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## Abstract

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Letter to the Editor

To the Editor,

It was with great interest that we read Guglielmucci et al.'s [6] paper ‘Dissociation in Problematic Gaming: a Systematic Review’ in Current Addiction Reports. Their systematic review of empirical studies examined associations between problematic gaming and phenomena considered to be on the continuum between normal and pathological forms of dissociation. Literature with this focus is scarce and we thank the authors for their contribution. However, the purpose of this letter is to discuss the authors’ conceptualisation of our research on Game Transfer Phenomena (GTP) as dissociative phenomena.

… excessive video game use is linked to a variety of dissociative phenomena (e.g. depersonalisation experiences, escapism, psychotic-like experiences, game transfer phenomena) (p.1).

Guglielmucci et al.’s conceptualization of our research on GTP was too simplistic. Game Transfer Phenomena are both more detailed and more nuanced. GTP are involuntary phenomena that comprise sensory, perceptual, cognitive, and self-agency transient changes or intrusions in direct relationship to (i) videogame content/features, (ii) subjective phenomena experienced while playing (e.g. immersion, embodiment, telepresence), and (iii) game-related hardware or peripherals [9]. Specific manifestations include perceptual distortions (distortions of objects, environments, sounds, body, or time), pseudo-hallucinations (e.g. images overlaying game-related objects or sounds coming from objects associated with the game), imagery (e.g. imagining game elements), sensations of unreality and disembodiment (e.g. out-of-body-like sensations and feelings), automatic mental processes (e.g. source monitoring errors, attentional bias), and involuntary actions/behaviours [11]. GTP connote the interplay of physiological, perceptual, and cognitive mechanisms and happen suddenly and outside the gamers’ control [18], although some gamers claim to be capable of controlling their GTP visualisations after a while [13].

The inclusion of GTP as dissociative phenomena by Guglielmucci et al. [6] raises interesting questions regarding the nature of GTP. For instance, should GTP be considered dissociative in the continuum from episodic intrusions with game content (e.g. images, sounds, thoughts, urges, impulses) that can awaken feelings and sensations of unreality, to engrossment in mental actions (e.g. replays of the game) or multisensory sensations and automatic actions toward game-related stimuli that lead to absent-mindedness? Based on the broad and rather general definition of dissociative disorders according to DSM-5 [1] used by Guglielmucci et al., to describe ‘dissociations’, the intrusive nature of GTP could be arguably be considered ‘dissociative’:

Dissociative disorders are characterised by “disruption of and/or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behaviour” ([1], p. 291).

We acknowledge there are phenomenological similarities between GTP and diagnostic features of dissociative disorders. However, we advise caution in generalisations which may lead to overestimating the impact of GTP on gamers’...
lives at this early stage in the study of GTP. This is because independently, the form of dissociation (normative or pathological) involves absentmindedness and implies different degrees concerning the sense of experimental disconnectedness with the self and with the environment [3].

Initial observations suggest there are associations between failures in cognitive control (e.g. sustained attention failures), inhibitory control game failures, and GTP [15, 17]. Mix-ups and confusion between game elements and physical stimuli that often resemble game content have also been observed [10, 12]. However, suspension of reality and/or self-consciousness only occur in some forms of GTP and in specific circumstances. Not all forms of GTP involve absentmindedness or appear to disrupt ongoing behaviour. Still, since intrusions with game content (e.g. hearing music from the game) are products of ‘a living game experience’ and are usually associated with events in the game, every intrusion can potentially awaken memories, feelings, false expectations, urges, impulses, and (in more extreme cases) sensations to be in the game. The degree to which game intrusions and changes in perception can be disruptive and lead to actions without awareness requires further empirical investigation.

Another significant aspect of many forms of GTP is the presence of game-related stimuli as a trigger to subsequent behaviour. Consequently, GTP that occur in fully awake states when not playing the game manifest in parallel or as complementary to ongoing thoughts and behaviours and do not result in zoning out. For example, experiencing an inner voice of a command from within a videogame (e.g. ‘Go, Go, Go’, a voice command from the game Team Fortress) while wanting individuals to move faster as they board a subway train [14]. However, we acknowledge that attentional bias and hyperfocus toward game-related stimuli or memories/feelings from a videogame may come at a cost and potentially lead to absentmindedness. Moreover, GTP is not the result of volitional acts of avoiding reality as escapism; GTP can occur suddenly as a homeostatic mechanism when social situations provoke anxiety, as well as by sleep deprivation and arousal [12, 13].

When examining dissociation in GTP, some forms of GTP are dissociative per se and dissociative instances have been identified in gamers’ self-reports [12–15] and when using the GTP scale [21]. We agree with Guglielmucci et al. that the forms of GTP they included in their paper involved dissociative phenomena or were intimately related because they involved altered body perceptions, including altered perception of time:

sensations of derealisation and depersonalisation triggered by external cues associated with the video game”, “mind disconnected from the body”, “feeling the body as different after playing a video game”, “feeling body movement after playing”, “feeling tactile sensations ([6], p. 8).

However, some of the altered perceptions provoked by the virtual immersion identified in previous GTP studies are highly prevalent and it appears problematic to classify them as dissociative rather than as simple neural adaptative phenomena, even though some of them are intrinsically related to dissociative phenomena such as vestibular adaptations to autoscopy [2, 18]. An example of this is “feeling body movement after playing” (i.e. whole body self-motion such as feeling the illusion of movement from the game) [18], which is one of the most common body-related phenomena reported (47–51%) among studies with general games [4, 17]. This mainly happens when trying to fall asleep and appears to be explained by vestibular neural adaptations similar to the Mal-de debarquement syndrome [8]. Another example of altered perceptions frequently reported in GTP studies is when objects are perceived as levitating or expanding, which typically happens after gamers look away from the screen when playing dance/music games [12]. This appears to be explained by motion aftereffects of a waterfall type [5, 18]. Moreover, it is well-known that immersion in virtual reality (VR) when individuals are wearing VR headsets is capable of overriding top-down knowledge with bottom-up perceptual mechanisms giving rise to illusions of transfer of body ownership [24]. Even acute dissociative symptomatology can be induced via VR immersion [25].

A broader examination of GTP by Ortiz de Gortari and Larøi [19] includes additional and redefined items that assess altered body-related phenomena and relate dissociative phenomena: (i) out of body/autoscopy (i.e. perceiving the self in third-person perspective as in a videogame), (ii) derealisation, (iii) depersonalisation, (iv) stupor-like phenomena (i.e. remaining immobile, unable to articulate words or being verbally unresponsive due to being stuck in the mindset of a videogame), (v) sensation of ownership of virtual limbs, (vi) perceiving changes in the characteristics of one’s own body (e.g. sizes, heaviness), (vii) involuntary movements of limbs (toward a game-related stimuli or jerk or twitch), and (viii) mimicking game characters (e.g. postures, gestures). Consequently, a classification of dissociations manifesting in GTP is as follows:

- Sensory/perceptual neural adaptations and other physical aftereffects (e.g. visual distortions, loss of visual acuity, uncoordinated movements, vertigo) most probably heightened by prolonged gaming sessions and mental fatigue, interpreted as still being in the game or being the game character usually soon after playing.

I was playing … about four hours straight. When I stood up, I had a massive head rush. I thought I was a Jedi in a cave for about five seconds. I was worried that the giant
fun for a while but then I think can lead to episodes of absentmindedness. Wakefulness and sleep (i.e. hypnagogia) but also during prolonged duration when they close their eyes and feel like they are replaying the game (i.e. closed-eye hallucinations, sometimes even accompanied with sound). This tends to occur not only in the liminal state between wakefulness and sleep (i.e. hypnagogia) but also during periods of wakefulness (i.e. parahypnagogia) [7], which can lead to episodes of absentmindedness.

After days of playing … I was at the gas station. There were two cars by each other, and I thought there would be enough room to squeeze through. I got all the way up to the cars and then realized that this was real life ([15], p. 444).

In their study, [17] found that a high prevalence of gamers experienced GTP at some point. This might be consistent with the video-terminal dissociative trance hypothesis, which predicts that an alteration of mental and behavioural functioning may occur in the individual at extreme levels of absorption into the game, due to an alteration in cognitive and affective processing of information linked to the excessive gaming and a consequent translation of gaming experience to real life (p. 10). Our research has showed that there is a significant relationship between GTP, immersion, and playing to escape from the real world [10, 16]. More specifically, engaging in activities that involve focusing the attention on specific game elements by exploring and customising appear to be relevant for GTP [16]. Regarding problematic and excessive playing, GTP is correlated with fulfilment of gaming disorder criteria [19]. Frequency of playing and session length predicts severe GTP (i.e. experiencing GTP many times and/or experiencing two or more types of GTP) [20]. However, gaming habits are not always consistent because most gamers experience mild levels of GTP [19, 20]. For instance, session length in different dimensions of GTP only shows significant differences in altered body perceptions and behaviours (e.g. verbal outbursts, involuntary movement of limbs), but not visual perceptions, auditory perceptions, or thought-related experiences.

In summary, a more in-depth understanding is needed concerning the relationship between dissociations in videogame playing and problematic gaming. This can only emerge from research that examines underlying mechanisms (e.g. physiological, behavioural) involved in dissociative trance-like states (during playing) and dissociations manifesting after playing, instead of only focusing on the relationship between dissociative disorders/traits and gaming and problematic gaming. It is important to bear in mind that GTP is almost ubiquitous among gamers (81–97%; N > 6000; 15–60 years old) (Dindar & [10, 17, 19]). GTP are mostly appraised as positive by gamers [17]. Most gamers who report
GTP do not have any mental disorder nor were they under the influence of psychoactive substances when they experienced GTP [10, 16]. The most common forms of GTP do not appear to affect ongoing behaviours or lead to sensation of unreality of self and body [11]. However, when GTP become severe (i.e. several forms and frequently), 58% reported distress and/or dysfunction in one study [20]. The impact of GTP appears to be related to how sensory/perceptual changes or intrusions are interpreted and appraised, what subsequent behaviour they lead to, and under what circumstances they manifest. Since most GTP manifest in diurnal contexts, it is crucial to evaluate when GTP can genuinely affect normal functioning (e.g. disrupt task performance, and in extreme cases, lead to potential accidents) and psychological health (e.g. from awkward moments to questioning self-identity and mental stability).

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