



Internet addiction disorder and problematic use of Google Glass™ in patient treated at a residential substance abuse treatment program ☆,☆☆



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HIGHLIGHTS

- This is the first reported case of internet addiction disorder involving the problematic use of Google Glass™.
- Excessive and problematic uses of Google Glass™ are associated with involuntary movements to the temple area and short-term memory problems.
- Frustration and irritability are related to withdrawing from excessive use of Google Glass™ in our patient.

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ABSTRACT

Introduction: Internet addiction disorder (IAD) is characterized by the problematic use of online video games, computer use, and mobile handheld devices. While not officially a clinical diagnosis according to the most recent version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), individuals with IAD manifest severe emotional, social, and mental dysfunction in multiple areas of daily activities due to their problematic use of technology and the internet.

Method: We report a 31 year-old man who exhibited problematic use of Google Glass™. The patient has a history of a mood disorder most consistent with a substance induced hypomania overlaying a depressive disorder, anxiety disorder with characteristics of social phobia and obsessive compulsive disorder, and severe alcohol and tobacco use disorders.

Results: During his residential treatment program at the Navy's Substance Abuse and Recovery Program (SARP) for alcohol use disorder, it was noted that the patient exhibited significant frustration and irritability related to not being able to use his Google Glass™. The patient exhibited a notable, nearly involuntary movement of the right hand up to his temple area and tapping it with his forefinger. He reported that if he had been prevented from wearing the device while at work, he would become extremely irritable and argumentative.

Conclusions: Over the course of his 35-day residential treatment, the patient noted a reduction in irritability, reduction in motor movements to his temple to turn on the device, and improvements in his short-term memory and clarity of thought processes. He continued to intermittently experience dreams as if looking through the device. To our knowledge, this is the first reported case of IAD involving problematic use of Google Glass™.

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1. Background

Process addictions, such as problematic gambling, pathological video gaming, and internet addiction disorder (IAD), can manifest as severe emotional, social, and mental dysfunction in multiple areas of daily activities (Fu, Chan, Wong, & Yip, 2010; Tao et al., 2010). Similar to substance abuse, IAD can be associated with severe physiological problems and emotional dependence (Kuss, 2013). Individuals with IAD share behavioral similarities with patients struggling with substance abuse, exhibiting psychological triggers, cravings, and addiction-seeking behaviors. It is not uncommon for addictive behaviors to be co-occurring

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(Pettinati et al., 2008), and patients with IAD can possess comorbid, underlying neuropsychiatric disorders (Ko, Yen, Yen, Chen, & Chen, 2012; Spada, 2014). Similarly, substance addictions can co-occur with mental disorders (Osher & Drake, 1996). Currently, IAD is not recognized as an official medical disorder as of the most recent version of the DSM-5; however, the editor of the *American Journal of Psychiatry* has acknowledged that IAD did warrant inclusion in the DSM-5 (DSM-5, 2013).

Google Glass™ was named as one of the best inventions of the year by Time Magazine in 2012 (Staff, 2012). The device is a wearable mobile computing device with Bluetooth connectivity to internet-ready devices. Google Glass™ has an optical head-mounted display, resembling eyeglasses; it displays information in a Smartphone-like, but hands-free format that is controlled via voice commands and touch (Albanesius, 2012). The potential medical dangers of head-mounted displays have been documented, which include decreased awareness of physical surroundings, visual interference, binocular rivalry with latent misalignment of eyes and headaches (Patterson, Winterbottom, & Pierce, 2006). However, there is no literature available on how heads-up displays may rewire neural pathways affecting memory, motor skills, addictive tendencies, and other neurosensory pathways. This case report concerns a patient who presented to a 35-day substance use disorder program for treatment of alcohol use disorder in a U.S. Navy's Substance Addiction Recovery Program (SARP), who was found to be wearing Google Glass™ up to 18 h per day. The patient presented to treatment with post-acute withdrawal symptoms, initially thought to be solely from alcohol symptoms. This particular patient is the first documented case illustrating potential associations between substance use disorders and IAD involving a novel mobile computing device, Google Glass™.

2. Case description

Patient is a 31-year-old male enlisted service member with a history of a mood disorder, most consistent with a substance-induced hypomania overlaying a depressive disorder, anxiety disorder with characteristics of social phobia, obsessive–compulsive disorder, and severe alcohol and tobacco use disorders. He was referred to the residential substance use treatment at SARP due to resumption of drinking alcohol in September 2013. He had previously completed an eight-week intensive outpatient substance use treatment in July 2013.

During his heaviest period of alcohol use, the patient drank six beers daily. He was unable to limit or control his drinking once he had started. He endorsed tolerance to the effects of alcohol. He recognized that this alcohol use was causing significant mood and interpersonal problems, and he reported experiencing withdrawals from alcohol. His last drink of alcohol was approximately two weeks prior to admission to the residential treatment program. The patient had been deployed to Afghanistan for seven months but was not exposed to combat and did not endorse post-traumatic stress disorder (PTSD) or other trauma related disorder symptoms. Upon admission to the residential program, his mood and anxiety symptoms appeared to be in good control with his current medication regiment consisting of duloxetine 60 mg PO daily, amitriptyline 30 mg PO every night, and gabapentin 300 mg PO three times daily.

The patient had been wearing the Google Glass™ device each day for up to 18 h for two months prior to admission, removing the device during sleep and bathing. He was given permission by his superiors to use the device at work, as the device allowed him to function at a high level by accessing detailed and complicated information quickly. The patient shared that he was able to take photos of convoy vehicles and tag those photos with identifying numbers and equipment lists related to each vehicle. Additionally, the patient shared that the Google Glass™ increased his confidence with social situations, as the device frequently became an initial topic of discussion.

All electronic devices and mobile computing devices are customarily removed from patients during substance rehabilitation treatment. The patient noted significant frustration and irritability related to not being able to use the device during treatment. He stated, “The

withdrawal from this is much worse than the withdrawal I went through from alcohol.” He noted that when he dreamed during his residential treatment, he envisioned the dream through the device. He would experience the dream through a small gray window, which was consistent with what he saw when wearing the device while awake. He reported that if he had been prevented from wearing the device while at work, he would become extremely irritable and argumentative. When asked questions by the examiner, the patient was noted on exam to reach his right hand up to his temple area and tap it with his forefinger. He explained that this felt almost involuntary, in that it was the familiar motion he would make in order to turn on the device in order to access information and answer questions. He found that he almost “craved” using the device, especially when trying to recall information. His eye contact was averted on the admission exam. Also, it appeared that his immediate recall was impaired frequently on the admission exam. He would lose his train of thought but he would remember with verbal cuing by the examiner. His short term and long term memory appeared grossly normal on exam. His affect appeared very restricted. He displayed no unusual thought content.

Over the course of his 35-day residential treatment, the patient noted a reduction in irritability, as well as a reduction in the desire and motor action of moving his hand up to his temple to turn on the device. Moreover, the patient exhibited an improvement in his short-term memory and clarity of thought processes. He continued to intermittently experience his dreams as if looking through the device. He continued to have a strong desire to use the device upon discharge from the treatment program. On exam, his eye contact improved significantly, his affect became more expressive and consistent with his stated-euthymic mood, and he no longer displayed difficulties with immediate recall. He was motivated to continue alcohol sobriety work, primarily via a 12-step program, and he was hopeful regarding his future.

3. Conclusions

Problematic use of technology and IAD are growing concerns globally with estimates of 1% of the general population and as much as 4% of youths exhibiting dysfunction with daily activities associated with technology and internet use (Rumpf et al., 2013). Our patient, to our knowledge, is the first documented case illustrating an association between substance use disorders and IAD involving a novel mobile computing device, Google Glass™. Excessive use of the Google Glass™ resulted in the patient exhibiting significant physical symptoms, repetitive motor movements, cognitive dysfunction, invasive imagery during sleep, and craving.

The patient's symptoms of irritability and difficulty with immediate recall short-term memory, as well as signs of averted eye contact and restricted affect may be explained by a combination of the effects of his severe alcohol use disorder and his underlying psychiatric issues, but may also be complicated by daily and extensive use of and subsequent withdrawal from Google Glass™ prior to treatment. The patient shared that he had strong desire and craving to use the device, which specifically manifested as a motor abnormality consisting of reaching up to turn on the device when he was not wearing the device.

The patient's experiences of viewing his dreams through the device appear to be best explained solely by his heavy use of the device and may be consistent with what is referred to as the “Tetris Effect”. When individuals play the game *Tetris* for long periods of time, they report seeing invasive imagery of the game in their sleep (Stickgold, Malia, Maguire, Roddenberry, & O'Connor, 2000). Interestingly, Stickgold et al. noted that patients with amnesia due to traumatic brain injury, who had trouble with short-term memory recall, reported invasive imagery of the game during sleep even though they did not recall playing the game (Stickgold et al., 2000). Technology-assisted learning devices and video gaming appear to be powerful methods to aid in the acquisition of new information. Further studies in the field of traumatic brain injury utilizing gaming and technology-assisted learning are needed.

The patient's use of the Google Glass™ helped increase his memory recall and confidence at work. However, with excessive use, he seemed to express a significant dependence on the device to function in daily routines and for tasks at work. Without the device, it appeared that he was less confident and exhibited significant craving similar to patients desiring their substance of abuse. Individuals consume alcohol for social motivations, as a coping modality, and for enhancement motives (Oliver, McGuffey, Westrick, Jungnickel, & Correia, 2014). Similarly, problematic use of technology, and in our case Google Glass™, may be driven by similar motives for social motivations, as a coping modality to escape personal deficiencies, and for a desire to improve personal performance. In our patient, he exhibited all of these characteristics.

As technology changes quickly, so will our utilization of new devices. Research is lacking on the neurological rewiring, mental ramifications, and physiological dependence that can develop with excessive technology and internet utilization, including long-term consequences and whether young children will be affected more severely. If the motives for using technology share similarities with motivations for alcohol and other psychoactive substance consumption, then the medical community should approach research in IAD with these ideas in mind. Technology has numerous benefits to individuals and to society. However, excessive utilization of any substance, behavior, and technological device will be associated with physiological and emotional dysfunction, as observed in our patient with problematic use of Google Glass™. Furthermore, it is important to note that IAD can be co-occurring with other addictive behaviors and substance addictions and that therapy should include associated disorders as well as the primary diagnostic focus. This case report illustrates the importance for mental health providers to be aware of IAD associated with new advancements in mobile computing devices in order to provide adequate counseling, education, and clinical support for patients.

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Contributors

The authors of this manuscript declare their individual contributions to the manuscript. All authors materially participated in the research and/or the manuscript preparation. All authors have approved the final manuscript.

Conflict of interest

The authors have nothing to disclose.

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