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Unexpected events and prosocial behavior: the Batman effect

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Francesco Pagnini[1] ✉, Francesca Grosso[1], Cesare Cavalera[1], Valentina Poletti[1,2], Giacomo Andrea Minazzi[1], Anna Missoni[1], Laura Bogani[1] & Mauro Bertolotti[1]

Prosocial behavior, the act of helping others, is essential to social life, yet spontaneous environmental triggers for such behavior remain underexplored. This study tested whether an unexpected event, such as the presence of a person dressed as Batman, could increase prosocial behavior by disrupting routine and enhancing attention to the present moment. We conducted a quasi-experimental field study on the Milan metro, observing 138 rides. In the control condition, a female experimenter, appearing pregnant, boarded the train with an observer. In the experimental condition, an additional experimenter dressed as Batman entered from another door. Passengers were significantly more likely to offer their seat when Batman was present (67.21% vs. 37.66%, OR = 3.393, $p < 0.001$). Notably, 44% of those who offered their seat in the experimental condition reported not seeing Batman. These findings suggest that unexpected events can promote prosociality, even without conscious awareness, with implications for encouraging kindness in public settings. Trial registration: ClinicalTrials.gov n° NCT06481748; registered on July 1, 2024.

Prosocial behavior, voluntary actions that aim to benefit others, has profound implications for societal functioning and individual well-being[1]. These behaviors can stem from a variety of motivations, ranging from empathy-driven altruism to adherence to social norms or even egoistic goals like guilt reduction[2]. Although much of the literature has focused on internal motivations for prosociality, it is well established that contextual factors also matter. For instance, bystander research has demonstrated that situational features can substantially shape helping behavior[3,4]. Likewise, cues associated with romantic love have been shown to promote prosocial responses[5]. Building on such findings, more recent studies have examined how specific environmental triggers may directly encourage prosocial actions[6–8]. In particular, the focus of this study is on events that break the monotony of daily life, such as unexpected and novel occurrences, which may serve as catalysts for prosocial behaviors by fostering mindfulness and heightened awareness of the present moment. Novel and unexpected events can, in fact, trigger cognitive appraisal of one's surroundings, as well as behavioral intentions[9].

Mindfulness, typically cultivated through deliberate practices, is characterized by non-judgmental attention to the present moment. However, certain situational triggers, such as unexpected events, may similarly engage mindful awareness, directing attention away from habitual, automatic responses. Previous studies suggest that this attentional shift can enhance individuals' sensitivity to the needs of others, potentially increasing prosocial behaviors.

This study investigates the hypothesis that unexpected events, such as the presence of a person in a superhero costume on public transportation or an unusual interruption in a classroom setting, can promote prosocial behavior. Drawing on theories of mindfulness and behavioral disruption, we propose that such events momentarily disrupt automatic patterns of attention and behavior, increasing individuals' awareness of their surroundings and the needs of others. We aim to assess whether these disruptions can foster prosocial behaviors in an ecological environment, such as offering a seat to a pregnant woman on public transport. By exploring this intersection of mindfulness, novelty, and prosocial behavior, our findings could inform strategies to promote altruistic behaviors in daily life, from public art installations to innovative social campaigns. Based on these considerations, we hypothesized that the presence of an unexpected event (a person dressed as Batman) would increase the likelihood that passengers offer their seat to a pregnant woman, compared to a control condition without Batman.

Methods

Design and setting

The study was conducted in the Milan underground metro system, using a quasi-experimental design with two conditions. In the control condition, a female experimenter, pretending to be pregnant with a prosthetic belly, boarded the metro alongside a non-interacting observer (see Fig. 1). The experimental condition mirrored the control but included an

[1]Department of Psychology, Università Cattolica del Sacro Cuore, Milan, Italy. [2]IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy.
✉e-mail: francesco.pagnini@unicatt.it

Fig. 1 | An example of the experimental setting, with Batman and a woman simulating pregnancy stand in a crowded metro. This image was staged for illustrative purposes and does not reflect the actual distance (~3 m) maintained between the experimenters during observations.

Table 1 | Observation report and interview thematic analysis

	Condition	
	Experimental	Control
Total observations (*N*)	68	70
Prosocial behavior (*N*, %)	41 (60.29%)	29 (41.42%)
Interviewed (*N*, %)	32 (78.05%)	20 (68.96%)
Women (*N*, %)	28 (68.29%)	19 (65.51%)
Age[a] (mean, SD)	40.92 (14.04)	42.35 (17.28)
Importance of recognizing pregnancy	17 (53.12%)	10 (50%)
Social norms, education, or safety	9 (28.12%)	6 (30%)
Other reasons	6 (18.75%)	4 (20%)
Explicitly reported they did NOT see Batman (*N*, %)	14 (43.75%)	

[a]Age values are based on observers' estimates.

additional element: another experimenter dressed as Batman entered the train from a different door approximately three meters away. There was no interaction between the pretend pregnant woman and Batman. For ethical reasons, the full mask (covering the upper face) was omitted to avoid potentially scaring passengers. The costume nevertheless included the characteristic cape, logo, and pointed cowl, making it easily recognizable.

Measures and data collection

Observers used an online form (Qualtrics suite) to record whether one or more seated passengers offered their seat to the ostensibly pregnant woman. When this occurred, the observers conducted a brief follow-up interview with the passenger, asking about their reasons for giving up their seat and, in the experimental condition, whether they had seen Batman.

Both conditions were conducted simultaneously to avoid possible confounds deriving from time and location, with the two research teams positioned in different cars of the metro trains and different areas of the platforms, ensuring they remained out of sight from one another. For an observation to be considered valid, all seats in the wagon had to be occupied, and no more than five people could be standing between the seats. This ensured that passengers had a reasonable chance of noticing both the pregnant woman and Batman. Each observation session lasted one stop (approximately 2–4 min), after which the teams exited the train and repeated the procedure on the next available train.

Sample size and statistical analysis

Given that the main outcome was dichotomous (whether someone offered their seat or not) and assuming a 50% increase in prosocial behavior in the experimental condition, a total of 136 observations would provide a statistical power of 0.9, with an alpha level of 0.05. A logistic regression was performed to assess the effect of Batman's presence on prosocial behavior (i.e., offering a seat). The dependent variable was dichotomous (seat offered: yes/no), and the independent variable was the experimental condition (Batman present vs. control). Model fit and predictive power were evaluated using Nagelkerke's pseudo-R^2 and classification accuracy, and the odds ratio was used to quantify the effect size.

Ethical approval

The study was approved by the UCSC Department of Psychology Ethics Commission (ref. CERPS_33-24). It was prospectively registered on ClinicalTrials.gov (ID: NCT06481748) on July 1, 2024. Given the minimal interaction with participants and the public setting, no consent was required for general observation. However, oral consent was obtained from passengers who were asked about their reasons for offering their seats.

Results

Main findings

We conducted 138 observation sessions (70 control condition, 68 experimental). In the control condition, the chances that a passenger would leave their spot were 37.66%, while when Batman was there, the chances increased to 67.21%. The logistic regression model was statistically significant, $\chi^2(1) = 12.088$, $p < 0.001$, indicating that the presence of Batman significantly influenced the likelihood of prosocial behavior. The model explained 11.2% of the variance in seat offering behavior (Nagelkerke $R^2 = 0.112$) and correctly classified 64.5% of cases. The odds ratio for the Batman condition was Exp(B) = 3.393, ($p < 0.001$).

As shown in Table 1, most of those who offered their seat were women in both conditions (68.29% in the Batman condition; 65.51% in the control condition). The estimated mean age of those who helped was approximately 41 years (SD = 14.04) in the Batman condition and 42 years (SD = 17.28) in the control condition.

Qualitative findings

When inquired about the reason for the prosocial gesture, most of the responses in the two conditions referred to the importance of recognizing pregnancy, with some directly referring to social norms, education, or safety (see Table 1). Interestingly, among those who left their spot in the experimental condition, nobody directly associated their gesture with the presence of Batman, and 14 (43.75%) reported that they did not see Batman at all.

Discussion

The study provides evidence that unexpected events, such as the presence of a person dressed as Batman, can significantly increase prosocial behavior in

real-world settings. Specifically, we found that when Batman was present, passengers were more likely to offer their seat to a seemingly pregnant woman compared to the control condition. Such "Batman effect" supports the hypothesis that disruptions to routine can heighten awareness of one's surroundings and enhance sensitivity to the needs of others, ultimately promoting prosocial actions.

Our findings resemble prior research linking present-moment awareness to increased prosociality; mindfulness may create a context in which individuals become more attuned to social cues. However, this remains a tentative interpretation: evidence on mindfulness-induced prosociality is still emerging—one meta-analysis finds only moderate effects[10], and trait mindfulness seems most impactful when coupled with strong moral identity[11]. Unlike traditional mindfulness interventions that require active engagement, this study highlights how situational disruptions alone may be sufficient to produce similar effects. This suggests a potential mechanism by which novelty and unpredictability foster prosocial behavior, reinforcing theories that link attentional shifts to increased social responsiveness. At the same time, alternative explanations should be considered. For instance, the superhero figure may have increased the salience of cultural values, gender roles, and chivalrous helping norms, in line with research on superhero-related priming. Therefore, a more parsimonious explanation is that the Batman figure served as a prosocial prime. Yet, this explanation, too, should be approached with caution: close replications of social priming effects largely failed to reproduce original findings[12]. More broadly, it is much easier to verify that participants were breaking routine scripts than to establish that they were in a state of mindfulness. This interpretation is consistent with research on the "pique technique," where atypical or unexpected stimuli disrupt automatic responses and increase compliance[13]. More studies are warranted to better understand the mechanisms underlying these effects and to disentangle whether they are driven primarily by attentional shifts, priming, or other contextual processes.

Interestingly, while the data suggest that this perturbation may have a strong effect, a notable percentage of individuals were not consciously aware of the reason behind it. Given that attention is socially influenced (e.g., the phenomenon where people instinctively look toward the same point of interest as those around them), we can hypothesize that the pattern of awareness triggered by a disruption in routine may be socially transmitted, extending beyond its original cause. This may also help account for the subset of participants who reported not noticing Batman but nevertheless offered their seat. A speculative interpretation is that the disruptive effect can operate at an interpersonal level: shifts in attention or prosocial cues triggered in some individuals may spread socially within the group, influencing behavior even among those not directly aware of the initial disruption, consistently with research on the social contagion and interpersonal synchrony of prosocial and emotional behaviors[14].

These findings contribute to discussions on how public spaces and social interventions can be designed to encourage kindness and cooperation. If unexpected yet non-threatening events can increase mindfulness and prosocial behavior, urban planners, policymakers, and psychologists may consider ways to integrate "positive disruptions" into daily life. This could range from artistic or theatrical interventions in public spaces to strategic messaging campaigns designed to momentarily break routine and engage individuals more deeply with their environment and community.

Despite the promising findings, some limitations should be acknowledged. First, while the study was conducted in an ecologically valid setting, it was limited to a specific public transportation system, and cultural or contextual factors may influence the generalizability of the results. Additionally, the experimental manipulation involved positive symbolism (Batman is a superhero), which may have increased the salience of positive values, thereby prompting prosocial behavior, as suggested by past research investigating the effects of superhero-related priming[15,16]. It remains unclear, however, whether the observed effect is unique to Batman or would also emerge with other unexpected figures. Future research should therefore test a range of characters or disruptions, varying in both emotional valence and symbolic meaning, to clarify the boundary conditions of this effect. Future research could explore whether different types of unexpected events, varying in emotional valence, produce similar effects. Controlled laboratory experiments, where these dimensions can be independently manipulated, will be needed to address this issue. A further limitation concerns the demographic data: sex and age were estimated by observers, which introduces the possibility of error. These results should therefore be considered descriptive rather than definitive. Finally, while we measured an overt behavioral outcome (seat offering), future studies could examine whether these effects extend to other forms of prosociality, such as helping behaviors in different contexts or long-term shifts in social awareness.

In conclusion, this study suggests that unexpected events can increase prosocial behavior by momentarily disrupting automatic attention patterns and fostering situational awareness. These findings open new avenues for understanding the environmental and cognitive mechanisms underlying prosociality, and suggest potential applications for promoting kindness and cooperation in everyday settings—extending the "Batman effect" to non-superheroes as well.

Data availability

The data are available from the corresponding author upon reasonable request.

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Author contributions

F.P. designed the study in collaboration with M.B., F.G., C.C., V.P., and G.A.M. Data collection was performed by all authors (F.P., F.G., C.C., V.P., G.A.M., A.M., L.B., and M.B.). F.P. wrote the first draft of the manuscript, which was subsequently revised by M.B., F.G., C.C., V.P., and G.A.M. All authors (F.P., F.G., C.C., V.P., G.A.M., A.M., L.B., and M.B.) read and approved the final version of the manuscript.

Competing interests

The authors declare no competing interests.

Additional information

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Correspondence and requests for materials should be addressed to Francesco Pagnini.