced to measure connectedness to nature. Identifying the similarities and differences between those concepts and instruments is needed to help the researchers to overcome the confusion in choosing one of those. Besides, delineating the overlapping constructs from the existing instruments provide the potential underlying constructs to measure connectedness to nature among children. In general, this review found that some author defined the concept in only one domain, while others defined it as a combination of two or three domains. The question is which one is more reliable? The overlapping definition of connectedness to nature suggests that future research should

conceptualize connectedness to nature in one framework rather than discuss them separately. Connectedness to nature should integrate all three psychological domains: cognitive, affective and behavioural. Conceptualization of connectedness to nature in only one or two domain may have limitation to reflect an individual disposition towards nature. Subsequently, this gives a hint that connectedness to nature should be measured in multi-dimensional approach and not in uni-dimensional approach. As suggested in recent studies, multi-dimensional approach seemed more reliable in measuring connectedness to nature and had a better performance to predict behaviour (Tam 2013; Restall & Conrad 2015). Meanwhile, uni-dimensional approach has limitation to explain attitude and behaviour (Johnson & Manoli 2008).

The overlapping constructs of connectedness to nature from the existing adult and children instruments reveal that there are six possible constructs that can be included to measure children's connectedness to nature. Even though previous instruments have named the constructs with various names but they share similar meaning and that can be combined in one construct. There are environmental identity, nature awareness, enjoyment in nature, empathy towards nature, interest towards nature activities and interest towards natural spaces. This finding suggests there is a need to develop a new instrument that includes these new constructs. Exploratory and confirmatory factor analysis need be conducted to explore and confirm the constructs. Moreover, since children see the world differently from adult, there is a need to validate the items in the new instrument to ensure the instrument is appropriate for children's cognitive level. Other than that, regarding the methods, most studies have examined children's connectedness to nature using quantitative approach. There are suggestions by many authors that qualitative methods offer more reliable approach to understand children's attitude and feelings (Chawla 2006; Alerby 2000). Thus, a mixed method research design with children may be advantageous to cross check the constructs of connectedness to nature. Finally, future research across diverse culture is recommended because children from difference culture may response differently.

## **5. Conclusion**

In conclusion, recognizing the similarities and differences of the concepts and constructs of connectedness to nature gives an indication on how connectedness to nature should be conceptualized. It helps future researchers to integrate them into one framework rather than discuss them separately. Moreover, this paper provides guideline on the underlying constructs to be used in measuring children connectedness to nature for future researchers. This gives new insights on assessment of children's connectedness to nature.

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