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Child Risk Assessment and Safety (CRAS)-Based Play Environment Management: A Study of Indoor and Outdoor Educational Play Tools in Early Childhood Education

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ABSTRACT

The study investigates APE availability, environmental management, and safety practices in early childhood education (PAUD) institutions, as well as to identify the extent to which the principles of Child Risk Assessment and Safety (CRAS) have been applied in managing child safety and play experiences. The study uses a descriptive qualitative approach practices through observation, interviews, and an APE inventory in 10 institutions in Tapos, Kediri Regency. The results show that manipulative and constructive APE have been used by most institutions, but not all institutions have an adequate variety of APE to provide diverse play options whereas the distribution of the outdoor play environment tends to be dominated by certain types of playground equipment. However, these institutions have implemented several safety practices through spatial arrangement, APE inspection and maintenance, teacher training, recording of medical and allergy profiles, and injury handling procedures. The finding shows that the implementation of CRAS has not been fully structured because of the lack of risk identification, assessment of the suitability of APE with child characteristics, risk-benefit analysis, mitigation, and monitoring documentation have not yet appeared as an integrated system. This study validates the necessity of transitioning from risk aversion to risk management that takes into account both safety and the developmental advantages for children.

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1. INTRODUCTION

The incidence of early childhood accidents in playgrounds over the past three years (2024–2026) shows a concerning trend, with risks of injury and even fatality still frequently occurring in various locations. In commercial play areas such as indoor and outdoor playgrounds, accident threats largely stem from the absence of adequate safety standards and minimal supervision. Some incidents in inflatable playgrounds have increased due to a lack of wind anchors, making the equipment was prone to tipping over

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or collapsing. Some highlighted a surge in serious injuries like fractures and neck injuries in toddlers due to the use of trampolines combined with larger children. The risk of falling from heights on slides is also frequently reported due to the lack of impact-absorbing layers on the ground. In public facilities and school environments, potential hazards also lurk from negligence and child-unfriendly infrastructure. A tragic incident happened in June 2026 involving a 4-year-old toddler who died after falling into a 4-meter-deep project pit in a Tebet citizen park in South Jakarta. Meanwhile, there was the case of a 5-year-old child's head getting stuck in a school pillar in Serpong, requiring rescue by firefighters. Biomi and Swandewi (2022) confirmed that the most common times for child accidents in kindergartens occur when queuing for outdoor rides and waiting for pick-up. Outside official play areas, accidents due to unsafe child spaces were reported in November 2025, when two children were run over by a car while playing in a vehicle parking area in Jatinegara, East Jakarta.

Considering the cases discussed above, play can be understood, at least theoretically, as a voluntary and enjoyable activity conducted without coercion and focused on the process rather than the outcome. It is commonly described as the most natural learning tool because it corresponds to children's world, which is characterized by exploration. Nevertheless, providing a safe and supportive play environment is an essential component of early childhood education. Play activities not only function as recreational activities for children but also serve as the primary vehicle for the learning process, exploration, social interaction, psychomotor development, and the formation of various children's skills. The concept of safe play is not intended to prevent children from trying new things, but rather to guide them in facing manageable risks (Brussoni et al., 2012; Gray et al., 2025; van Rooijen et al., 2023). Schools and families share the responsibility of balancing physical and psychological safety by providing space for children to take relevant and valuable risks for their development (Cahyani & Arfanaldy, 2026; van Rooijen et al., 2023).

In its implementation, children directly interact with the play space, educational play tools (APE), teachers, peers, and various activities that have different risk levels. Therefore, the management of the play environment in early childhood education cannot be understood solely by focusing on the availability of facilities and play tools. This management needs to include spatial arrangement, suitability and utilization of APE, teacher supervision, hazard identification, risk prevention, and handling procedures in case of an incident. Challenges often faced by schools generally lie in the professional dilemma between the duty of care (obligation to ensure safety) and efforts to facilitate challenging play (Jerebine et al., 2022, 2025) against legal claims, job loss, or negative evaluations from parents drive risk-averse decisions and restrictions on play activities. In some schools, playground injuries have led to the removal of the cause of the injury, for example, trees being cut down after a child falls (Jerebine et al., 2022). And then, from a family perspective, 78% of parents showed low risk tolerance when faced with specific play scenarios, although they were generally positive about children's involvement in risky situations (Jerebine et al., 2024). Children whose parents have higher risk tolerance are more likely to adhere to daily physical activity guidelines and spend more time on adventure play (Sando et al., 2021).

Previous research has shown that managers can identify potential hazards and create a safer, more conducive environment for children's learning and play, ultimately reducing the risk of accidents and enhancing children's psychological and physical development

by implementing effective management strategies, including supervision, safety signage, and emergency preparedness (e.g., first aid kits) (Rembulan, 2020). In line with it, Morgenthaler, et al (2023) emphasize the importance of creating safe, well-maintained playgrounds with features like fences to protect against dangers, and the role of supportive adults in ensuring children's safety during play. The findings underscore the importance of creating settings that safeguard children while also providing opportunities for enjoyment and challenge, thereby improving outdoor play experiences for all children. Imad et al also suggest to focus on the feasibility, acceptability, and impact of a sustainment strategy for indoor-outdoor free play programs in early childhood education and care services, emphasizing the implementation of these programs rather than risk assessment frameworks. In addition, the study highlights that parents' safety concerns about children's outdoor play are often a key reason they accompany their children. It also calls for better outdoor play spaces in residential neighborhoods, which may indirectly support safety management in play environments (Zhao et al., 2023). Thus, to enhance understanding of how children's risk assessment and management skills develop through risky play, Sandseter et al., (2023) developed The ViRMa project which utilized innovative methods like virtual reality and examines children's interactions with play environments, focusing on their risk willingness, assessment, and handling. These insights can support the management of play environments, helping ensure that they are both safe and conducive to healthy risk-taking, and thus inform educational and injury-prevention strategies for schools and families.

Although the studies offer an important basis for understanding playground safety, risk management, risky play, and the implementation of play programs, the evidence remains fragmented across different aspects of the problem. Existing research generally emphasizes either hazard prevention and environmental safety, adult supervision and parental concerns, program implementation, or children's individual risk perception and risk-taking behavior. There remains limited research that integrates these dimensions into a systematic management framework in which children's risk assessment and safety considerations become the basis for designing, implementing, monitoring, and continuously improving play environments. In particular, previous studies have not specifically conceptualized CRAS-based play environment management as an integrated management framework that connects children's risk assessment capacities with environmental hazard identification, safety management, adult supervision, emergency preparedness, and opportunities for developmentally appropriate risky play. A CRAS-based play environment management has the potential to bridge the gap between safety protection and developmental risk-taking by providing a framework for identifying hazards, assessing risks from the child's perspective, determining appropriate preventive and control measures, and maintaining opportunities for meaningful and challenging play.

2. **LITERATURE REVIEW**

2.1. Management of Play Environment for Early Childhood Education

The management of the play environment in early childhood education (PAUD) is a strategic part of the learning process because the environment not only functions as a place for children's activities but also becomes an integral part of the pedagogical process. This management includes the arrangement of indoor and outdoor physical spaces, the

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provision of educational play tools (APE), the regulation of access to play materials, teacher supervision, and risk management that can balance safety aspects with children's needs for exploration and developmental challenges (Anggraini et al., 2023; Cahyani & Arfanaldy, 2026; Salna et al., 2024). An optimally managed play environment can become an active pedagogical instrument that provides opportunities for children to explore, interact, make decisions, solve problems, and develop creativity and socio-emotional skills (Suryana et al., 2022). Therefore, play environment management needs to be viewed as a dynamic and continuous process, not just an activity of physically arranging facilities.

Moreover, a supportive learning environment enables children to learn calmly, concentrate effectively, and move sufficiently to support gross motor development (Salna et al., 2024). Indoors, the layout should be organized into zones by activity type, including constructive play, art, reading, role-play, and group activities. Separating zones is not intended to restrict children's interaction; instead, it provides a spatial structure that helps children select activities aligned with their interests and needs. Van Liempd et al. (2020) stress the importance of arranging activity areas so that children can continue to maintain visual contact with caregivers. This condition supports a sense of security while also providing children with opportunities to use the space more independently. Besides spatial structure, the availability of easily accessible and flexibly arrangeable play materials is an important factor in supporting children's play. Materials that are open to various possibilities of use can encourage functional play, imagination, and creativity (Fornons-Casol et al., 2026; Sandseter et al., 2022). Therefore, indoor spaces should not be stocked with materials whose use is overly prescribed by the teacher; instead, they should offer children choices that enable exploration and decision-making (Sandseter et al., 2022).

In outdoor spaces, management can be directed towards providing a more sensorially and motorically rich environment. The integration of natural elements, surfaces with a certain degree of unevenness, and loose parts can offer varied play experiences and opportunities for children to develop motor skills, exploration, and decision-making abilities (Cahyani & Arfanaldy, 2026; Fornons-Casol et al., 2026). Outdoor spaces provide greater freedom of movement, making them highly conducive to the development of children's gross motor skills (Salna et al., 2024). In fact, interventions such as adding natural materials to outdoor play environments have been shown to reduce depressive affect and antisocial behavior while increasing play with natural materials, independent play, and prosocial behavior in children aged 2–5 years (Brussoni et al., 2012). The management of educational play materials also needs to consider the diversity of learning resources. Educational play materials can include specially designed educational games, safe recycled items, or natural materials that are appropriate for the child's developmental characteristics (Cahyani & Arfanaldy, 2026). The utilization of diverse materials allows children to choose, combine, and modify objects according to their ideas. This process not only develops creativity but also trains independence, decision-making skills, and responsibility towards the play environment (Aprianti et al., 2025).

An important consideration in managing early childhood education play environments is understanding risk management. Risk management is an important component in managing PAUD play environments. Teachers not only function as supervisors but also as environment managers who regulate, adjust, and negotiate play

conditions so that children's safety can be maintained without eliminating opportunities to gain meaningful developmental experiences. In this context, risk is not always synonymous with danger that must be eliminated. Certain risks can be part of the learning experience if they are within manageable limits and are appropriate for the child's abilities. Therefore, risk assessment needs to be carried out situationally and continuously, considering the child's physical abilities, emotional maturity, experience, and familiarity with play materials and activities (Cahyani & Arfanaldy, 2026; Zein et al., 2021).

Teachers who have tolerance for uncertainty tend to provide greater autonomy, allowing children to learn to navigate challenges independently. The supervisory strategy of watchful presence enables teachers to remain present and responsive without taking over the entire play process. This approach enables children to encounter measurable failure, address problems, and strengthen self-regulation. It also treats the physical environment as an active pedagogical tool rather than a neutral setting for play. Nevertheless, the application of risk-containing play remains shaped by institutional policies, cultural norms, and parents' expectations. These factors significantly determine the extent to which schools can adopt an inclusive play approach while providing space for age-appropriate risks. Structured evaluation of learning environment management still faces various limitations in a number of early childhood education units (Cahyani & Arfanaldy, 2026). Limitations in facilities and a lack of collaboration with external parties are challenges in optimally implementing environmental evaluations. Meanwhile, teacher training is still be able to improve skills in using simple evaluation instruments while also encouraging the development of more systematic follow-up plans in each early childhood education unit (Haryono et al., 2025).

Thus, early childhood education play environments should be managed by integrating physical environment quality, access to play materials, teacher supervision, risk assessment, children's participation, family involvement, and ongoing evaluation. This integration serves as an important foundation for developing the CRAS-based play environment management system, which is helping to identify, assess, and manage risks as part of both safety and pedagogical strategies. This system keeps the play environment safe while still giving children opportunities to explore, make decisions, confront challenges, and progressively build risk management competencies. Furthermore, inviting classroom environments that facilitate multisensory experiences and provide diverse activity opportunities have been shown to improve the cognitive problem-solving skills of 5–6 years old children (Zein et al., 2021).

2.2. Utilization of Indoor and Outdoor Educational Play Equipment (APE)

APE is an important component in early childhood education as it not only serves as a play medium but also as a means of developmental stimulation designed through meaningful play experiences. APEs are not sharp or pointed, not easily broken, non-toxic, and appropriate for the size and age group of children. Using APE in a directed way enables children to obtain learning experiences that engage multiple developmental domains at the same time and build on one another. The research indicates that APE-driven stimulation mainly operates via three pathways: psychomotor development, reinforcement of cognitive-language abilities, and socio-emotional development. This effectiveness is further optimized when APE is used in a structured manner, allows direct manipulation by the child, and is placed within a play context that suits the child's needs,

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abilities, and developmental characteristics. In the psychomotor domain, the most consistent evidence shows the contribution of manipulative APE to fine motor development. Activities such as stringing beads, collage, and coloring provide opportunities for children to practice grip precision, hand-eye coordination, and finger dexterity, which are important foundations for various early academic skills (Amira & Kadir, 2025).

APE has been shown to significantly enhance fine motor skills, particularly finger control and hand-eye coordination (Putri & Hamidah, 2025). This effect is supported by activities such as playdough, Busy Books, and other manipulative games that promote rolling, pinching, and finger-movement while also strengthening children's motivation to participate in learning (Handika & Rocmah, 2025). Accordingly, manipulative APE can be used strategically to build children's motor control and readiness in hand skills. In the cognitive-linguistic domain, APE supplies experiences that require children to explore, solve problems, sustain attention, work with symbols, and generate new ideas. Loose-parts and materials that can be combined or separated further enable exploration and discovery, while also fostering problem-solving, behavioral regulation, and creativity (Cankaya et al., 2023, 2025). In preschoolers, puzzles, blocks, and structured play likewise contribute to creative thinking and problem-solving (Itryah & Pertiwi, 2024; Ningsi et al., 2025). Meanwhile, pretend play provides opportunities to use symbolic language as children depict objects, roles, and situations through imagination, and it is associated with inhibitory control, executive functions, and self-regulation (Cankaya et al., 2023, 2025).

APE can also be an important medium in the formation of social-emotional competencies, especially when used in role-playing and cooperative play activities. Role-playing provides children with opportunities to understand others' perspectives, negotiate, communicate, and build relationships with peers. These effects are further strengthened when play activities are accompanied by play tutoring, which can improve social behavior and the quality of peer relationships (Jaggy et al., 2023). Furthermore, pretend play and non-therapeutic games are reported to contribute to the reduction of anxiety, aggression, and fear, while supporting children's emotional regulation and resilience (Fehr et al., 2021). Cooperative games strengthen social and emotional skills through communication, collaboration, role-sharing, and group interaction (Humairoh et al., 2026). The effectiveness of these APEs is determined not only by the type of tools used but also by how these tools are directed within the play experience. Manipulative APEs most consistently support fine motor skills, loose parts and symbolic play strengthen cognitive-language, while role-playing and cooperative play strongly contribute to social-emotional development. These three pathways are essentially complementary because one APE activity can involve more than one developmental domain simultaneously. Therefore, APE management needs to consider material variations, structure levels, exploration opportunities, social interactions, and suitability with children's abilities so that the play environment is not just safe and engaging, but also capable of producing holistic and targeted developmental stimulation.

2.3. Child Risk Assessment and Safety (CRAS)-Based Play Environment Management

The CRAS-based play environment management system represents a paradigm shift in early childhood play environment management, moving from an orientation that places safety as an effort to eliminate all risks towards a framework that considers the balance between safety and developmental benefits. In this perspective, risk is not always seen as something to be avoided, as the experience of facing measured risks can provide opportunities for children to develop physical, cognitive, self-regulation, decision-making, and social competencies. This framework aligns with the view that a good play environment is not one that is completely risk-free, but rather one that can control serious hazards while maintaining challenges that provide developmental benefits (Brussoni et al., 2012; Cahyani & Arfanaldy, 2026). The principle of safety needs to be placed as a foundation for exploration, not as an instrument to limit children's play experiences.

Children's risk assessment is a dynamic process involving the interplay between emotional willingness, cognitive evaluation, and physical responses to a challenge (Kleppe et al., 2024). Children do not consistently react to identical situations because risk perception is shaped by experience, ability, emotional state, and environmental characteristics. By engaging in both direct and indirect exploration, children progressively develop strategies to anticipate the outcomes of their actions (Tangen et al., 2022). This process transforms risky play into a learning experience that helps children identify their own limits. Participation in risky play is also positively associated with children's psychological well-being, activity engagement, and physical activity (Sando et al., 2021). Consequently, it is essential to differentiate between risk and hazard. Risk is the possibility of manageable consequences that, in certain contexts, offer developmental benefits, whereas hazard is a condition with the potential to cause serious injury and must be controlled or eliminated (Eager et al., 2025). Natural environments have advantages because they provide a variety of challenges that can be adapted to a child's age and competence, from uneven surfaces and changes in elevation to open materials that allow children to determine their own level of challenge (Little, 2022; Tangen et al., 2022). However, this process can be disrupted when caregivers too quickly take over children's risk assessment and decision-making, thereby reducing opportunities for children to build their autonomy and self-regulation skills (Tangen et al., 2022).

Within the CRAS framework, educators act as managers and facilitators of the play environment, rather than mere safety supervisors. Educators are responsible for organizing space, materials, access to challenges, and supervision patterns to maintain safety without eliminating opportunities for exploration. Risk assessments conducted by teachers in practice do not always use standard protocols but occur situationally and continuously, considering the child's physical abilities, experience, and emotional maturity. Teachers with higher risk tolerance tend to grant children greater autonomy to face and navigate play challenges independently. This practice can be realized through several strategies. First, flexible space design and the use of loose parts allow children to explore height, speed, balance, and movement within limits that can still be controlled by the educator. Second, adaptive supervision through a watchful presence approach allows teachers to remain present and responsive without constantly intervening in children's activities This pattern provides children with the opportunity to experience measurable failure, evaluate their actions, and develop self-regulation (Cahyani & Arfanaldy, 2026).

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Third, incorporating natural elements can improve the play environment by using more open-ended materials that allow multiple ways of use. Such elements may strengthen children's creativity, psychological well-being, and prosocial interaction (Brussoni et al., 2012; Eager et al., 2025). Fourth, educator competence can be enhanced through play facilitation and risk-reframing training, which supports a broader paradigm shift. Through training, staff learn that risky situations do not always require prohibition; instead, they should be assessed in relation to the level of danger, the child's abilities, the activity's benefits, and mitigation strategies. This method can increase staff risk tolerance and lessen reliance on decisions driven only by risk avoidance (Jerebine et al., 2022).

On the other hand, assessing the safety of public spaces calls for multidimensional quantitative tools that assess facility conditions while also accounting for children's behavior and caregivers' involvement (Rui & Qin, 2022). When play-environment management is guided by children's risk assessment, safety functions as a prerequisite for exploration rather than an obstacle. This transition from as safe as possible to as safe as necessary requires educators, parents, and policymakers to adopt a different risk perspective: risks that are understandable, measurable, and mitigable do not always need to be eliminated when they yield meaningful developmental benefits. Under the CRAS framework, decisions about managing play environments should ideally reflect the interplay among risk characteristics, children's capabilities, potential developmental benefits, supervision levels, mitigation strategies, and monitoring outcomes. With this approach, play environments can simultaneously provide safety and appropriate challenge, offering children optimal opportunities to develop independence, competence, creativity, self-regulation, and social skills through authentic play experiences.

3. METHODS

This research employed a descriptive qualitative approach with an observational field study design. The research was conducted in several institutions in Kediri Regency. The research instruments included observation, semi-structured interviews, and an APE inventory sheet. Observation was used to identify the condition of indoor and outdoor APE, as well as to observe the tidiness of classrooms, play area partitions, sanitation, and medical facilities. Interviews explored compliance with PERMENDIKBUD No. 137 of 2014 concerning National PAUD Standards, the frequency of teacher safety training and conflict/bullying management, SOPs for handling minor accidents up to hospital referrals, as well as medical data management and the implementation of the Visual Allergy system. The inventory sheet was used to record the availability of APE with an available/unavailable category. Observations were conducted on play activities, social interaction patterns, and potential hazards in educational toys, while in-depth interviews were conducted with institutional leaders and education practitioners to obtain information regarding operational challenges, budgeting, and innovation strategies (Miles et al., 2014). This research provides a comprehensive picture of the relationship between the availability and condition of play equipment, playground environment management, application of safety standards, the needs of children with diverse characteristics, and risk management strategies in supporting safe, inclusive, and child development-promoting early childhood play environments.

ChatGPT (OpenAI) were used solely to assist in refining academic language and improving manuscript structure. These AI tools were not used for research design, data collection, data analysis, interpretation of results, or the formulation of scientific

conclusions. All scientific content, research findings, and the final version of the manuscript were independently reviewed, verified, and approved by the authors, who bear full responsibility for the accuracy and integrity of the published work.

4. RESULTS

The research results indicate that the management of play environments in early childhood education institutions, which were the study sites, is not only related to the availability of APE but also includes how the institution organizes space, conducts facility inspections, provides supervision, identifies children's health conditions, and prepares handling procedures when risks or accidents occur during play. Data was obtained through field observations, surveys of APE availability in the Tapos institution, and interviews with principals and teachers. The availability of indoor and outdoor APE across the 10 study institutions is presented in Table 1 and Table 2.

Table 1. Availability of Indoor Educational Play Equipment (APE) Across the Study Institutions

APE	Number of Institution	Percentage
Building blocks	7	70%
Puzzles	6	60%
Lego/Bombik	5	50%
Slides	9	90%
Sandboxes	5	50%

Table 2. Availability of Outdoor Educational Play Equipment (APE) Across the Study Institutions

APE	Number of Institution	Percentage
Seesaws	4	40%
Swings	3	30%
Crawling tunnels	1	10%

A survey of 10 early childhood education institutions in Kediri Regency shows that the availability of indoor APE is not yet evenly distributed. Building blocks are the APE with the highest availability, found in 7 out of 10 institutions, or 70%. Puzzles are available in 6 institutions (60%), while Lego/Bombik are only available in 5 institutions (50%). Thus, half of the surveyed institutions do not yet have Lego/Bombik as part of their indoor play facilities. This condition indicates that manipulative and constructive APE have been used by most institutions, but not all institutions have an adequate variety of APE to provide diverse play options. The difference in availability also shows that the fulfillment of APE is still influenced by the procurement capacity and resources of each institution.

In the outdoor APE, slides showed the highest availability rate, with 9 out of 10 institutions or 90%. This finding indicates that slides are the most commonly available outdoor play facility. Sandboxes were available in 5 institutions (50%), seesaws in 4 institutions (40%), swings in 3 institutions (30%), while crawling tunnels were found in only 1 institution (10%). This distribution shows that the outdoor play environment tends to be dominated by certain types of playground equipment, especially slides, while equipment that provides more diverse movement and exploration experiences is relatively limited. The low availability of crawling tunnels and swings indicates that children's

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opportunities to gain varied motor experiences through the outdoor environment are not yet fully optimal.

These findings are significant because learning aids both indicate that learning facilities are in place and shape the play experiences children can access. Building blocks, puzzles, and Lego/Bombik enable children to engage in manipulation, construction, and problem-solving while developing hand-eye coordination. In contrast, slides, swings, seesaws, sandboxes, and tunnels provide different affordances for physical activity, balance, body coordination, exploration, and social interaction. Therefore, the observation results indicate that the evaluation of the availability of learning aids needs to be conducted not only based on the principle of "present or not present" but also based on the variety of functions, physical condition, age appropriateness, and the level of risk that may arise when children use the equipment.

Based on the findings, it was found that child safety has been integrated into the operational governance of the institution. One form of this management is evident in the arrangement of the play environment. Indoor spaces are partitioned or organized into area boxes to group children's activities, enabling teachers to supervise more effectively. This setup not only helps structure learning activities, but also functions as a strategy to regulate children's movement, minimize the likelihood of collisions, and allow teachers to monitor children's conditions during play. An additional finding is that teachers receive safety training. According to interview results, teachers are required to complete safety training once every two weeks before the start of the new academic year, including training on bullying prevention.

In addition, there is periodic training every three months or once to twice a year. This information indicates that safety is understood not only as an inspection of physical facilities but also as the competence of human resources in recognizing and handling risks that arise in child interactions. Teachers' ability to supervise, prevent conflicts, identify potentially harmful behavior, and respond effectively to incidents is essential to creating a safe play environment. Facility and infrastructure management likewise forms a core element of the safety system. Inspections and maintenance are coordinated by the Deputy Head of Infrastructure, with comprehensive maintenance conducted every three months during school holidays. This practice demonstrates a clearer division of responsibility in maintaining the play environment. Meanwhile, the safety standards for APE are adjusted according to Ministerial Regulation No. 137 of 2014, and there are recommendations for regular checks of APE conditions. Nevertheless, interview results also found a gap between ideal needs and institutional capacity. Budget limitations and teachers' lack of understanding in selecting appropriate APE are the main challenges. To overcome this, the institution developed workshops for making APE using local and relatively low-cost materials.

Safety management extends to health considerations and emergency preparedness. The institutions compile children's medical profiles and allergy information from the registration process. This information provides schools with a basis for anticipating particular health conditions as children take part in activities. Minor injuries are treated at school, whereas more serious injuries are managed through coordination with parents and referral to the nearest hospital. Overall, the results suggest that play safety is understood in a broader sense, covering physical hazards, health hazards, and the institution's capacity to respond in emergencies. Safety management also needs to consider the characteristics and individual needs of children with special needs. Play

equipment and learning media are also adapted to the child's type of disability. The key safety practices and identified CRAS implementation gap based on the findings can be summarize as below:

Table 3. Key Safety Practices and Identified CRAS Implementation Gaps

Safety Practice	Evidence Identified	CRAS Gap
APE inspection	Regular inspection and maintenance	Limited structured child-specific risk assessment
Teacher supervision	Safety supervision and training	Limited evidence of adaptive supervision
Health management	Medical/allergy profiles	Limited integration with risk assessment
Emergency response	Injury handling and referral	Limited systematic documentation
APE adaptation	Adaptation for children with special needs	Need for systematic risk-benefit assessment

These results show that child safety cannot be separated from the principle of adaptation. Play equipment that is safe for one group of children may not have the same level of safety for children with specific developmental characteristics or disabilities. These also indicate that the management of play environments at the research site already incorporates several safety practices, ranging from the provision and inspection of educational toys, spatial arrangement, teacher training, health data collection, to emergency handling procedures. However, the research data indicates that the presence of educational toys must be analyzed in conjunction with physical conditions, developmental functions, user characteristics, supervision patterns, and potential risks. These findings form an important basis for developing play environment management based on Child Risk Assessment and Safety (CRAS), that places child risk identification, safety management, suitability of educational toys, and developmental benefits as a unified whole in decision-making for play environment management.

5. DISCUSSION

5.1. Availability of Educational Play Equipment (APE) and The Quality of Children's Play Experience

The issue of APE management cannot be sufficiently understood through the indicator of facility availability alone. It needs to be viewed from the diversity of functions, the quality of play experience, developmental appropriateness, and the potential risks of its use. The management of the play environment should not only encompass the provision of facilities but also the arrangement of space, access to play materials, teacher supervision, and risk management that allows children to gain safe exploratory experiences and developmental challenges (Morgenthaler et al., 2023; Salna et al., 2024). An optimal environment even functions as an active pedagogical instrument that allows children to explore, make decisions, solve problems, and develop creativity and socio-emotional skills (Cahyani & Arfanaldy, 2026; Suryana et al., 2022; Ukkas et al., 2020).

The dominance of slides in 90% of institutions does not automatically indicate that the quality of the outdoor environment has been optimized. Conversely, the low availability of swings (30%) and crawl tunnels (10%) indicates a limitation in the variety of motor experiences. However, a sensorially and motorically rich outdoor environment, including the integration of natural elements, varied surfaces, and loose parts, can expand

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children's opportunities for exploration, motor development, and decision-making (Cahyani & Arfanaldy, 2026; Fornons-Casol et al., 2026). The outdoor environment also provides a larger space for the development of children's gross motor skills (Salna et al., 2024). The same issue is observed with indoor educational toys such as blocks, puzzles, and Lego/Bombik do provide manipulative, constructive, and problem-solving experiences. However, limited variety can reduce children's exploration choices (Fornons-Casol et al., 2026; Sandseter et al., 2022).

Although the number of APEs is still limited, the availability of these APEs must be considered as one of the objects for assessing risks and developmental benefits. A large number of APEs that only provide one type of experience may not necessarily result in an optimal play environment. The opposite, simple APEs made from local materials can provide more diverse developmental experiences if designed, placed, and supervised appropriately. Therefore, the presence of educational toys needs to be assessed not just to answer about the availability of the tools but to answer what developmental experiences these tools could provide for children.

5.2. Environmental Arrangement and Supervision as Initial Components of CRAS

Based on the research, the institution implemented spatial arrangement through the BBCT (Beyond Centers and Circle Time). The indoor space is divided using partitions or area boxes to group activities, facilitate teacher supervision, reduce potential conflicts between children, and help teachers recognize children's conditions during play. The institution has implemented safety training for teachers, along with periodic coaching, to strengthen their ability to prevent conflicts and identify potentially harmful behaviors. Van Liempd et al. (2020) underscores the need to organize activity areas while preserving visual contact between children and caregivers rather than restricting interaction, zoning is intended to provide structure for how space is used, enabling children to select activities based on their interests and needs.

However, when it was analyzed from the CRAS perspective, such spatial arrangements only represent an initial layer of risk management, namely preventive environmental control. CRAS demands more than just reducing the likelihood of accidents. Teachers need to be able to determine when a risk should be mitigated, when it can be tolerated, and when a challenge actually offers developmental benefits. Teachers in a risk-based play environment are not merely supervisors, but rather managers and facilitators who arrange space, materials, access to challenges, and supervision patterns. The supervision practices found in the research institution are an important foundation for implementing CRAS, but they cannot be directly equated with watchful presence. A watchful presence means teachers stay involved and respond as needed without taking control of the entire play. This framework enables children to encounter observable failures, assess their own actions, and strengthen self-regulation. Accordingly, CRAS pointed on how the teacher supervises the child under different risks, shaped by their abilities, experiences, emotional states, and activity characteristics. This reframing marks a substantial shift from safety monitoring toward supervision informed by risk (Rui & Qin, 2022; Spiegal et al., 2014).

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5.3. Inspection of Educational Play Materials, Maintenance, and Risk Identification

Research results indicate that there is coordination in the management of facilities and infrastructure, facility inspections, comprehensive maintenance every three months during school holidays, and appeals for regular inspection of APE conditions. APE safety standards are also adjusted according to Permendikbud No. 137 of 2014. Nevertheless, budget limitations and teachers' lack of understanding in selecting appropriate APE remain obstacles. The institution then developed APE creation workshops using relatively inexpensive local materials. These practices show that the institution actually has several risk mitigation mechanisms. However, within the CRAS framework, there is a difference between facility safety inspections and child risk assessments. Physical inspections can identify damage or unsuitable facility conditions, but they do not automatically answer whether the APE is suitable for a specific child's abilities. Risk assessment needs to be conducted situationally and continuously, considering the child's physical abilities, emotional maturity, experience, and familiarity with the materials and play activities (Cahyani & Arfanaldy, 2026). Risk must also be distinguished from hazard. Risk is the possibility of consequences that can still be managed and in certain contexts has developmental benefits, while hazard is a condition that can cause serious injury and needs to be controlled or eliminated (Beaulieu & Beno, 2024; Eager et al., 2025).

The findings indicate that the institution demonstrated relatively strong practices in inspection and maintenance, but explicit evidence regarding the use of structured instruments to classify risk levels based on the likelihood of occurrence, severity, child characteristics, developmental benefits, and mitigation strategies has not yet been found. The primary implementation gap in CRAS is not the absence of safety practices, but their insufficient integration into a systematic risk assessment process. Among the findings, health-related measures are relatively well developed. The institution gathers medical and allergy profiles during registration, manages minor injuries at school, and communicates with parents while referring children to hospitals when injuries are more severe. In addition, play equipment and learning materials are adjusted to the specific disabilities of children with special needs. This is pertinent to the CRAS principle because it indicates that safety is not interpreted uniformly across children: equipment that is safe for one child may pose a different level of risk for another. Accordingly, motor, sensory, communication, and attention abilities along with the need for supervision must be incorporated into decisions about whether to use specific equipment. This is further reinforced by evidence that children's perception and ability to handle risk are influenced by experience, skills, emotional state, and environmental characteristics (Kleppe et al., 2024; Tangen et al., 2022). Children can even have the capacity to recognize challenges and adjust their behavior when exploring. So that the assessment must be individual and contextual. In practice, a piece of equipment may be categorized as safe for a particular child with minimal supervision, but require modifications or more intensive supervision for another child. Play environments are directed to become spaces that are sufficiently safe to allow children to explore, face measurable challenges, make decisions, experience manageable failures, and gradually build self-regulation and risk management competencies. This is what differentiates CRAS from safety frameworks that are solely oriented towards the physical condition of the facility (Tangen et al., 2022).

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6. CONCLUSION

This research indicates that the management of play environments in the early childhood education institutions studied possesses several safety foundations, evidenced by the provision and inspection of play equipment (APE), the arrangement of play spaces, teacher supervision, safety training, recording of children's medical profiles and allergies, injury handling procedures, and adaptation of APE for children with special needs. However, the availability of APE is still uneven, and outdoor play environments are still dominated by certain types of APE. At the same time, budget limitations and teachers' competence in selecting APE suggest that play environment management still faces a gap between existing safety practices and the need for more systematic risk management. The implementation of the Child Risk Assessment and Safety (CRAS) principles has begun to appear at the operational-preventive level, but has not yet fully developed into an integrative risk management system. Institutions have carried out various forms of risk identification and mitigation.

The safety of play environments is not sufficiently measured by the presence of safe facilities or the absence of accidents, but needs to be analyzed through the relationship between risks, child characteristics, the developmental function of play equipment, supervision, mitigation, and opportunities for exploration. Future research is needed to test whether the systematic application of CRAS can improve the quality of the play environment while maintaining children's opportunities to gain measurable exploratory, independent, and challenging experiences.

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