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Psychological Restoration and Nature Connectedness in terms of "Bottom-up" and "Top-down" Approaches to Understanding Interaction with Nature

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Relevance. The article presents an overview of notions about the foreign environmental psychology constructs — psychological restoration and nature connectedness. The constructs represent the effects of person's relationship with nature and are thought of as a resource of health/well-being. **Objective**. To reveal general characteristics of the constructs and to analyze them from the point of view of the "bottom-up" (evolutionary-psychological) and "top-down" (constructivist) approaches to understanding the salutogenic effects of interaction with nature. **Methods**. Analysis and generalization of theoretical and empirical research within the framework of foreign and Russian environmental psychology. **Results**. The constructs are characterized using the following criteria: basic conceptual assumptions, specific constructs, measures, empirical support. The theoretical foundations of constructs and their role in empirical studies are considered from the point of view of "bottom-up" and "top-down" approaches. Based on the review, we identified a trend towards the integration of approaches, and highlighted points that should be taken into account when studying the salutogenic effects of interaction with nature. Among them are mediation and moderation schemes, which include variables of psychological restoration and nature connectedness, they are "predisposed" to support "bottom-up" and "top-down" assumptions, respectively. When studying restorative environments, it is worth predicting the likely influence of "top-down" variables: traits, values, attitudes. In Russian studies, mostly appears the construct of connection with nature.

Keywords: psychological restoration, nature connectedness, bottom-up and top-down approaches, well-being, environmental psychology.

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Психологическое восстановление и связь с природой с точки зрения «восходящего» и «нисходящего» подходов к пониманию взаимодействия с природой

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Актуальность. Предложен обзор научных представлений о конструктах зарубежной психологии среды — психологическом восстановлении и связи с природой, — репрезентирующих эффекты взаимоотношений человека с природой, полагаемые ресурсом здоровья/благополучия. **Цель**. Общая характеристика конструктов и рассмотрение их с точки зрения дискуссии «восходящего» (эволюционно-психологического) и «нисходящего» (конструктивистского) подходов к пониманию салютогенных эффектов взаимодействия с природой. **Методы**. Анализ и обобщение теоретических и эмпирических исследований зарубежной и российской психологии среды. **Результаты**. Конструкты охарактеризованы по следующим критериям: базовые концептуальные допущения; частные конструкты; психодиагностические методики; эмпирическая поддержка. Теоретические основания

конструктов и их отношения в эмпирических исследованиях рассмотрены с точки зрения «восходящего» и «нисходящего» подходов. На основе проведенного обзора выделена тенденция к интеграции подходов и определены моменты, которые стоит учесть при исследовании салютогенных эффектов взаимодействия с природой. Во-первых, схемы медиации и модерации, включающие переменные психологического восстановления и связи с природой, «предрасположены» поддерживать «восходящие» и «нисходящие» допущения соответственно. Во-вторых, при изучении восстановительных сред стоит прогнозировать вероятное влияние «нисходящих» переменных: черт, ценностей, установок. Отмечено, что в российских исследованиях обсуждаемого направления фигурирует преимущественно конструкт связи с природой.

Ключевые слова: психологическое восстановление, связь с природой, «восходящий» и «нисходящий» подходы, благополучие, психология среды.

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Introduction

The concept of the beneficial effects of the natural environment on human mental and physical health — such as relaxation, restoration, and vitality — has increasingly become the focus of psychological studies over the past two decades [52]. This growing interest is associated, according to experts, with concerns regarding the quality of the surrounding environment amidst advancing urbanization. This is rooted in the widely accepted notion that the environment has the potential to influence human health and well-being [13; 19; 24]. In the field of environmental psychology, research into salutogenic (supporting health and well-being) effects of nature has emerged as an actively evolving area in international science (North America, Europe, Australia, East Asia) [24; 28; 36].

This article presents a narrative review of scientific perspectives on two specific constructs within this domain: psychological restoration and nature connectedness. Each construct represents a fragment of the psychological reality influenced by human interaction with nature. Interaction can be with nature as a referent (physical reality) or with nature as a sign, but one way or another it produces certain changes in the human psyche. Both constructs are popular in environmental psychology, corresponding with specific areas of research. However, given their significance in understanding the psychological benefits of interacting with nature [9; 32; 54], their spheres are increasingly overlapping (see Table 1).

The tasks of this article are: 1) to provide a general characteristic of constructs, 2) to examine the constructs and their possible relationships from the perspective of "bottom-up" and "top-down" approaches to understanding the salutogenic effects of nature, as the discussion of these approaches has become an area of significant focus in environmental psychology in recent years [20; 29; 40; 47; 51; 52]. "Bottom-up" theories are based on evolutionary psychological foundations and universalize the beneficial influence of the physical qualities of the environment on a person. "Top-down" theories explain the effects of nature not through the immanent qualities of the stimulus, but through a person's interpretation of this stimulus. The choice of the topic is determined by the scarcity of texts addressing these tasks in English and the extreme scarcity in Russian.

General Characteristics of Constructs

The term *psychological restoration* [32] or *restoration* [21], concerning the effects of being in nature, has become established due to the influence of well-known theories since the 1970s: Attention Restoration Theory (ART) by R. and S. Kaplan and Stress Recovery Theory (SRT) by R. Ulrich [22, p. 95]. The former focuses on restoring cognitive functions, particularly directed attention, af-

Table 1

The Number of Search Results in Google Scholar

Keywords	Year of Publication			
	1990—1999	2000—2009	2010—2019	2020—2023
psychology restoration nature connectedness	2	20	643	934

Note: Search Parameters: Any articles; All of these words appear anywhere in the article: *psychology*, *restoration*, and the exact phrase *nature connectedness*.

ter mental fatigue (*cognitive restoration*), while the latter focuses on reducing vegetative stress responses (*physiological restoration*) and improving emotional states by decreasing negative emotions and increasing positive ones (*affective restoration*) [43, p. 7]. Both frameworks are evolutionarily oriented and explain the effects of being in nature through the evolutionary benefits of perceiving its qualities [52, p. 38]. To some extent polemical, these theories in the 20th century demonstrated an inclination toward synthesis [27], which is now realized: contemporary empirical research often considers restoration as a complex phenomenon that combines cognitive and affective/affective-physiological recuperation [21; 30; 31; 53] (literature also includes social and other dimensions of restoration [43], yet here we adhere to the "traditional" boundaries of the concepts outlined by ART and SRT [9]). One definition of this complex phenomenon is "the recovery of physical and psychological adaptive resources depleted in the performance of daily activities" [21, p. 154].

As noted by one of the leading researchers on nature's effects, T. Hartig, the construct of restoration belongs to the framework of the relationship between an individual and their environment, which he, following S. Saegert and G. Winkel, terms "the adaptive paradigm" [22, p. 91]. Restoration is one facet of adaptation, alongside two others expressed in terms of stress and coping. The basic conceptual assumption of this construct is the need for periodic renewal of mental adaptive resources [Ibid.].

Empirical studies on the salutogenic effects of nature contact encompass various aspects of the restoration phenomenon, in other words, it's a general construct comprising several specific ones. For instance, one can distinguish between *restoration* and *restorativeness* [21]. "Restoration" emphasizes the individual's *state* as a result of their interaction with the environment. Its indicators may be subjective, such as when specific self-report scales are used (Restoration Outcome Scale [30]), or objective, in cases employing measurements of physiological (pulse, cortisol level) or cognitive (objective tests) restoration. "Restorativeness" emphasizes a person's *evaluation* of the environment. This evaluation assesses the specific restorative characteristics of the environment described by ART [27], for which specialized questionnaires are used (Perceived Restorativeness Scale [23]). One study mentioned over 10 self-report restoration/restorativeness scales [33]; no equivalent original or adapted tools have been identified in Russian psychology.

Although the heterogeneity of the listed measures leads to divergent results, the overall positions of ART and SRT are confirmed. For instance, a systematic review of 36 studies verifies the reliability of results for affective restoration, showing less consistent outcomes for physiological restoration [17]. A systematic review of 42 works confirms cognitive restoration but with a greater effect on working memory and cognitive flexibility than on attentional control [50]. A meta-analysis of 22 studies comparing restoration self-report scales confirms a more pronounced restorative potential of natural environments compared to urban ones [39].

In Russian psychology, the concept of restoration is represented in a limited manner, both in theoretical [2] and empirical research. Among the latter, one can mention organizational-psychological studies of work environments that consider natural elements and symbols integrated into office spaces as resources for psychological restoration [4; 5].

The terms used to define the second discussed general construct, nature connectedness, in foreign psychology vary: *nature affiliation* [25], *nature connectedness* [14], *sense of connection*, *relationship with nature*, *environmental identity* [45, p. 109], *human-nature connectedness* [10]. The underlying category behind these names circulates between "sense (of oneness)" [34], "relationship" [48], "identity" [45; 48]. Currently, there is no widely accepted definition; the concept is rather intuitively grasped. One definition of this construct is "sense of oneness with the natural world" [34, p. 504]. Nature connectedness can be conceptualized as *a state* induced by contact with nature [35; 41], or as *a personal trait* [35; 42], where an individual feels this connection "regardless of where one is" [9, p. 13].

Specific constructs of nature connectedness correspond to a range of psychodiagnostic instruments; empirically, their commonality is affirmed by a strong correlation of their indicators [45]. Among these concepts are emotional closeness to nature (Emotional Affinity Toward Nature scale); cognitive aspects (Implicit Associations Test — Nature); both cognitive and affective components (Connectedness to Nature Scale (hereinafter — CNS)); a combination of emotional, cognitive, and behavioral aspects (Nature Relatedness Scale); environmental identity (Environmental Identity scale (hereinafter — EID)) [Ibid.], among others. One study examines 26 tools measuring similar phenomena [49]. Russian research utilizes adapted foreign methods, such as "Шкала связи с природой" (adaption of CNS) [6], "Шкала идентификация с природой" (adaption of EID) [15], as well as original instruments: "Люди и растения" (People and Plants) [3].

The origin of the general construct is associated, on the one hand, with global urbanization [25], and on the other hand, with global environmental issues [42]. The fundamental conceptual assumption can be formulated as follows: the sense of connection with nature compensates for alienation from nature (conceptualized as a harmful deficit, "nature starvation" [25, p. 232]), and also promotes ecologically oriented attitudes and actions. In essence, this construct is conceptualized as a resource simultaneously for health/well-being and pro-environmental behavior [38]. In a systematic review of 16 meta-analyses (832 experimental and correlational

studies), it was demonstrated that nature connectedness has a positive influence on pro-environmental behaviors and values, and also positively correlates with the same phenomena and with health/well-being [10]. *Well-being*, a positive psychological aspect of health, stands as one of the most prominent variables validating the beneficial effects of nature connectedness [45, p. 113]. A meta-analysis of 30 studies indicates that a stronger nature connectedness aligns with higher levels of hedonic well-being [14], while a similar pattern is evident concerning eudaimonic well-being in a meta-analysis of 20 studies [46]. This consistent pattern is also corroborated in Russian studies concerning the relationship between nature connectedness and well-being [1; 6; 26].

Theoretical foundations of constructs

The difference between "bottom-up" and "top-down" restoration theories lies in the explanations for the restorative effects of nature contact. "Bottom-up" theories explain these effects through evolutionary mechanisms and the "universally beneficial" properties of the environment, while "top-down" theories attribute them to sociocultural mechanisms — cognitive constructs, attitudes, and values.

Traditionally recognized as "bottom-up" theories are ART and SRT, along with the biophilia hypothesis by E. Wilson, which suggests that for successful adaptation, human ancestors needed to be emotionally responsive to non-threatening non-human life forms [9]. This need continues to contribute to subjective security and productivity in humans. "Top-down" or constructivist ideas are more recent. An example is the Conditioned Restoration Theory by L. Egner et al., which suggests that the restoration process follows the classical conditioning scheme: leisure in a natural environment triggers feelings of relaxation and pleasure, cementing the "nature+restoration" association [18]. Other "top-down" concepts, supported by empirical research, explain restoration through the influence of cognitive constructs (learned positive associations with nature) [20; 29] or personal variables (place attachment) [40; 51].

Among the explanations of nature connectedness, one can also recognize tendencies towards the discussed poles. On the "bottom-up" side, we find the same biophilia hypothesis [45, pp. 110, 112], while on the "top-down" side, there's the Self-Determination Theory by R. Ryan and E. Deci, where nature connectedness is seen as satisfaction a basic psychological need for relationships. Unlike the biophilia hypothesis, the sense of connectedness here is determined not "objectively", but subjectively (for individuals with autism, engaging with nature can fulfill the need for relationships) [16].

Particularly noteworthy is the recent trend toward integrating approaches. An example covering both discussed constructs is the work of G. Barbiero and R. Berto. On one hand, the authors conceptualize restoration, as understood by ART (1), and nature connectedness (2) as *two components of biophilia*, reflecting evolutionarily ingrained tendencies in humans "to *focus upon* life and lifelike forms" (1) and "*affiliate* with them emotionally" (2) [9, p. 12]. On the other hand, "top-down" explanations do not contradict the biophilia hypothesis. Biophilia is not inevitability but potential ("weak learning rules"), requiring cultivation in an individual's psyche through accumulating experience of nature contacts [8, pp. 4, 8]. Apparently, the non-realization of this potential does not deprive individuals of receiving restorative benefits. In one of the works, a hypothesis is proposed according to which the level of restoration is a product of both the nature connectedness and the "biophilic quality" (naturalness level) of the environment. A high level of restoration can be produced by a combination of high connectedness and high biophilic quality of the environment, as well as a combination of low connectedness and low biophilic quality [11, p. 14]. Thus, "bottom-up" and "top-down" logics merge at the point of implementing initial assumptions.

The other group of authors presents a similar scenario, offering *an evolutionary-constructivist perspective* on restoration: an inherent positive response to natural stimuli can be modified by "top-down" factors, such as the level of nature connectedness [29].

Another example of understanding restoration is interesting as a broad synthesizing gesture. This is *a three-level model of restoration* in urban environments, which can be adapted for natural environments as well. The first level of the model is *containment*: the absence of noise, pollution, crowds. There are no psychological changes at this level; it serves as a premise for restoration. The second level is *passive restoration*, induced by the "bottom-up features" of the urban environment, such as biophilic design. In the case of nature, these are the qualities of the environment itself. The effects of this level are the forms of restoration described by ART and SRT. The third level, *active restoration*, works through "top-down features", the personal contribution of the individual: place attachment, place memories, sense of belonging (in the case of a natural environment, this could be nature connectedness). The effects of the third level: cognitive engagement, eudaimonic well-being [12].

The other theoretical framework integrates restoration and nature connection "under the umbrella" of mindful engagement in nature experiences (both effects are supported by a practice of mindfulness). The authors distinguish between both perceptually-oriented *external awareness* and *internal awareness* of emotions, thoughts, and ideas. They note that in a "more restorative", i.e., more natural environment, the first form might be suffi-

cient for psychological benefits, while in perceptually restricted conditions (plantings in a busy city) the second one might be needed [32]. It's easy to observe here the analogy between passive "bottom-up" and active "top-down" restoration.

Relationships between constructs

Given that both the constructs of restoration and nature connectedness embody positive psychological effects of engaging with the natural environment, their convergence in research domains was inevitable.

Their relationships can also be systematized based on the distinction between the bottom-up and top-down approaches. Specifically, from this standpoint, one can consider the application of mathematical-statistical methods such as *mediation analysis* and *moderation analysis*, often used to test assumptions about the relationship between the discussed constructs. The use of mediation analysis in studying the relationships between constructs is more characteristic of the "bottom-up" approach. As noted by P. Olivos and S. Clayton, nature connectedness "could be considered a mediator variable because of its possible phylogenetic origin and a potential universal explanation of the sense of belonging to nature" [45, p. 118]. The authors discuss here the mediation of relationships between variables of nature exposure and well-being. In our view, this notion can be extended to other relevant mediation schemes as mediation reconstructs *the paths of effects* ("how or why such effects occur" [Ibid.]), representing a universalizing assumption par excellence. Along with that, moderation analysis tests *conditions* ("when certain effects will hold" [Ibid.]), which constitutes a differentiating "top-down" assumption.

For instance, the mediating role of nature connectedness in the relationship between nature perception and affective-cognitive restoration has been experimentally confirmed [35]. In other words, sense of oneness with the natural world acts as the "active ingredient" in restoration. In another experiment, affective restoration mediates the effect of outdoor walks concerning nature connectedness [41]. This means that the path from nature contacts to the sense of connectedness is facilitated through affective restoration. Both studies, despite the contrasting directions of effects in regression models, pose questions and interpret results within the framework of a "bottom-up" approach.

An example validating the "top-down" hypothesis is a study confirming the moderating role of nature connectedness in the relationship between landscape perception and affective restoration [37], where higher affective restoration was observed among individuals feeling more connected to nature. Another instance is a study where nature connectedness acts as a grouping variable (that is conceptually close to moderation analysis). It was confirmed that the nature connectedness variable "switches modes" of restoration: the low-urban-oriented group (or nature-oriented) showed the highest restoration effect after a walk in the forest compared to the high-urban-oriented group [44].

In summary, depending on the theoretical framework and study design, we obtain arguments supporting both "top-down" and "bottom-up" logic of relationships. Such polyphony can be predictable for two reasons. Firstly, due to the complexity of constructs and the diversity of their indicators, not to mention the vast array of additional variables (socio-demographic characteristics, outdoor activity types, environmental types) beyond the scope of this article. Accordingly, different data configurations may cause different relationship patterns. Secondly, the approaches integration described above allows validating both positions.

Given the aforementioned, it could be suggested that the constructs are *interdependent*. This formulation doesn't contradict either approach, signifying that a stronger nature connectedness is observed in a more restorative natural environment, and conversely, more pronounced restoration is documented in the environment respondents feel more connected to [54]. As articulated in one recent study, restoration and nature connectedness "appear to mutually reinforce one another" [32, p. 2].

Conclusion

Psychological restoration, recovery of depleted adaptive resources through nature perception, and *nature connectedness*, sense of oneness with the natural world, are constructs used in environmental psychology to describe the psychological effects of human-nature relationships.

The theoretical foundations of these constructs and their relationships in empirical studies are examined through the lenses of both "bottom-up" (evolution-oriented) and "top-down" (constructivist) approaches to understanding the salutogenic effects of nature. A *tendency towards integration* observed in the discussed research area is highlighted. On one hand, this is integration of the approaches where the psychological effects of relationships with nature depend on both the qualities of the environment and the characteristics of a person. On the other hand, this is conglomerate of psychological effects: restoration and nature connectedness tend to be considered mutually reinforcing phenomena. Hence, in exploring the psychological benefits of nature, both constructs are increasingly taken into account in recent years.

The review's limitations include the generalizing perspective used to consider the constructs, which might

create an impression of their homogeneity. However, restoration indicators are quite heterogeneous; the construct in some cases might be represented by cortisol levels in saliva [17, p. 11], while in others by evaluating statements like "I would like to spend more time looking at the surroundings" [23, p. 182]. Although there's currently no basis to isolate any parts from the basic construct, generalizing such diverse phenomena should be approached with caution. And, of course, "bottom-up" / "top-down" frameworks cannot exhaust the topic of interaction with nature.

This article might be of interest to researchers studying recovery from mental fatigue or stress and those exploring the effects of nature contacts within Russian-speaking samples. The review allows for the identification of aspects worth considering in such research. Firstly, mediation and moderation models involving restoration and nature connectedness variables are inclined to support "bottom-up" and "top-down" assumptions, respectively. Secondly, when studying restorative environments, it's important to forecast the likely influence of "top-down" variables — attitudes towards nature, value preferences, etc.

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