

8-1-2013

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Recommended Citation

Petrass, Lauren A. and Blitvich, Jennifer D. (2013) "Unobtrusive Observation of Caregiver-Child Pairs at Public Pools and Playgrounds: Implications for Child Unintentional Injury Risk," *International Journal of Aquatic Research and Education*: Vol. 7 : No. 3 , Article 4.

DOI: 10.25035/ijare.07.03.04

Available at: <https://scholarworks.bgsu.edu/ijare/vol7/iss3/4>

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Unobtrusive Observation of Caregiver-Child Pairs at Public Pools and Playgrounds: Implications for Child Unintentional Injury Risk

Lauren A. Petrass and Jennifer D. Blitvich

This study aimed to determine and compare the nature of supervision children received in two settings that have different levels of environmental risk, an aquatic setting (public pools) and a nonaquatic setting (playgrounds). An observational design was implemented to examine caregiver and child behaviors at six indoor public pools and four playgrounds. Chi-square tests of homogeneity were conducted to determine associations between caregiver and child variables. Preschool children received significantly higher levels of supervision than school-aged children in both settings. For school-aged children the level of supervision varied between settings, with children significantly more likely to be unsupervised in public pools and poorly supervised on playgrounds. Reasons for the lack of supervision in aquatic settings remain unclear, particularly as this setting was considered to present higher environmental risk, because drowning rates are high for young children. Because evidence indicates inadequate supervision is common in aquatic settings, further investigations are required to identify ways to promote closer supervision practices and determine caregiver perceptions regarding their responsibilities when supervising young children in aquatic settings.

Keywords: caregiver supervision; parent child aquatics; drowning; playground

In high-income countries (HICs), from the age of one year, unintentional injury is a leading cause of child death, and rates progressively increase until children reach adulthood (World Health Organization, 2008). Pediatric drownings, in particular, have been identified as one of the most common causes of injury deaths among children (World Health Organization & UNICEF, 2005). Although many HICs such as the United States and Australia have documented reductions in drowning death rates as a result of specific interventions and changes in risk exposure, fatal drownings among young children are still over-represented in drowning statistics compared with other age groups. During the decade between July 2002 and June 2012 in Australia, drowning statistics illustrated that 331 children aged 0–4 years

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drowned (Australian Water Safety Council, 2012; Royal Life Saving Society Australia [RLSSA], 2012).

Supervision is frequently cited as important for preventing childhood injuries and child drowning deaths (Blum & Shield, 2000; Bugeja & Franklin, 2005; Petrass, Blitvich, & Finch, 2011a). Contemporary supervision literature indicates that the level of supervision required to ensure a child's safety differs based on the level of environmental risk and the behavioral characteristics of the child (Morrongiello, Klemencic, & Corbett, 2008; Morrongiello, Zdzieborski, & Stewart, 2012). There is, however, limited published research on the nature of supervision that children experience in active recreational settings which contain diverse levels of environmental risk. To date, this research has focused largely on single environments (Morrongiello & House, 2004; Petrass & Blitvich, 2012; Petrass, Blitvich, & Finch, 2012). Comparison of multiple settings might create an increased understanding of supervision and child unintentional injury risk.

Playgrounds provide a recreational setting for children where cognitive, physical, and psychosocial skills can be enhanced and developed, generally away from traffic and other outdoor hazards (Howard et al., 2005). While deaths associated with playground equipment are rare, nonfatal injuries have been a significant problem for children. Playground safety is recognized as an area of concern for parents, physicians, and injury prevention advocates (Altmann, Ashby, & Stathakis, 1996). Some studies have recognized the height of falls and effectiveness of surfaces to absorb energy as important risk factors contributing to playground injuries (Howard et al., 2005; Sherker & Ozanne-Smith, 2004; Sherker, Ozanne-Smith, Rechnitzer, & Grzebieta, 2005). In addition to the provision of safety products and modifying the physical environment, supervision by caregivers can moderate child injury risk; however, the effect of supervision has been neglected somewhat in playground safety research to date. Although a small number of studies have identified supervision in relation to playground settings (Colman, 1997; Laforest, Robitaille, & Dorval, 2001; Mayrx, Russe, Spitzer, Mayr-Koci, & Hollwarth, 1995; Mitcham, 2005), only a limited number measure and describe supervision and how it relates to unintentional injury in play and recreational settings (Morrongiello & House, 2004).

The aim of this study was to determine and compare the nature of supervision children received in two recreational settings that have different levels of environmental risk: an aquatic setting (public pools) and a nonaquatic setting (playgrounds). In addition, the study examined the willingness of caregivers to intervene in these settings when children exhibited behaviors that had the potential to lead to unintentional injury.

Method

Participants

A naturalistic observation study of caregiver-child pairs who frequented either public pools or playgrounds across regional and metropolitan Victoria was conducted. This study was granted ethical approval from the University Human Research and Ethics Committee before its inception. Public pools and playgrounds anticipated to have adequate patronage during the data collection period were selected from the phone book and internet. In total, six aquatic centers were selected (three

metropolitan and three regional) because of their popularity for recreational swimming and access to a range of different swimming pools including lap, recreation, toddler, wave, and hydrotherapy pools. Two well-patronized metropolitan and two regional playground venues were chosen. All playgrounds were unfenced and complied with the Standards Australia 2.5 m equipment height recommendation (Standards Australia, 1981).

The main outcome measure was caregiver supervision at either public pools or playgrounds, and the conceptual model of supervision developed by Saluja et al. (2004) was implemented as a framework to measure this. Saluja's model assumes that supervision incorporates attention (categories include visual: focal or peripheral and auditory: focal or peripheral); proximity (categories include constant physical contact, within arm's reach, beyond reach nearby $\leq 5\text{m}$, beyond reach distant $\geq 5\text{m}$); and continuity (categories include continuous, intermittent, absent). The model interprets supervision within the wider context of injury risk and injury prevention behaviors. As applied to this study, it enabled categorization of the quality of supervision, with the level and degree of supervision escalating as attention, proximity, and continuity in supervision increased.

Observation Instrument

To enable objective recording of caregiver supervisory behavior, child behavior, and associated environmental factors, a set of three matrices was developed specifically for the public pool setting, as outlined previously (Petrass & Blitvich, 2012). Following preliminary observations at playgrounds, a similar set of matrices was developed for this setting. These matrices were refined following a pilot project in playgrounds before commencement of the main study.

The *caregiver supervision* playground matrix was identical to that used in public pools, and details of the constructs recorded are reported elsewhere (Petrass & Blitvich, 2012). The *child behavior* matrix contained two cells that were identical to the pool matrix (approximate age of the child and size of the group with whom the child was playing). There were an additional three cells specific to playgrounds: equipment on which child was playing (swings, slides, monkey bars, rocking frogs/horses, climbing castles, playground area, other); number of children playing on equipment; and behavior displayed as categorized into one of five types of behavior:

- running unsafely in area, defined as having both feet off the ground simultaneously to move around playground, and in close proximity to moving objects (e.g., swings)
- leaving playground area, defined as wandering away from and/or outside of the defined playground boundaries
- fighting/arguing, defined as physical or verbal aggression toward another person
- general play, defined as acceptable, safe recreational activity
- other, defined as any behavior observed not encompassed in the previous categories

The *environmental* matrix for pools and playgrounds was completed at 30 min intervals. The environmental playground matrix included the approximate number of patrons at the venue and any hazards in the venue (i.e., playground surface, positioning of equipment, traffic, water, other). At the start of the six-hour observation

period, the researcher also recorded the approximate size of the playground; the type of boundaries that surrounded the area (i.e., fence, wooden logs, buildings, no boundaries, other); and the type of equipment in the setting (i.e., swings, slides, monkey bars, rocking frogs/horses, climbing castles, open area, other). To ensure familiarity with the observation instrument and consistency with recording, pilot testing was conducted before the main data collection phase and all data collection was conducted by the first author (LP).

Sampling Procedure

Observation sessions were completed on weekends throughout the school term, or over school holiday periods, as pilot testing indicated this was the most popular time for caregiver-child pairs and maximized the chances of achieving a representative sample of caregiver supervision and child play. Observations and recordings were made during a single six-hour period at each venue, conducted between 10:00 am–4:00 pm or 10:30am–4:30pm because, during pilot studies, these were judged to be the busiest times. All infants to 10-year-old children engaged in recreational play, along with their caregivers who were present at the swimming center or playground during the observation time, were eligible to be monitored.

To ensure a wide range of behaviors were captured, the researcher entered the venue and selected an area where unobstructed observations could be undertaken. The researcher remained in this location until all eligible caregiver-child pairs who could be clearly observed were monitored. She then progressed to a different location in the venue where the sampling process was replicated. This sampling process enabled the researcher to capture both proactive and reactive supervisory behaviors and also allowed observation of caregiver-child pairs who had been at the venue for varying lengths of time. In cases where a child was supervised by multiple caregivers, observational data were collected only for the caregiver who was observed to be the primary supervisor. If a primary supervisor could not be determined because multiple caregivers appeared to be providing an equivalent level of supervision, one of the caregivers was randomly selected.

Data Analysis

All caregiver-child pairs remained completely anonymous; accordingly, unique identification codes were allocated to all child-caregiver pairs. Due to the anonymity, it was possible that some pairs may have been represented more than once in the data. All coded data were extracted from the observation sheets and manually entered into Microsoft Excel® software on two separate occasions. Cleaned data were exported to SPSS for analysis.

Frequencies and percentages were calculated to describe the nature of caregiver supervision and child behaviors in pool and playground settings. For each data entry, an overall supervision score was calculated based on the score for each supervision dimension (attention visual, attention auditory, proximity, and continuity), as reported elsewhere (Petraś & Blitvich, 2012). Supervision scores were collapsed into five groups and allocated categorical descriptors (excellent, good, sound, poor, absent) to capture the spread in the level of supervision observed and also to enhance the interpretation of results.

A series of Chi-square tests of homogeneity involving the caregiver categorical variables—approximate age of the supervisor; number of children for whom the supervisor was responsible; responsibility level of the supervisor (based on the overall supervision score); intervention; and intervention description—were compared with child-based variables (the approximate age of the child; and behavior displayed) to determine associations between caregiver and child factors. Statistical significance to control for Type I error was set at $p < .05$.

Results

Across the four playgrounds, and over a total of 24 hr of data collection, the behavior of 334 parent/child pairs was recorded. Comparisons were made with the 715 parent/child pairs observed at the six aquatic venues, over a 36 hr period, reported previously (Petraass & Blitvich, 2012). In both aquatic and playground settings, a low frequency of parents was observed in the 12–18 caregiver age group, and accordingly, this age category was eliminated. This process ensured that all variables met assumptions concerning the minimum expected cell frequency for Chi-square analysis and resulted in the analysis of 327 playground and 705 pool observations. Frequencies and percentages identified a number of common variables which influenced caregiver supervision and Chi-square analyses demonstrated significance associated with nearly all variables.

In pools and playgrounds, as expected, child age was significantly related to the level of caregiver supervision. Preschool-aged children were provided with a significantly higher level of supervision than school-aged children both in pools ($\chi^2(4) = 121.31, p < .001$), and playgrounds ($\chi^2(4) = 37.52, p < .001$; Table 1). When comparing differences in supervision between the two venues after controlling for child age, there was no significant difference in the level of supervision provided for preschool children in pools and playgrounds ($\chi^2(4) = 0.31, p = .989$), with approximately one third of children receiving good supervision (Table 1). In contrast, children of school age were significantly more likely to receive no supervision in pools ($\chi^2(4) = 10.319, p = .035$) and a poor level of supervision in playgrounds (Table 1).

Caregiver age was also significantly related to the nature of child supervision. Young caregivers (19–25 and 26–32) were more likely to provide good levels of

Table 1 Comparison of Supervision Between Pools and Playgrounds Categorized According to Child Age

Level of Supervision	Pools		Playgrounds	
	Preschool-age	School-age	Preschool-age	School-age
Absent	14.6%	46.0%	13.7%	31.7%
Poor	20.9%	24.6%	22.7%	33.3%
Sound	21.4%	16.7%	20.9%	20.3%
Good	33.2%	11.1%	32.7%	14.6%
Excellent	9.9%	1.5%	10.0%	0%

supervision in pools ($\chi^2(8) = 80.62, p < .001$), and playgrounds ($\chi^2(8) = 28.39, p < .001$), whereas the over 32 age group was more likely to allow children to play unsupervised. When considering this further, a significant interaction between caregiver age and child age was evident. Young caregivers (19–25 and 26–32) were significantly more likely to be responsible for preschool children, compared with older caregivers (>32 years) who were significantly more likely to be responsible for school-aged children ($\chi^2(2) = 69.61, p < .001$).

In both settings, caregiver supervision was found to be associated with the number of children for whom the caregiver was responsible. Caregivers responsible for only one child in pools or playgrounds provided significantly higher levels of supervision ($\chi^2(12) = 123.09, p < .001$, $\chi^2(12) = 168.31, p < .001$, respectively) than caregivers who were responsible for a larger number of children. Further, when the level of caregiver supervision was high, caregivers were significantly more likely to intervene in pools ($\chi^2(4) = 321.62, p < .001$) and playgrounds ($\chi^2(4) = 139.06, p < .001$) than when supervision was at a lower level. In playgrounds, likelihood of intervention was also significantly related to the child's exposure to injury risk. As injury risk increased, caregivers were significantly more likely to intervene in comparison with incidents considered to be of low perceived injury risk ($\chi^2(4) = 42.69, p < .001$). In pools, intervention was likely when children were involved in general play (considered to be low risk or less severe injury risk; $\chi^2(4) = 23.26, p < .001$). Conversely, intervention was less likely when children were engaged in activities considered high risk including running unsafely in the venue, play-fighting, and performing inappropriate water entries.

Discussion

The findings of this study have shown that the level of caregiver supervision which children experience in active recreational settings is influenced by a number of factors. Despite previous research recognizing the increased importance of caregiver supervision for children in and around water (Fisher & Balanda, 1997), this study found a significantly greater number of school-aged children were unsupervised in public pools compared with playgrounds. While reasons for this finding are unknown, it is of concern, particularly because of the augmented dangers and potential for tragic consequences associated with a lack of supervision in aquatic settings. Perhaps caregivers mistakenly believe that the responsibility for children's safety is transferred to the lifeguard once they enter an aquatic venue, or they may perceive that the lifeguard is best able to supervise their children. In two recent studies conducted at Australian and New Zealand beaches, approximately one fifth of caregivers in each study believed that lifeguards could provide the best supervision (Moran, 2009; Petrass, Blitvich, & Finch, 2011b); although interestingly, in the Australian study, only 3.6% of caregivers reported providing a lower level of supervision when their child was within the area patrolled by lifeguards.

While lifeguard supervision is recognized as an effective drowning prevention intervention (Branche & Stewart, 2001), in Australia, not all aquatic settings are patrolled or guarded. For example, Australia has 10,685 beaches and only 3% are patrolled by lifesavers and/or lifeguards (Short, 2006). Even in patrolled settings, it is physically impossible for lifeguards to provide close and constant supervision

to all children, and studies have shown that lifeguard efficacy decreases in busy conditions, late in the day, and in the presence of other lifeguards (Harrell, 2006). For this reason, close and constant caregiver supervision for young children, even in patrolled settings, remains paramount.

Findings of the current study also indicated that with higher levels of supervision caregivers were more likely to intervene in both pools and playgrounds. In playgrounds, likelihood of intervention was related to child injury risk, with caregivers significantly more likely to intervene as injury risk increased. Conversely in public pools, interventions were less likely when children were engaged in high risk activities (e.g., performing inappropriate water entries, play-fighting, and running unsafely in the venue). An unobtrusive observational study on daily behavior at a public outdoor pool in Alabama (U.S.) also reported that risk-taking behavior was alarmingly high, with an average of 91.37 dangerous behaviors (e.g., running on the deck, jumping into the water too close to other swimmers, pushing others under water in an aggressive manner) per hour (Schwebel, Simpson, & Lindsay, 2007). The reasons for these patterns are unclear, as child drowning risk remains a serious threat even in public swimming areas that are patrolled (Branche & Stewart, 2001). Schwebel et al. (2007) suggested that patrons are either neglectful or unaware of pool rules, although it may be that caregivers are mistakenly abdicating their responsibilities to lifeguards. Similarly, lifeguards may not recognize that children's behavior often fit the high-risk profile and therefore require appropriate scanning strategies (i.e., tracking) to ensure their safety. As few studies have considered behavior patterns of swimming patrons at public pools (Petraass & Blitvich, 2012; Schwebel, Simpson, & Lindsay, 2007), further investigations are required to confirm this conjecture.

Consistent with previous studies (Morrongiello & Dawber, 2004; Wills et al., 1997), child age, the presence of siblings or peers, and caregiver age also were associated with level of supervision in pools and playgrounds. Children playing alone were more likely to receive a good or excellent level of supervision, as were preschool-aged children (1–5 years), while school-aged children (6–10 years) were more likely to receive no supervision or poor supervision in these settings. With increasing child age, supervision naturally declines to promote autonomy and independence (Morrongiello, Corbett, & Brison, 2009); however, the lack of supervision for school children in pools does not correspond well to RLSSA's recommendations regarding appropriate supervision for children in aquatic settings (RLSSA, 2010). RLSSA advises that for children aged 5–9 years, supervisor distance may be increased but supervisors should always remain within eyesight and be ready to take action (RLSSA, 2010). The findings of this study may indicate that caregivers are underestimating both potential dangers and the required level of supervision when children are in or around the water.

Limitations

Overall, this study provided increased understanding of caregiver supervision of children, particularly in relation to differences between aquatic and land-based recreational settings. There are, however, limitations that must be acknowledged

and that merit consideration in planning future studies investigating caregiver supervision. First, all observations were conducted during an autumn season and accordingly pool observations were conducted at indoor facilities. Based on the data collection period, the number of patrons at both pools and playgrounds may have been fewer than in summer and therefore it is recommended that future studies consider the summer period to determine whether these findings are indicative of supervision during peak season. Second, as drowning deaths at public pools and deaths associated with playground equipment are rare, a range of incidents and behaviors anecdotally associated with injury and/or drowning risk was measured. No life-threatening incidents occurred during the 60 hr of observation. Third, to minimize the possibility of bias and misrepresentation of the caregiver's true supervisory behavior, caregivers were unaware that they were monitored. This decision meant that it was not possible to observe the same caregiver-child pairs in both aquatic and playground environments. In addition, as convenience samples, we did not control the sex of the caregivers which likely alters the supervision dynamic. This may represent an important future variable to consider. Finally, as the study was based only on unobtrusive observation, caregivers were not asked about their supervision behaviors and therefore intentions behind their supervisory decisions are unknown.

Conclusion

In summary, caregivers demonstrated different levels of supervision in two recreational settings with dissimilar risks. Despite the increased risks and adverse outcomes associated with a lack of supervision in aquatic settings, a greater proportion of school-aged children were unsupervised in public pools compared with playgrounds. Further investigation is required to understand what factors caregivers consider when determining an appropriate level of supervision as this may provide insight into why caregivers do not provide closer supervision of their children at swimming pools. In addition, direct evaluation of water safety messages that relate to supervision is required, and investigation of caregiver responses to these messages should be made to determine whether supervisory practices are enhanced in response to these messages. Further investigations are also required to identify additional ways to promote closer supervision practices, particularly in aquatic settings, but also in playgrounds.

As expected, with an increased level of supervision, caregivers were more likely to intervene in response to a behavior that could lead to injury, in both pools and playgrounds. Ironically, in pools an inverse relationship was identified between injury risk and likelihood of intervention. That is, as injury risk increased, interventions decreased. This finding was surprising and contrary to caregiver behavior observed on playgrounds, where the likelihood of intervention increased with increased injury risk. Reasons for this are unclear, and this finding highlights the importance of conducting further studies to investigate the perceptions of caregivers and lifeguards regarding their responsibilities when supervising young children in aquatic settings.

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