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No Role for Outcomes in Definitions of Impulsive Actions

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Abstract

Purpose of Review This paper aims to revisit and critically analyse the definitions of impulsive actions, challenging the traditional focus on negative outcomes and dysfunctionality. By shifting the discussion away from an exclusive association with dysfunctionality, it advocates for a more nuanced examination of rapid actions undertaken with minimal forethought, potentially uncovering overlooked adaptive qualities and situational benefits.

Recent Findings Empirical evidence and formal models challenge the notion that impulsive actions are inherently maladaptive. Instead, these studies suggest that the context and environment play crucial roles in determining whether such actions are or not adaptive.

Summary This paper proposes a new perspective on impulsive actions. Impulsive actions are rapid because not all available evidence is considered, but this does not necessarily result in negative outcomes. Future research should focus on developing modified impulsivity measures that reflect this viewpoint. Such measures could provide deeper insights into the nuances of psychopathological symptoms and disordered behaviours.

Keywords Impulsive action · Impulsivity · Goal-directed theory · Adaptivity · Functional impulsivity

Introduction

Imagine three scenarios: A researcher hurls their laptop on the ground when it crashes moments before a crucial deadline; a colleague hastily takes and consumes the final cookie, not realising until too late that it should have been saved for the birthday celebrant; and Will Smith slaps Chris Rock during the 2022 Academy Awards. These cases appear to involve impulsive actions, characterised by two common features: The action is carried out quickly and leads to harm or insult to others, or damage to equipment. Researchers have linked the tendency to act impulsively with numerous disorders exhibiting externalising behaviours, including attention deficit hyperactivity disorder (ADHD), compulsive sexual behaviour disorder, substance use and addictive disorders (e.g. alcohol use disorder, gambling disorder), conduct disorder and antisocial personality disorder (e.g. [1]). However, recent studies suggest that research on impulsivity has stagnated, with impulsivity concepts holding a meaning that is incompatible with psychometric, neuroscientific and clinical data. The purpose of this paper is to re-examine the meaning of the concept of impulsive action. We will achieve this by reviewing widely used definitions of

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impulsive action, thereby questioning the role of negative consequences and dysfunctionality in these definitions.

In the literature, impulsive action has been differentiated from other forms of impulsivity, including impulsive choice, which involves opting for smaller and sooner rewards over larger and later ones (also known as delay or temporal discounting [2]). Impulsive action itself has been defined in various ways. One definition describes it as "actions that are poorly conceived, prematurely expressed, unduly risky, or inappropriate to the situation and that often result in undesirable outcomes" ([3], p. 311). Others have described it as "rapid response impulsivity" (RRI, [4]), and the "tendency toward immediate action that is out of context with the present demands of the environment, and which occurs with diminished forethought". Lastly, impulsive action and RRI have been described as "a diminished ability to inhibit prepotent responses" [4–6].

The aforementioned definitions have three main components (see also the examples above). The first component is the absence of premeditation ("prematurely expressed", "diminished forethought"), resulting in rapid actions ("tendency towards immediate action", "prepotent responses"), which is the second component. The third component refers to the negative outcomes of the actions (e.g. "poorly conceived", "inappropriate", "undesirable", "out of context", "diminished"). The definition of impulsive action as stemming from a lack of inhibitory control has also led to the premise that impulsive actions are inherently negative: It is presumed that the individual would have acted differently and more optimally had inhibitory control been more effective. Finally, the negative connotation is evident as "impulsivity" is frequently used as a criterion to define psychiatric disorders in diagnostic manuals such as the DSM [7].

The inclusion of negative consequences in the definition of impulsivity limits the current research in different domains. For example, in addiction research, researchers tend to focus on questions such as whether impulsive action is involved in the aetiology (cause) or rather is a result (consequence) of addiction [8, 9], and if it is a cause, which impulsivity sub-components can be considered as risk factors for developing addictive behaviours [10, 11]. However, there is a shortage of research addressing how impulsive behaviour arises in the first place and whether impulsivity could even be harnessed in the prevention and the treatment of addiction. Importantly, dissociating impulsive behaviour from its consequences could contribute to a better understanding of how and why some people intensively engage in appetitive and rewarding behaviours — such as gaming, gambling or cybersex — in a way that is functional and thus not associated with negative consequences [12–15].

Although we concur with the first two components of these definitions (i.e. lack of premeditation leading to rapid actions), we question that negative outcomes and dysfunctional traits are *necessary* conditions to characterise an action as impulsive. While some of the definitions mentioned above do contain nuances, such as the *likelihood* of negative outcomes, this nuance is rarely present in research. This has also been evident in conversations with other impulsivity researchers and clinicians, where we noticed that many have a tendency to rely on negative outcomes to determine whether or not an action was truly impulsive. Therefore, the present paper argues that the literature has placed excessive emphasis on the negative consequences and dysfunctionality of impulsive action, and that defining impulsive action on the basis of outcomes impedes its study.

On the Functionality and Dysfunctionality of Impulsive Action

Our main thesis is that impulsive actions (i.e. executed rapidly and without premeditation), may carry no negative repercussions and may even result in positive outcomes. Examples include impulsive purchases that provoke joy, or spontaneously approaching an unfamiliar person at a social gathering, leading to a lasting friendship or romantic relationship. Thus, impulsive actions are not necessarily "dysfunctional" or "maladaptive". Support for this idea comes from empirical work and formal models.

In line with our perspective, Dickman [16] already emphasised in his seminal paper on functional and dysfunctional impulsivity that the construct is too often perceived negatively and advised against adopting such a dogmatic stance. He cited empirical evidence indicating that the cost of impulsive actions — in terms of errors committed — is usually minimal in simple experimental tasks. Impulsive actions may even enhance accuracy compared to less impulsive actions in circumstances with highly restricted decision-making time [16]. For example, Burnett Heyes and colleagues [17] found that impulsive actions (faster and riskier) are beneficial when rewards are time-sensitive. This was demonstrated by their Traffic Light task, where participants had the opportunity to gain more rewards by promptly responding to a green signal, even though there was a risk of penalties for premature responses. Rapid anticipatory reactions and, as a result, increased rewards were associated with the "lack of premeditation" trait (defined as " an individual's tendency to act without consideration of the potential consequences of the behaviour") assessed by the UPPS-P Impulsive Behaviour Scale [18], challenging the traditional view that impulsivity is maladaptive.

The necessary dysfunctional nature of impulsivity is also challenged by a review of formal models of impulsivity. Fenneman and colleagues [19••] identified across different disciplines the conditions under which impulsivity may be adaptive, highlighting predictability and harshness

of the environment as crucial factors. For example, when the future is unpredictable or environments change quickly, rapid actions without taking all evidence into account can be beneficial. Thus, in a classroom situation, children with ADHD may struggle because they have to sit still and learn. In contrast, these children might thrive in fast-paced environments, such as certain sport or video-gaming settings, because here, the environment rewards quick decisions and movements.

Note that the role of the predictability and harshness of the environment has been demonstrated not only in the impulsive *action* literature but also in the impulsive *choice* literature. For example, Kidd and colleagues [20] conducted a delay discounting test on children, comparing two scenarios. In the first, there was a reliable second reward, which consisted of a second marshmallow. In the second scenario, the reward was unpredictable. Compared with the predictable condition (scenario 1), children waited less often for the second reward if the delivery of this reward was unpredictable (scenario 2). Furthermore, a comprehensive study by Watts et al. [21•] revealed that a correlation between impulsive choice (i.e. not waiting for a larger but later reward) and adverse life outcomes disappeared when taking into account the harshness of the children's environment.

The studies discussed show that the advantages (benefits) and disadvantages (costs) of impulsive actions are heavily influenced by present context and the broader social and physical surroundings of the person. In other words, one cannot determine whether an action is adaptive or not without taking the environment into account ("functional contextualism", see [22]).

To understand how it is possible that impulsive actions can be adaptive, we must also acknowledge that people have multiple goals, some of which are not immediately apparent to outsiders or the agents themselves [23••, 24]. Indeed, an action may seem unhelpful when, in reality, it helps an individual achieve a goal that is not immediately obvious. For instance, when Will Smith hit Chris Rock in the face, his primary aim was not to appear good in front of the cameras, but to respond to a verbal aggression against his wife and defend her. Protecting his wife's honour may have been more important at that time than presenting socially desirable behaviour. Another example concerns gambling. Electronic gambling machines are sometimes utilised as mood adjusters [25]. Individuals who use these machines may do so mainly to regulate their mood and consider the associated social, personal and financial costs as less important (or even a price they are willing to pay). The same reasoning can be applied to buying, which can be an efficient way to promote positive affect or reduce negative affect [26]. Determining which goals are prioritised requires a separate cost–benefit analysis. This cost–benefit analysis is again dependent on the reward structure of the environment.

In the examples of Will Smith, gambling and buying, the impulsive actions *seem* maladaptive because it is overlooked that they not only have long-term costs (long-term goals are violated) but also short-term benefits (short-term goals are satisfied) and that the short-term benefits outweigh the long-term costs for the individual at least at the time of the decision. The earlier discussed study using the Traffic Light Task, however, shows that impulsive actions can also have short-term costs (i.e. not receiving a reward on a specific trial) while leading to long-term benefits (i.e. a larger overall reward rate) [9].

No Outcomes in Definitions of Impulsive Action

The previous section highlights that acting impulsively can have positive outcomes and should not always be viewed negatively. However, some might argue that if we ignore the negative component of the conventional definitions of impulsive actions (i.e. third component), we are left with rapid actions in response to some cues in the environment. Such a definition would indeed be overinclusive as it would include actions that are rapid due to, for example, priming, easy task demands or practice. But as mentioned before, impulsive actions are not merely *rapid* (i.e. second component); they are rapid because *not all available evidence is considered* (i.e. the first component). Using less evidence is typically a consequence of time constraint, and it does not matter whether this time constraint is perceived or real. Important here is that the individual chooses to take a decision with less evidence.

A definition of impulsive action that concentrates on the extent to which all available evidence is considered (the first component of the aforementioned definitions) and the extent to which actions are executed rapidly as a result (the second component) allows us to examine the extent to which impulsive actions are adaptive or maladaptive, rather than to a priori assume that they are maladaptive. A further asset of a definition that focuses on the consideration of evidence prior to taking action is the ability to quantify the level of impulsivity of an action through formal "sequential sampling" models [27]. Instead of limiting analysis to just response speed and error rates, these models describe how decisions and resulting actions stem from a process in which evidence for the various choice options is accumulated. A decision is made at the moment that the evidence for one of the alternative response options exceeds the response threshold. When the threshold decreases, less evidence is considered, generating a rapid action. However, reduced evidence also increases the likelihood of selecting an erroneous action. As previously discussed, whether such errors are costly and

consequently render the chosen action maladaptive depends on the reward structure of the environment.

In our discussion above, we neglected the fact that impulsive action can also refer to a decreased ability to inhibit responses. Dalley and Robbins [6] put forward an operational definition of impulsive action (they called it "motor impulsivity"), which involves the inability to stop in a stop-signal task, or the likelihood of executing premature responses in go/no-go or serial reaction time tasks. Nonetheless, the external validity of such tasks has been consistently challenged on several grounds [28–32]. One argument is that these tasks regularly employ external stop signals, which are typically absent in everyday life and thus lack ecological validity [30]. Relatedly, it has been demonstrated that the likelihood and latency to stop, two widespread indicators of impulsive action within the stop-signal task, largely rely on perceptual factors [33]. Consequently, conventional measurements in tasks involving response inhibition may be appropriate for investigating various aspects of fundamental motor control, but may not be as suitable for exploring impulsive action and externalising behaviours in natural environments [32]. As a solution to some of these problems, alternative tasks without external stop signals have been created. Participants in such tasks are required to make a decision about whether to stop or continue [30]. Therefore, even the act of stopping can be considered as a process of accumulating evidence. It should be noted that the latter applies even when stopping is in response to external stop signals [34]. Therefore, we propose that even in motor impulsivity, evidence accumulation seems to play an important role.

Conclusion and Implications for the Assessment of Impulsivity

In this paper, we argued that possible outcomes should not be part of any definition of impulsive actions. Instead, we propose that researchers should focus exclusively on how actions unfold and how they are selected. Our recommended emphasis on the selection process of impulsive action may result in new research inquiries that can broaden our current understanding of impulsive behaviours and open up new avenues for assessing impulsivity.

Thus, from an assessment point of view, investigating impulsive actions on a trait level, including more items that concentrate on the decision-making process, rather than on negative consequences, can prove useful. For example, the UPPS-P Impulsive Behaviour Scale [18] includes a facet labelled "negative urgency", which refers to the tendency to experience strong reactions in the context of intense negative affect. This facet of impulsivity has been associated with a wide range of psychopathological symptoms and is often considered a transdiagnostic marker of psychopathology [1, 35]. Relevant to our purpose, this impulsivity facet is often considered as "necessarily dysfunctional". Many studies indeed show an association between urgency and maladaptive behaviours such as behavioural problems and psychopathological symptoms [1, 36], poor abilities to inhibit prepotent responses [37], rumination [38], substance abuse [39], self-harm and suicidal behaviour [40], disordered eating [41] and aggressive behaviour [42]. Studies rarely investigate whether urgency may be associated with positive outcomes in some circumstances. This is in contrast with some findings presented in the current paper showing associations between measures of impulsivity traits and positive outcomes. Yet, this is not surprising given most items developed to assess urgency explicitly refer to negative outcomes. For example, three out of four items used by Cyders et al. [43] to assess the negative urgency construct in their short UPPS-P scale explicitly mention negative outcomes. It is thus expected that this construct correlates with problematic or dysfunctional behaviour. However, it would be relatively easy to modify urgency items to align with the view expressed in the current paper. It is an empirical — yet interesting — question to test whether such modified urgency items would show a differential pattern of correlation with psychopathological symptoms or disordered behaviours (e.g. problem gambling) as it might provide us with a more nuanced understanding of the relationship between emotion-laden impulsivity and addictive behaviours. On the one hand, taking negative outcomes out of the equation, this relationship might be weakened as urgency might covary with other non-addictive behaviours, including high but healthy involvement in appetitive or rewarding behaviours. On the other hand, it is also possible that the relationship between urgency and addictive behaviours is strengthened as these behaviours might also feature positive outcomes.

Acknowledging that impulsivity can be functional/adaptive in certain contexts has the potential to impact the way we assess and intervene on addictive and dysregulated behaviours. Recognising the benefits of impulsive behaviours (in general) might also play a role in the treatment of addictive behaviours. Although addictive behaviours may be maladaptive, impulsive behaviours or high levels of engagement in appetitive behaviours may fulfil important needs, such as the needs for stimulation or excitement. Fulfilling these needs may be adaptive as long as this is integrated harmoniously into the individual's life and does not impede the fulfilment of other fundamental needs. When considering treatment, it is therefore crucial to take into account the contexts in which a behaviour is exhibited (as argued above) and the degree to which it aligns with or hampers the fulfilment of other needs. This requires identifying situations in which impulsive behaviour may actually be beneficial for the individual. Another type of treatment that may result

from this perspective is to overtrain and thereby increase the accessibility of the positive outcomes of adaptive behaviour and/or the negative outcomes of maladaptive behaviour. For instance, overtraining the contingency that going for a run leads to a positive outcome (e.g. positive mood) and that drinking alcohol leads to negative outcomes (e.g. aggression) can increase the likelihood that this information gets activated when a person is under time pressure or does not want to consider additional information.

In summary, altering the definition of impulsive action by removing explicit references to negative consequences may shift the focus away from consequences to the behaviour itself and provide a more refined perspective on the ontogeny of the behaviour. This knowledge can be used in the assessment and the development of new treatment avenues.

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Data Availability No datasets were generated or analysed during the current study.

Declarations

Conflict of Interest Prof. Joël Billieux, serves as an editorial board member and a topical editor for Current Addiction Reports. However, he was not involved at any stage of the review process. The other authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent All reported studies/experiments with human or animal subjects performed by the authors have been previously published and complied with all applicable ethical standards (including the Helsinki declaration and its amendments, institutional/national research committee standards and international/national/institutional guidelines).

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- •• Of major importance

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