



An ecological stance on risk and safe behaviors in children: The role of affordances and emergent behaviors



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A B S T R A C T

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Unintentional injuries are a major cause of disability and death among children. Initial strategies to address child safety issues have primarily either focused on the environment, trying to identify “risk environments”, or on the individual, trying to identify “at risk children”. More recently, the interaction between child and environment is starting to be addressed in order to enhance the understanding of childhood injuries. The present review suggests a framing of these studies in ecological theory, which implies that children with certain characteristics perceive certain affordances in the environment. In this context, risk may be considered a relational concept. The literature on risk prevention is reviewed and the role of caregivers in managing affordances is emphasized.

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1. Introduction

Unintentional injuries are a major cause of disabilities among children, with a large impact on their own lives as well as the lives of their families. According to the World Report on Child Injury Prevention (Peden et al., 2008), every day around the world more than 2000 families lose a child due to unintentional injury. The problem of child safety is somewhat complex to deal with for three main reasons. First, the environments that children move in are mostly designed by and for adults with minimal adaptations for children. For instance, inadequate physical constraints that do not consider a child's body dimensions, such as a balcony in which the railings are too low or spaced too far apart (i.e., more than 10 cm), or a window sill that is too low, fail to protect children's falls from heights (Istre et al., 2003). Many safety barriers designed to prevent access to risk environments have poor or inadequate design

(e.g., horizontal bar barriers with footholds) and therefore are easily crossed by children (Cordovil, Barreiros, Vieira, & Neto, 2009; Cordovil, Vieira, & Barreiros, 2011). Second, the action capabilities of children are substantially different from those of adults, which are usually presented as a reference. Children differ physically and cognitively from adults. For instance, preschoolers cannot read, which sometimes might be a problem. Many poisonous products look like and come in similar looking containers to drinks or food (Lueder & Rice, 2008). Those containers might be labeled as a “juice” or a “home cleaner” but for a child that cannot read they are indistinguishable. Pictogram symbols must also be tested if the intention is to warn children. For instance, the skull and crossbones symbol used as a hazard symbol for poisonous substances may be interpreted as “pirate food” (Schneider, 1977). Safe packaging with child-resistant caps and safe storage are particularly important to prevent poisoning. Third, children's behavior is frequently unpredictable and variable, i.e., children find divergent solutions to interact with an environment designed for adults. For instance, adults usually walk up or down the stairs, but children can consider a set of stairs as an object of fun to play with, and they can chose creative

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ways, sometimes other than walking, for going up or down (e.g., see Ulrich, Thelen, & Niles, 1990). Sinnott (1977) vividly described how children behave in the home environment, using their houses in creative ways that sometimes have not been foreseen by the designer: “children will crawl about the floor, climb onto the window ledge, squeeze through stair balustrades, slide down the stair handrail, swing on the gate, run from room to room and ride bikes inside as well as out” (p. 76). These three child safety factors are related to: the environment or the task performed by the child (i.e., inappropriate design); the child (i.e., the specificity of his/her action capabilities); and the relation between the child and the adult (i.e., the unpredictability of the child's behavior for the supervisor). The interaction of these three factors, sometimes results in accidents and injuries.

Most early analyses concerning child safety issues have endorsed views in which either the risk environment or the individual at risk have been the focal point. In order to further prevent accidents and injuries, the aim of the current paper is to underline the need to consider risk in behavioral terms, as a dynamic, relational, emergent and constantly actualized state of affairs between the child and the environment, as proposed by an ecological approach. To this end, in this article, we first review the literature on risk prevention and present the contributions of previous research to the identification of “risk environments” and “at risk children” (i.e., accident prone children). Next, we refer to some studies that have already considered the importance of the interaction between the individual child and the environment when addressing risk issues. We propose that those studies could be understood from an ecological approach to risk, which considers risk as a particular state of the child in relation to the environment. In addition, risk is associated with uncertainty (Aven, Renn, & Rosa, 2011). Children engage in a number of actions that sometimes have different outcomes than expected. A risk situation exists when the outcome is uncertain and the child's safety is at stake. From this viewpoint risk cannot be seen as something inherently negative. To the contrary, we argue that risk behavior and unintentional injury are emergent phenomena whenever there is the potential for a misfit between a child's action capabilities and his or her environment. So rather than understanding risk as something to be prevented, it is the emergence of behavior that might lead to injury, which should be prevented. But that is not to say that we can or should completely regulate risk environments.

Children's actions lead to perceptions of the environment which in turn lead to new actions in the environment. Therefore, we propose that risk is a dynamic concept and, accordingly, children's actions need to be understood as a result of actualization of affordances (Smith & Pepping, 2010). Affordances, the opportunities for action in the child's environment, are intimately tied to the child's action capabilities in that same environment. Greater understanding of the dynamics of individual capabilities and environmental opportunities for action and their relative fit is needed for a better understanding of risk environments and their potential negative behavioral consequence. It is slight (unanticipated) changes in the child's action in a given environment, or changes in the environment itself,

that bring about risk. Therefore, the negative behavioral consequences of risk, injury, is emergent. This ecological approach is postulated to advance the understanding and management of child safety issues. Finally, we emphasize the importance of caregivers in selectively structuring environments for the children they are caring, in order to manage these risk environments and the risk behaviors they invite without impeding children's opportunities for exploring and learning.

2. “Risk environments”

Traditionally, risk has been related to the expected losses that can be caused by an event, in association with the probability of occurrence of this event (*ISO/IEC Guide 50, Safety aspects – guidelines for child safety, 2002*). Accordingly, the analysis of risk environments has been based on statistics of children's injuries in different environments in combination with the clinical impact of such injuries. The World Report on Child Injury Prevention (Peden et al., 2008) identifies five leading causes of children's unintentional injuries around the world: road traffic injuries, drowning, burns, falls, and poisonings. Accident prevention analyses have focused on environments with features like roads (related to traffic injuries), water surfaces (related to drowning), objects or places with high temperatures (related to burns and scalds), places with different height levels (related to falls), and access to toxic substances (related to poisoning). Some environmental characteristics such as family related variables (e.g., socio-economic status), novelty and variation in daily routines, lack of physical constraints, and lapses in supervision are known to increase the possibility of accidents (Neto et al., 2008). Some causes of unintentional injuries have daily and seasonal trends. For instance, falls from heights peak around meal times when supervision might be more careless (Istre et al., 2003) and occur more frequently in the summer months, presumably because around that time of the year windows tend to be open (Bull et al., 2001). In relation to the socio-economic environment, children in low-income and middle-income countries, especially poor children, encounter more unintentional injuries (Delgado et al., 2002; Hyder et al., 2008). Several aspects contribute to the poverty penalty, such as education, habits and routines, family dimension, environment quality, and poor parental supervision routines (Peden et al., 2008; Towner, Dowswell, Errington, Burkes, & Towner, 2005).

The strategy of identifying risk environments is undoubtedly very important, since it allows the delimitation and deeper analysis of places where the probability of accidents with children is higher. However, the analysis of “risk environments” should not be separated from the analysis of how individuals act in those environments. As we argue, “risk” is not a property of a specific environment, but it emerges from the interaction between a specific individual and a specific environmental condition.

3. “At risk children”

The concern for the safety of young children has led to a growing amount of research related to individual

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