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Risk-taking Behavior and Drowning Incidents in Swimming and Non-Aquatic Activities Around the Water

Avramidis, S.^{1,2}; Butterly, R.²

¹Hellenic Center for Disease Control and Prevention, Athens, Greece

²Leeds Metropolitan University, Leeds, UK

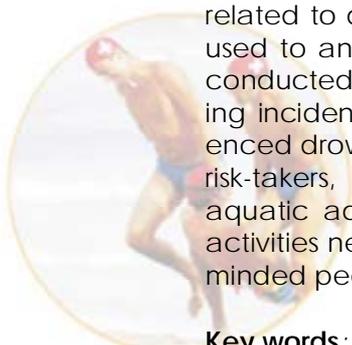
Contact email: Avramidis, S.: S.Avramidis@leedsmet.ac.uk



Risk-taking Behavior and Drowning Incidents in Swimming and Non-Aquatic Activities Around the Water

Abstract

The aim of the present study was to associate the sets of behavior and the components of risk-taking behavior that were observed during a sample of drowning incidents. A major literature review of research identified potential risk-taking factors related to drowning reported in the literature. Qualitative content analysis also was used to analyze publicly-available drowning incident videos (n = 41). Authors also conducted semi-structured interviews of persons (n = 34) involved in separate drowning incidents. Based on these samples, results confirmed that people who experienced drowning episodes come from a range of age groups and they include sport risk-takers, as well as those engaging in rewarding, exciting, fun or exhilarating aquatic adventures. Risk-takers often participated in swimming and non-aquatic activities near and above the water on their own or as members of a group of like-minded peers.



Key words: drowning; lifeguarding; lifesaving; water safety; swimming; rescue



Las conductas de riesgo y ahogamiento. Incidentes en Natación y actividades acuáticas y no acuáticas alrededor del agua

Resumen

El objetivo del presente estudio fue asociar los conjuntos de comportamiento y los componentes de la conducta asunción de riesgos que se observaron durante una muestra de accidentes. Una revisión importante de la literatura de la investigación permitió identificar los potenciales riesgos, los factores relacionados con ahogamientos descritos en la literatura. En el análisis de contenido cualitativo también se



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utilizó para analizar vídeos ahogamiento disponibles públicamente (n = 41). Los autores también realizaron entrevistas semi-estructuradas de personas (n = 34) que participan en diferentes ahogamientos. Sobre la base de estas muestras, los resultados confirmaron que las personas que experimentaron episodios de ahogamiento provienen de una variedad de grupos de edad e incluyen deportes arriesgados, así como aquellos que participan en aventuras gratificantes, deportes acuáticos emocionantes, divertidos o estimulantes. Otros accidentados participaban en las actividades de natación cerca del agua, por su cuenta o como miembros de un grupo de ideas afines a sus compañeros.

Palabras clave: ahogamiento, salvavidas, seguridad en el agua, natación, salvamento.

Comportamentos de risco e afogamento. Incidentes na natação e em atividades aquáticas e não aquáticas em torno da água

Resumo

O objetivo do presente estudo foi associar os conjuntos de comportamento e os componentes de toma de risco que foram observados durante uma amostra de afogamento. Uma revisão importante da literatura identificou potenciais riscos tendo em fatores relacionados com afogamento relatados na literatura. Análise qualitativa de conteúdo também foi usada para analisar vídeos afogamento publicamente disponível (n = 41). Autores também realizaram entrevistas semi-estruturadas de pessoas (n = 34) envolvidos na diferentes afogamentos. Com base nessas amostras, os resultados confirmaram que as pessoas que experimentaram episódios de afogamento vêm de uma gama de faixas etárias e que incluem esporte de risco, bem como aqueles envolvidos em gratificantes, emocionantes, divertidos ou emocionantes aventuras aquáticas. Outros acidentados participaram de natação e actividades aquáticas não-próximas a água e acima da água por conta própria ou como membros de um grupo de colegas.

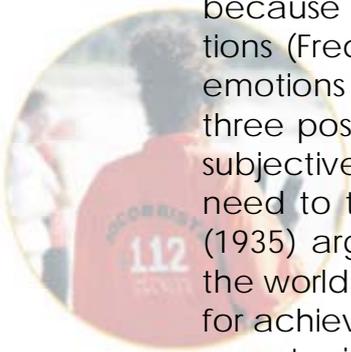
Palavras-chave: afogamento; salvavidas; a segurança da água, natação de salvamento;

"Risk is sometimes taken as synonymous with hazard but risk has the additional implication of the chance of a particular hazard actually occurring. Thus, a hazard may be defined as a potential threat to humans and their welfare and risk as the probability of hazard occurrence" (Smith, 1992, p. 6). In other words, to consider behaviour as risky, it must have as a potential outcome either no injuries or actual harm (Irwin & Ryan, 1989).

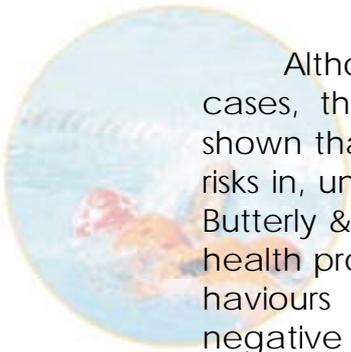




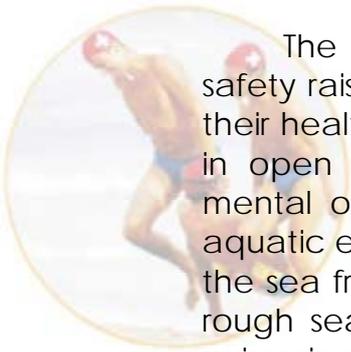
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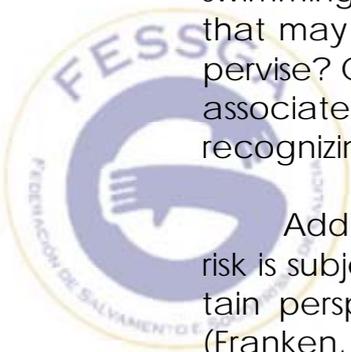
Risk can be beneficial to people for a number of reasons. First, because according to the broaden-and-build theory of positive emotions (Fredrickson, 2004), it may be a means of achieving the positive emotions that contribute to optimal well-being. An overall ratio of three positive to every negative emotion has been shown to optimise subjective well-being (Fredrickson & Losada, 2006). Second, humans need to take risks because they desire to explore the world. Einstein (1935) argued that humans seek escape from their personal life into the world of objective perception and thought. Finally, risk is necessary for achieving learning because people learn more effectively from sense-rich personal experiences (Bowman, 2009).



Although taking certain kinds of risks may be beneficial in some cases, this is not universal. For example, research has repeatedly shown that some drowning deaths are caused because people take risks in, under, above, or around the aquatic environment (Avramidis, Butterly & Llewellyn, 2007). Given that drowning is a serious social and health problem worldwide (World Health Organization, 2003), risky behaviours act may exaggerate the magnitude of the likelihood of negative outcomes from the hazards found in aquatic environments.



The consequences of risk-taking behaviors in public health and safety raises a series of aquatic-related questions. Why do people risk their health or life by participating in excessively risky aquatic activities in open water or other environments with unpredictable environmental or hazardous settings? Why do some people participate in aquatic experiences that contain potentially fatal risks (e.g. jumping in the sea from high cliffs, night scuba diving without a bubbly, sailing in rough sea without wearing personal flotation device, long distance swimming in areas with sharks)? Are there individual behavioural traits that may allow lifeguards to foresee risk-taking in the people they supervise? Could this knowledge help lifeguards prevent injuries or death associated with aquatic environments by having this knowledge and recognizing those prone to engage in risky behaviours?



Addressing these questions is not easy because the concept of risk is subjectively assessed by the decision-maker. Viewed from a certain perspective every human activity can be seen to contain risk (Franken, 1998), and risk-taking behaviour is a central facet of human



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information processing as explored within cognition, personality, motivational and social psychology (Tenenbaum, 1995). Researchers have stressed both the theoretical and practical implications of being able to understand risk-taking behaviour and to modify its occurrence (Lightfoot, 1997).

People take risks for many reasons. Firstly, some people may be ignorant of potential risks. Secondly, others may take risks because they avoided being hurt in previous experiences; they were lucky. Lack of any injuries can reward unsafe behaviour. Behaviour that is rewarded by a lack of consequences, otherwise injuries are recurrent. Thirdly, by ignoring training, safety rules, signs and precautions, risk and likelihood of being injured increases. Fourth, individuals can be compromised by having only a limited behavioural repertoire for completing an activity. Finally, because they decide that it is better to risk failing than to avoid trying when the consequences are less aversive, persons engage in unsafe behaviours that bring high levels of risk (Weinstein, 1980; Plumert, 1995; Rutter, Quine & Albery, 1998).

Psychological Profiles of Risk-Taking Relevant to Lifeguarding

In aquatic settings lifeguards and other emergency personnel are likely to come across two types of risk-takers. On the one hand are the people with a psychological high-risk sporting profile. On the other hand are those with an anti-social risk-taking profile (Llewellyn, 2003). Sporting risk-takers tend to be confident that they can manage the risks involved, and have like-minded friends. They are willing to take physical risks to trigger their 'fight or flight' response. The resulting "adrenalin rush" apparently gives them feelings of satisfaction derived from the exercise of control in dangerous circumstances, which they interpret as being challenging rather than threatening. Dangerous activities continue to be sought as long as the reward outweighs the consequences and when the sport activity provides intrinsically rewarding experience that is unique to the particular form of sport activity (e.g., sky diving above the sea; Cogan, 1999). Risk-takers in this category are more likely to be male, and may be low on neuroticism scales suggesting resilience to adverse stimuli. They are also low in anxiety, which may partially explain their heightened self-confidence (Llewellyn & Sanchez, in press). Risk-takers seeking sensation by participating in these activities are also more likely to report both a life-



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time history and a family history of anti-social personality (n=335; Ball, Carroll & Rounsaville, 1994). Describing risk-taking sports participants in a sentence, they are confident, physically adventurous and need to demonstrate mastery (Llewellyn, 2003).



As with the high-risk sporting profile, anti-social personality risk-taking might lead to drowning through health risk-taking or anti-social risk-taking behaviour, like binge drinking. Many drowning victims have consumed alcohol while boating or before swimming (Mackie, 1999; Smith, Keyl, Handley, Bartley, Foss, Tolbert, & McKnight, 2001; McCool, Moran, Ameratunga & Robinson, 2008). One explanation behind this might be that alcohol reduces risk perceptions compared to estimates made before drinking. This increases the risk-taking behaviour (Fromme, Katz, & D'Amico, 1997) possibly because the depressed nervous system inhibits the ability to foresee likely consequences. For example, adolescents are aware that their behaviour is risky and it is different from the decision-making processes of adults regarding consumption of alcohol and drugs combined with reckless driving (e.g., driving on steep paths near the water; Lightfoot, 1997). Collectively, anti-social risk-takers engage in risky situations that do not involve a large degree of personal control (e.g., Russian roulette), and favour conditions unlikely to appeal to the sporting kind of risk-taker (Llewellyn, 2003).

As shown above, a more detailed understanding of risk-taking behaviours is vital to optimise aquatic safety. This will help to refine the training provided by aquatic sporting and recreational organizations to avoid and/or manage potentially risky behaviours before the develop into drowning events. The aim of the current study was to identify sets of behavior and components of risk-taking that may lead to drowning or other aquatic emergencies.

Methods



Consideration of the strengths and limitations of different research approaches (see Johnson & Onwuegbuzie, 2004) underpinned our decision to undertake a mixed methods approach across three studies. The first study reviewed quantitative studies, aiming to identify literary evidence of drowning incidents demonstrating specific sets of behaviours and components of risk-taking. The second study, based



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on observations of video recorded drowning rescues, aimed to assess whether or not the specific sets of behaviours and components of risk-taking identified in the first study were either present and/or supplemented by others. The third study was based on interviews, aimed to assess whether or not the specific sets of behaviours and components of risk-taking found in the quantitative literature review were identified as well as finding possible emerging ones. The third study also sought insights into questions left unanswered by the second study. Finally, the variables present in all three sets of data were synthesized to provide a better understanding of the relationships between risk-taking and drowning. Comparing and contrasting the outcomes from the three studies provides a triangulated evidence-base. For the rigour of the three studies see Table 1.

Study 1

The first study was an extensive review of the literature on empirical studies that employed quantitative dependent measures. It was important that this type of research was completed first within the present mixed methods design, since the initial aim was to identify literary evidence of behaviour sets and components of risk-taking as causes of drowning episodes. The terms 'drown', 'aquatic emergency', 'risk factors', 'risk-taking behaviour', 'risk assessment', 'lifeguard', 'water safety', 'lifesaving' and 'rescue' were used as key words. The search identified 185 aquatic safety peer reviewed journal articles and textbooks in libraries, electronic databases typically available in academic libraries (e.g. Medline, Sport Discuss, Sport Discuss with Full Text, PsychINFO and PubMed).

Study 2

Data Sources

The exact data sources and procedures have been reported earlier (Avramidis, et al., 2007). A criterion-sampling method obtained drowning-incident videos ($N = 41$) that were freely available in the public domain. This method facilitated the identification of variables and their relationships that otherwise might not be available for fatal or non-fatal traumatic drownings. These visual narratives ranged in length from 30 to 720 s ($M = 345.0$, $SD = 2.8$).



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Table 1: Rigour of the Three Studies of the Current Research.

	Study 1 Review	Study 2 Video Analysis	Study 3 Semi-structured Interviews
Strengths	<p>External validity as the broad literature search provided secondary quantitative data.</p> <p>Data collection was relatively quicker compared to the other two studies.</p> <p>Results of the reviewed studies were provided independent of this research team.</p> <p>Reflects a large number of people.</p>	<p>Internal credibility provided by a number of drowning episodes. This provided in-depth individual case information.</p> <p>Researcher could document sequential patterns and change.</p> <p>Researcher could get more information about each drowning episode compared to the first study.</p> <p>Data collection in natural settings.</p> <p>Identification of local situations, conditions, and stakeholders' needs.</p>	<p>Internal credibility provided by a number of drowning episodes. This provided in-depth individual case information.</p> <p>Detailed description of phenomena embedded in local contexts.</p> <p>Researcher directed the interview along a desired pathway to extract responses to particular questions. This allowed deeper understanding of the drowning episodes.</p> <p>Data collection in natural settings.</p> <p>Understanding and description of people's personal experiences and opinion.</p>
Limitations	<p>Researcher has no direct control over the data and therefore could not have an in-depth understanding of who, why and when a drowning incident occurred. This is a fundamental requirement in injury epidemiology of risk-taking behaviour.</p> <p>Researcher may have overlooked specific phenomena.</p> <p>Researcher's chosen variables may have not reflected local constituencies' understandings.</p>	<p>Small samples limit external generalizability of the findings.</p> <p>The scale and quality of evidence varied by incident.</p> <p>The results were more easily influenced by the researcher's personal biases and experiences.</p> <p>Difficult to make quantitative predictions.</p>	<p>Small sample limited generalizability of the findings.</p> <p>A combination of convenience or snowball sampling did not allow the identification of all the variables that had been found in the literature but only those that were related to the specific circumstances of the examined aquatic environments.</p> <p>The results were more easily influenced by the researcher's personal biases and experiences.</p> <p>Difficult to make quantitative predictions.</p>

Apparatus and Procedures

We observed the videos on standard equipment and software to perform appropriate qualitative analyses (QSR, 2002). To deal with



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the various disadvantages and bias, the objective and subjective audio and visual content of the video were observed without unsupported assumptions and editorial comments. The audio-visual content was transcribed twice within a period of three months. This text was coded and analysed using NVIVO (version 2002). A number of codes were identified within the text. Finally, frequencies were measured.

Study 3

Participants

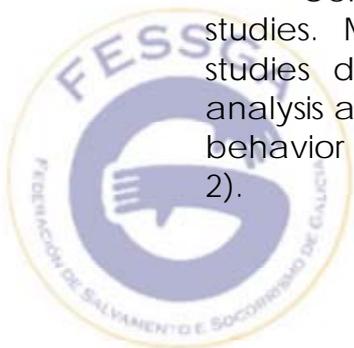
A combination of convenience and snowball sampling located participants who were water safety or aquatic professionals (e.g., lifeguards, lifesavers, scuba divers, and athletes of aquatic sports ($N=34$) who could describe a drowning episode.

Apparatus and Procedures

The same procedure as in the previous study (that examined observation of video recorded rescues) and past published work was followed (Avramidis et al., 2007). Anonymity and confidentiality were maintained. The participants received and read a participant information sheet. After having any questions about their involvement answered to their satisfaction, each signed an informed consent form. The semi-structured interview schedule included open-ended questions. The interview was transcribed and content analysed using NVIVO.

Results

Components of risk-taking behavior were noted in all three studies. More precisely, the literature search revealed numerous studies dedicated to risk-taking behavior. Furthermore, the video analysis and the interview analysis identified 11 cases where risk-taking behavior led to a drowning episode with one or multiple victims (Table 2).





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Table 2: Evidence of Risk-Taking Behaviour in the Second and Third Studies.

Study	N	Risk-Taking Related Drowning Episodes	Frequency	Cases
Video Analysis	41	2	7.4%	Illegal bungee jump of a 5-team members from a 200 ft high bridge; base jump from 746 ft high tower above the sea
Interview Analysis	34	9	26.5%	Unsupervised repetitive hyperventilation exercises over underwater well; fisherman with epilepsy goes fishing alone far from the coast; deep scuba diving without a buddy; attempt to rescue an unknown drowning victim without knowing life-saving techniques; attempt to save a child in a flooded river without knowing lifesaving techniques; diving in the sea from high cliffs; swimming having consumed alcohol and food; snorkelling far from the coast with wearing a lifejacket in an area with sharks; repetitive deep scuba diving without a buddy and without maintaining the safety rules
Total	75	11	14.7%	

Discussion

Risk-taking behaviour was one cause of drowning in the first review study. The results of the second (video) and third (interview) studies supported this finding. More importantly, in the context of the current study, they helped in understanding how and why this happened. Therefore, a number of psychological perspectives need to be addressed in relation to risk-taking behavior.

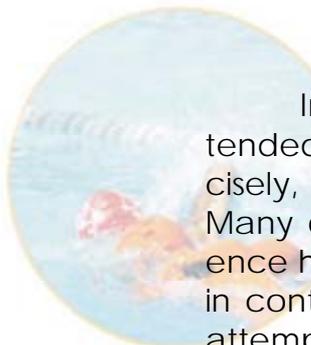
First, in terms of age, in the second and third studies, older children often performed risk-taking activities beyond their physical abilities. Consistent with previous evidence, they often participated in activities that required high ability, physical strength and experience (Plumert, 1995; Lightfoot, 1997). In adults who performed risky activities, the effects of drugs and alcohol altered the accuracy of their perception of the risks and hazards in aquatic activities. In some cases, the effect was to reduce awareness of the negative consequences, thus increasing the likelihood of engaging in risk-taking behaviour. The script below describes the case of a man who swam under the influence of alcohol.



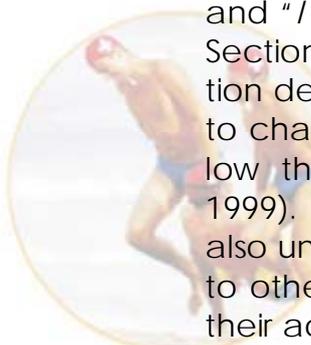
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A 50-year old, man had drunk a lot of beer and had eaten just before going swimming. He was swimming fine. Less than a minute later, we saw him unconscious face down. The lifeguard who was on duty swam towards him. The waves were so big that he couldn't see that the victim had moved. Thus, he lost sight of him. The 2nd guard started swimming out to get him. They gave him mouth-to-mouth whenever they could. They got him out. From the time the man was spotted until he was removed from the water was about 10min. Resuscitation was administered. He died in the hospital." (Interview 11, Section 3, Paragraph 6).



In the videos and interviews we observed that sporting risk-takers tended to be confident about managing the risks involved. More precisely, they took physical risks to trigger the 'fight or flight' response. Many of the sampled drowning victims apparently sought to experience high arousal as excitement rather than fear, believing they were in control of the risks. For example, some risk-takers before their risky attempt, commented: "*Wow, ready to go. Let's go over the edge*" and "*I got some butterflies; you will be stupid if you weren't*" (Video 2, Section 2, Paragraph 3). This may have given them feelings of satisfaction derived from exercise of control to shift from perceptions of threat to challenge; this was underpinned by the preparation that would allow them to experience personal control (Franken, 1998; Cogan, 1999). Often risk-takers - in both the videos and the interviews - were also unrealistically optimistic expecting that misfortunes would happen to others and, because of that, they ignored every prohibition about their action that was not consistent with their behaviour (Plumert, 1995; Rutter, Quine & Albery, 1998):



"Thinking retrospectively I would consider swimming on that day as a risky activity; we had set up the red flags indicating that swimming was dangerous. Nevertheless, the father with the child had possibly ignored them when getting in to the water." (Interview 20, Section 1, Paragraph 8).

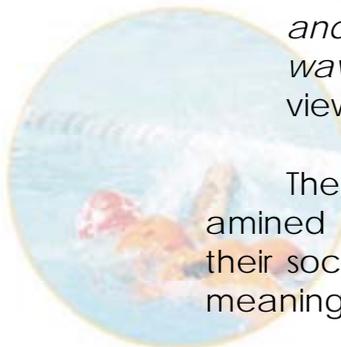


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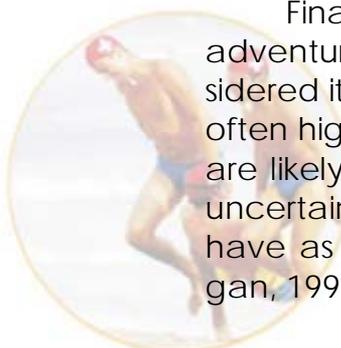
The casualties in the video and interview studies all participated voluntarily in risky activities. However, their behavior was often influenced by peer groups. We observed that risky behaviour was performed when it was recognized as risky by others who also participated voluntarily in the same activities.



"He dove from very high up. We cheered. The other friends followed from different lesser heights. One of us wasn't a very good swimmer. We told him 'Don't jump. There is no shame in saying you can't swim very well'. 'No, you all jumped. What am I, stupid?' He went to dive, but flipped over in the air and hit the water with his back. He gasped and water went into his mouth. He started to panic and wave his arms about as most drowning victims do." (Interview, 10, Section 2, Paragraph 6).



Therefore, part of the problem of risk-taking behaviour in the examined samples relied on the relationships among individuals and their social groups. This suggests that relational context confers both meaning and status (Lightfoot, 1997; Llewellyn, 2003).



Finally, we observed in the videos and interviews that aquatic adventures triggered the risk-taking behavior when the risk-takers considered it to be emotionally or sensationally rewarding. Risk-takers were often highly skilled and few reported, or showed, fear; these individuals are likely to have developed and refined their coping skills to handle uncertain situations. Unfortunately for them, risk-takers do not always have as much control over their risky actions as they anticipate (Cogan, 1999) and as our evidence suggests;



"The five Dare Devils jump. Slow motion replay of the failed stunt shows that they did not have enough on the cable when they jumped on the top of the bridge. When the five member team weighting almost 1000 pounds reaches the end of the cable, the tremendous force snapped their lifeline. The more powerful injuries came from the impact of the water 200 feet below the bridge. Laurie is unconscious; her neck broken. Jeff is not breathing; his neck is also broken. Chaos..." (Video 2, Section 4, Paragraph 3).



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These findings may have important implications for the general public, lifeguards, and local authorities for considering the risks to which they expose themselves. Even swimming in a controlled lifeguarded environment needs to be recognized as risk-taking increased when following a heavy meal and alcohol consumption. This led to the conclusion that, in the present sample, risk-takers were not only those who seek pleasure from activities that contain some degree of risk but also those who disregarded local safety rules and prohibitions. On the other hand, when local authorities ought to make available funding for providing sufficient lifeguard supervision, adequate rescue equipment and preventive measures (e.g., warning signs, flags and drowning detection systems) this averts risk becoming actual harm. Finally, lifeguards should come to expect that drownings are equally likely to happen to non-swimmers as to those highly skilled individuals. These highly skilled individuals increase their risk both on their own and when they are with like-minded peers.

The current findings are subject to a number of sources of potential bias. The first limitation is that the first study used only literature that was based in English and Greek languages. Therefore, it may have neglected important findings from research conducted in other languages. A second limitation relates to the time lag between the drowning incident and the interview, which may impair recall quality.

Conclusions

The mixed methods research design adopted here shows that risk-taking behavior during engagement may lead to a fatal or non-fatal drowning episode. In terms of age, we observed that older children performed risk-taking activities where they may have overestimated their physical abilities in relation to physical strength and experience. On the other hand, some adult risk-takers had a lifetime history of risky behaviour. Furthermore, sporting risk-takers tended to be confident about managing the risks involved. Additionally, the casualties of the present sample participated in risky voluntarily (e.g. stunts, sporting and recreational activities). Finally, we observed that aquatic adventures triggered the risk-taking behavior when the risk-takers considered it to be rewarding, exciting, fun or exhilarating.

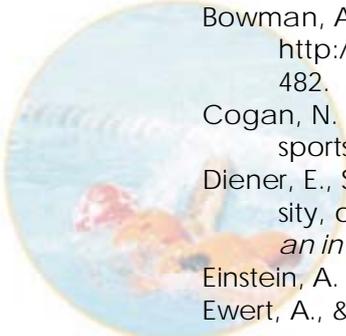


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