

# Violent Video Games in Forensic Psychiatric Hospitals

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Popular media and the lay public have long expressed concerns about the association between violent video games and violent behavior. The current scientific literature exploring this connection focuses primarily on the relationship between violent video games and aggression in healthy populations. We are unaware of prior publications exploring the effect of such games on aggression in institutional settings or with forensic populations. Here we examine whether state psychiatric institutions, particularly forensic hospitals, have set policies to govern the use of violent video games for patients under their care. We present data from a national survey of such institutions in the United States, with some anecdotal international data included. The results demonstrate that hospital policies, when they exist, are inconsistent in their approaches to the use of violent video games. We argue that hospitals should devise policies that acknowledge the limited evidence in this area and that optimally balance the relevant stakeholders' interests. We propose guiding principles that balance these competing interests for institutions to consider when developing such policies. Finally, we advocate for further research regarding the safety and potential therapeutic effects of video games in forensic settings so that an evidence-based approach can be initiated future.

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Commentators have long expressed concerns about the association between violent video games (VVGs)

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and violence. Game franchises such as *Mortal Kombat*, with its graphic depictions of dismemberment and killing, and *Grand Theft Auto*, which enables players to engage in antisocial behavior in realistic virtual environments, have provoked public outcries.<sup>1</sup> Days after the school shooting in Parkland, Florida, President Trump observed, "I'm hearing more and more people say the level of violence on video games is really shaping young people's thoughts."<sup>2</sup> Mr. Trump had made similar comments previously in 2012 following a school shooting in Newtown, Connecticut: "Video game violence and glorification must be stopped—it is creating monsters!"<sup>2</sup> Such concerns about VVGs were again raised following the mass shootings in Dayton, Ohio, and El Paso, Texas, in 2019.<sup>3</sup>

Despite these concerns, the video game industry has grown significantly in the last three decades, with global sales comparable to those of books, music, and film in 2013<sup>4</sup> and worldwide sales outpacing all other forms of entertainment media in 2018.<sup>5</sup> The proper

constraints on VVGs for general public consumption remain a subject of ongoing debate. The scholarly literature partly supports the lay perception that VVGs may contribute to violent behavior but remains far from definitive. Some studies show an association between VVGs and violence (or, at least, aggression) and propose neuropsychological mechanisms.<sup>6-9</sup> Others do not find such an association and highlight the limitations of existing research paradigms.<sup>10-15</sup> This conflict is further detailed in the literature review below. Further, various researchers define in-game violence and resultant cognitive or behavioral measures of violence differently, with research consensus recommending that the ratings of the Entertainment Software Rating Board (ESRB) offer an acceptable approximation of in-game violence for the purpose of literature review.<sup>16</sup> Here the authors have followed this precedent and defined VVG as games rated as M (i.e., Mature 17+) by the ESRB, which include games that “may contain intense violence, blood and gore, sexual content, and/or strong language.”<sup>17</sup>

Certain populations may warrant special attention, for example, forensic psychiatric patients or others who have been found to exhibit an increased risk of violent behavior. Although experts dispute the nature and extent of the relationship between VVGs and violence, it is plausible that individuals at high risk for violence or who have a history of violence may be particularly vulnerable to the potential adverse effects of exposure to VVGs. At first glance, restricting such persons from playing VVGs seems appropriate; one can easily imagine harmful rather than beneficial effects of allowing someone who previously committed serious violent acts to commit additional simulated violent acts. On the other hand, patients’ rights advocates argue that individuals with mental illness should be afforded the same opportunities as others, including leisure activities and access to popular mass media such as VVGs.

The current scientific literature focuses primarily on the relationship between VVG and aggression in healthy populations, usually volunteers who are studied in laboratory settings. The authors are unaware of prior published work exploring the effect of VVGs on aggression or violence in institutional settings or with forensic populations. Given the public attention and policy debates VVGs have sparked, the authors examined whether state mental health institutions or forensic psychiatric hospitals have set policies to govern the use of VVGs for patients under their care.

This article presents data from a national survey of such institutions in the United States, with some anecdotal data drawn from international institutions as well. The results demonstrate that hospital policies, when they exist at all, are inconsistent in their respective approaches to the use of VVGs in long-term inpatient units. We argue that hospitals should devise policies that acknowledge the limited evidence base in this area and that optimally balance the relevant involved parties’ interests. The authors conclude by providing guiding principles for institutions seeking to develop such policies to consider.

### Literature Review

Despite decades of research, the association between exposure to VVGs and commission of violent acts remains contentious, with numerous studies yielding conflicting results.<sup>18</sup> A growing body of evidence appears to support a connection between VVGs and increased risk for aggressive cognitions, affect, and behavior; however, an outspoken minority of researchers has challenged this research and points to multiple studies that have refuted such a link. Strong moralistic objections to VVGs from advocacy groups and politicians further complicate the question and have been criticized as amounting to a moral panic, given the mixed evidence.<sup>19</sup>

### Putative Connection between VVGs and Behavior

Bushman and Anderson<sup>20</sup> developed the general aggression model to explain a possible association between aggression and VVG playing. This model predicts that situational factors trigger innate character traits that affect a person’s propensity for aggression, and that repeated VVG playing leads to reinforcement of aggression through learned schemas and scripts promoted through the game. The general aggression model suggests that when individuals repeatedly act violently in a virtual environment, their aggressive cognitions and affect, as well as physiological arousal, are heightened and reinforced, increasing the likelihood of aggressive behavior in real life. Studies relying on the general aggression model use a variety of research paradigms to assess aggressive behaviors. For example, some studies expose subjects to VVGs and measure the degree to which they administer a noise blast or hot sauce to a study confederate (i.e., an actor who participates in a psychological experiment pretending to be a subject but who

actually works for the researcher).<sup>20,21</sup> In addition, word-fill tasks, in which some of the letters of a word are replaced with blank spaces and the subject's task is to fill in the blanks, are often used to assess for aggressive cognitions.<sup>22,23</sup> Some authors observe that these laboratory surrogates for aggression are unstandardized and question their validity.<sup>21</sup>

In addition to the general aggression model, researchers have proposed alternative mechanisms by which aggression increases after VVG exposure. Subjects exposed to VVGs reportedly display increased dehumanization toward out-groups, and this effect appears to mediate aggressive outcomes; additionally, exposure to VVGs appears to make perceptions of everyday aggression (e.g., pushing others) appear more benign.<sup>24,25</sup> VVGs also frequently employ elements of moral disengagement, such as justification of violence, distortions of consequences, and euphemistic labeling, which can influence players.<sup>26,27</sup> For example, adolescents with recent exposure to *Grand Theft Auto IV* demonstrated increased moral disengagement, as indicated by increased scores on tests of diffusion of responsibility, justification of immoral conduct, and distortion of consequences.<sup>28</sup> Although the vast majority of studies examine an adolescent or adult population, similar results have been reported in younger subjects. One study reported that children exhibited more hurtful behaviors and fewer helpful behaviors after playing violent versus prosocial video games.<sup>29</sup> Further, data suggest that the interactive nature of VVGs gives them greater potency than other types of violent media, such as movies and television shows.<sup>30</sup>

There is a substantive body of literature supporting such a link. Anderson and colleagues<sup>6-8</sup> have been an influential voice in promoting the link between violent game playing and aggression, relying on the results of three meta-analyses that found a significant effect. Though Hilgard *et al.*<sup>31</sup> questioned Anderson's methodology, Greitemeyer and Mügge replicated these findings in another meta-analysis.<sup>9</sup> A meta-analysis by Prescott *et al.*<sup>32</sup> examined prospective studies that used acts of physical or verbal aggression as measures of violence instead of psychometric scales, reporting a positive correlation between VVG use and aggression. There was no significant evidence of publication bias via multiple analyses, and the authors concluded that inclusion of covariates (i.e., confounders) had only minor impacts on the effect sizes.<sup>32</sup>

The American Psychological Association issued a position statement in 2017 on the subject based upon a systematic evidentiary review of the literature, including four meta-analyses prior to 2009 and 31 published studies meeting review inclusion criteria since 2009.<sup>33</sup> The task force affirmed the link between VVGs and aggressive outcomes, including increased aggressive cognition, affect, behavior, and physiological arousal, as well as decreased empathy. The review concluded, however, that the evidence was not sufficiently compelling to suggest a connection between playing VVGs and criminal behavior, delinquency, or other violent outcomes. This assertion is further supported by studies by Markey *et al.*<sup>34</sup> and Cunningham *et al.*,<sup>35</sup> who reported no increase in such behavior following VVG exposure and noted that the evidence may even suggest a decrease in such behavior following VVG exposure.

A number of methodological limitations have been identified in studies that have reported an association between VVGs and aggression. Ferguson<sup>19</sup> argues that laboratory measures of aggression are invalid because confounding variables are not accounted for adequately (e.g., exposure to family violence, innate aggression), effect sizes are small, and publication bias prejudices against null studies. Several other studies, including two meta-analyses, failed to find evidence of the effect of VVGs on aggression, particularly future aggression in youth.<sup>10-14,36</sup>

Another criticism is that the studies supporting a link between VVGs and aggression often assess subjects immediately after exposure and after only a brief duration of play (on the order of 15–20 minutes), which suggests that researchers may be revealing a transient phenomenon. A recent randomized controlled trial assigned subjects to play either the VVG *Grand Theft Auto V* or the prosocial video game *The Sims 3* for a total of eight weeks.<sup>37</sup> The participants were administered a battery of psychological tests directly after the eight-week exposure period and again two months later. There were no measurable differences in affect, behavior, or cognitions between the two groups.<sup>37</sup>

Although proponents of the connection between VVGs and aggression frequently cite desensitization to violence as a plausible mechanism,<sup>38</sup> studies have failed to find markers of neural desensitization on functional magnetic resonance imaging in VVG users.<sup>39,40</sup> From an epidemiologic perspective, national rates of violence, including youth violence, decreased

over the same time period that sales of video games increased dramatically.<sup>41</sup> Active-shooter incidents in the United States increased from 2000 to 2013, but they were statistically rare events that accounted for a small fraction of total homicides.<sup>42</sup> Interest in the effects of VVGs frequently surges after active-shooter or mass-shooting incidents where the perpetrator is known to have played such games. It is not clear, however, even if VVGs temporarily increase aggressive cognitions, that this could induce someone to commit an act of extreme violence (e.g., a mass shooting), a point that is reflected in the American Psychological Association's policy statement.<sup>33</sup> This point is further illustrated by equal or greater levels of such video game exposure in other countries without the corresponding increases in mass-shooting incidents, which suggests that other factors contribute to this phenomenon in the United States.<sup>5,43-45</sup>

### Video Game Use and Psychiatric Disorders

A small evidence base, primarily in the occupational therapy literature, describes the general use of video games by people with mental illness. For example, Di Bona and Boyle<sup>46</sup> surveyed a group of 19 individuals with psychiatric disorders and noted that computer or video games were the second most common leisure activity, and that respondents identified video games as a way to relax and pass the time. There is also some evidence to suggest that video games may help promote coping strategies and enhance social interaction for individuals with psychotic disorders.<sup>47,48</sup>

Research on the impact of VVGs on persons with psychiatric disorders is limited. Correlations between increased VVG use and increased depression and bullying have been described.<sup>49,50</sup> Our 2019 literature search exploring multiple databases (e.g., PubMed, Ovid, CINAHL, PsycInfo, Google Scholar) for all years utilizing various search terms (e.g., video games, VVGs, psychiatry, psychology, mental illness, forensic psychiatry, forensic hospital, state hospital) yielded no empirical studies assessing the impact of VVG use on individuals with serious mental illness. Thus, this area remains poorly understood.

### Video Game Use in Forensic Treatment Settings

The literature describing the use of video games by forensic patients is even more limited than that in general psychiatry. Gooch and Living<sup>51</sup> reviewed the occupational therapy literature on the therapeutic use of video games in secure forensic settings, reporting the results of

several relevant studies. Badger *et al.* noted that the age and gender demographics of forensic patients (i.e., approximately 30 years old with a male to female ratio of 4:1) are similar to that of typical video game users, suggesting that video games may be a leisure activity of interest to this group.<sup>52</sup> Bryce highlighted that video game consoles can be regarded as a tool for accessing normal and contemporary leisure spaces, providing individuals with a sense of group identity and cultural value.<sup>53</sup> In addition, Taylor remarked that the ability to explore virtual environments through video games may be therapeutic for those who do not have the opportunity to explore their physical environment.<sup>54</sup> Gooch and Living suggested that video game play may be a useful form of graded introduction to the use of technology and may increase feelings of self-efficacy and self-esteem through exploration of virtual environments.<sup>50</sup>

Gooch and Living also reviewed two empirical papers on this topic.<sup>50</sup> They described a small 1985 study of 12 male residents in a maximum-security facility, which reported that individual biofeedback training and video game play were equally effective at improving locus of control and self-concept.<sup>55</sup> They also identified a 1986 paper describing the use of computer adventure games for social skills training for individuals with chronic schizophrenia at a state hospital, noting that cooperative participation in computer games with staff led to a more natural interaction between staff and patients.<sup>56</sup> Gooch and Living suggested that future research might explore both the quantitative and qualitative impact of video game use on forensic inpatients. Gooch and Living claimed that the use of VVGs by forensic patients remains problematic and was not explored by these prior reports in the 1980s, likely because such graphically violent games were not yet technologically available. The authors suggested that prohibiting patients with a history of violence from playing games that depict graphic and realistic violence made logical sense, given the literature describing a possible connection between VVG use and short-term negative effects in healthy populations.<sup>51</sup>

## National Policy Review

### Methods

To better understand national practices concerning video game use by hospitalized forensic patients, in

**Table 1** State/Forensic Hospital Facilities Video Game Policies and Practices

	States	Notes
Video games are not permitted	Alabama Georgia Hawaii Idaho Mississippi New Mexico ( <i>n</i> = 6/19; 32%)	
No video game policy, but video game use by patients is permitted	Alaska Indiana Montana Ohio Oklahoma Oregon South Dakota Tennessee ( <i>n</i> = 8/19; 42%)	Alaska: Some games are available for use during certain times of the day. Games are reviewed by staff prior to use on unit. Games of a “graphic nature” are prohibited. Indiana, Oregon: Gaming systems are all offline (no Internet connection). Montana: Some patients have personal video game players. Gaming systems are all offline (no Internet connection). Ohio: Maximum-security facility has video games available in “honor room,” which is accessible to patients who demonstrate behavioral control. Gaming systems are off-line (no Internet connection). Staff monitor video game use by patients. Hospital is currently investigating development of a policy focused on the use of games with violent content by patients. Oklahoma: Patients may use games with Internet connection. Video game use is monitored by staff. South Dakota: Access to games is limited, and selection of games is monitored by staff. Tennessee: Video game use is on computers and only without Internet access.
Policy is in place governing video game use by patients	Arizona California Minnesota Missouri Virginia ( <i>n</i> = 5/19; 26%)	Arizona: Use is monitored/managed by nursing staff. Missouri: Video game consoles are available for patient use under supervision and without Internet access. Video games cannot be used during treatment groups or milieu activities. Virginia: Each facility in the state can choose whether to allow access. Facilities that permit video game use only allow them to be used without Internet access. Facilities that permit video game use require staff supervision during video game use.

February 2018, the authors queried the National Association of State Mental Health Program Directors (NASMHPD) Forensic Division listserv, which is a group representing forensic mental health leadership from all 50 U.S. states. A survey conducted in 2009 among NASMHPD Forensic Division members inquired about states’ policies governing forensic patients’ access to communication devices. The query we submitted asked whether there had been any updates or changes to this policy since 2009. The query also asked whether each state’s forensic hospital(s) allowed video game use by patients, whether they had an existing policy on patients’ use of video games or other electronic media, and, if they had such a policy, whether they would be willing to share the details of the policy. In addition, five international forensic institutions with readily identifiable representatives (via Internet search) were queried in a similar manner.

**Results**

Nineteen of 50 states responded to the authors’ inquiry (38% response rate; see Table 1). Of the

19 responding states, 14 had no formal policy governing the use of video games (74%), but eight of those states permitted patients to play video games, whereas the other six did not. The remaining five states had a specific written policy that allowed video game use by patients (26%).

For the eight states that allowed video game use without a formal policy, all reported that video game use is monitored or restricted. Five states reported that video games must be offline (i.e., without Internet access). Furthermore, patients in these five states are only allowed access to games under staff supervision; in certain states, they are only allowed access to a select set of preapproved games. Only one state explicitly prohibited the use of video games with violent content, although the use of nonviolent video games was permitted. One state reported that allowing patients access to video games was under active consideration by hospital leadership, though it was not permitted at the time of the survey.

Of the five states with an official policy permitting video game use, two states explicitly permitted video

game use only under staff supervision. One state's policy stipulated that each facility within the state could determine whether personal entertainment systems, including video game consoles, would be made available to patients and that, if they were made available, the facility would be required to enact a formal policy for the institution. California and Minnesota reported having an official policy permitting video game use, but further details regarding the policies were not provided.

The five international institutions representing four countries (i.e., Australia, Germany, Greece, and Sweden) provided supplementary information about their facilities' video game use policies and practices. None of these institutions had formal policies regarding video game use at their facilities; four of the five facilities did allow forensic inpatients to play video games, although no additional information was provided regarding the institutions' access, monitoring, and supervision practices.

### Discussion

The literature describing the connection between VVG use and violent behavior is complex and contradictory. Consensus statements from large academic bodies acknowledge that playing VVGs can increase aggressive cognitions and behaviors based on aggregate data, yet many studies have not found such an effect, and the real-life ramifications of transient increases on psychometric measures of aggression are unclear. Currently, there is insufficient evidence to support the popular idea that excessive use of VVGs can cause an otherwise peaceable person to commit an act of extreme violence.

Given this sparse and conflicting evidence, forensic psychiatric hospitals have a particularly challenging task when trying to decide whether to restrict access to video games. Patients in such settings often have a significant history of violence, which may conceivably increase their risk of acting violently in response to simulated video game violence. With little documented research on the impact of video game use on this population, however, policymakers are again left to make their best unguided efforts at devising reasonable practices that weigh safety and security concerns with patient autonomy.

Our review of forensic and state hospital policies on this topic found that hospitals have disparate practices regarding video games in forensic psychiatric settings. The majority of responding states (14 of 19, 74%) indicated that their forensic hospitals had no

explicit policy regarding video game use by forensic inpatients. Thirteen states allowed patients to access video games, with five reporting an existing written policy outlining acceptable use by patients and eight lacking a formal policy. The majority of states that allowed video game play required staff supervision during game use and did not allow patients to access the Internet during game play. Only one state reported having explicit restrictions around the violent content of games, though one additional state suggested that staff monitor the selection of games by patients, which is likely related to whether the content of the game is deemed appropriate for the patient or setting.

Although our survey results were limited by a low response rate, the data suggest that a substantial proportion of U.S. forensic hospitals have no policy on this topic. Our low response rate may also have been related to the framing of our listserv query to the extent that the query was interpreted as solely pertaining to policies specifically about communication devices and video games, given that institutions may address these questions in broader policies related to patient privilege levels, media with violent content, or general policies about institutional review of patient access to various other items or activities. Another factor potentially contributing to the relatively low numbers of such policies may be the challenge of articulating how competing interests are to be balanced in this complex area within a forensic institutional setting. For forensic patients, civil liberties must be weighed against risk concerns and the negative perception of third parties such as victims, victims' families, and the public. It is more expedient simply to deny patients access to such games; however, for hospitals interested in promoting recovery and respecting patient autonomy, it is important to take up the difficult task of developing policies governing the responsible use of technology, including safe access to video games. In the next section, the authors describe proposed principles for development of institutional policies based upon consideration of these competing interests.

### Balanced Policy Development

When developing a video game policy for a forensic institution, it is important to consider the clinical perspective. Clinical teams in such settings are charged with treating a patient's psychiatric disorder and addressing the factors that contributed to the

patient's hospitalization (e.g., restoration to competency, violent behavior precipitating insanity acquittal). Clinicians may be concerned and even disturbed if patients who have previously committed violent acts are allowed to play VVGs. These reactions may be moralistic, or they may be driven by concerns that violent games will increase the likelihood of violence or posttraumatic reactions. This risk may be heightened if the particular game reenacts elements of the patient's past trauma or behavior that lead to the initial arrest or hospitalization.

Conversely, there are potential clinical advantages to allowing time-limited and controlled use of violent games in a monitored environment. Simulations of violence could provide material for an exploration of a patient's thoughts and feelings with regard to aggressive acts. In an exposure-response model, patients could be asked to play such video games and then process their emotional responses with a therapist. Furthermore, interest in VVG play could reflect a form of sublimation in which patients are allowed to enact their aggressive impulses in a safe, controlled manner. Given the omnipresence of violent media, video games could also be used as a mechanism to gauge a patient's response to potentially distressing media and readiness for life in a community setting.

The perspectives of victims and their families must also be considered when developing a video game policy. In forensic cases, particularly when a patient's conduct was highly violent or sexual in nature, victims and their families may maintain an interest in the patient after hospitalization. Even if the victim or family is not involved in the case on an ongoing basis, it is incumbent upon hospitals to consider how such policies and practices would be perceived by individuals who have been harmed by the patient. For example, patients playing VVGs, particularly those that allow them to recreate their crime in a simulated environment, may create an appearance to the victim, their family, and the public of impropriety or insensitivity to victims' suffering. This could foster feelings of anger, disgust, or re-traumatization.

It must be stressed that patients residing in forensic hospitals, regardless of their history, are patients in a health care facility, not prison inmates. Although forensic hospitals have a limited obligation to protect third parties from harm, the primary goal of any hospitalization is to promote recovery from the underlying illness, not to punish or exact retribution.

Therefore, patients adjudicated as not guilty by reason of insanity deserve a stimulating therapeutic environment with access to forms of entertainment that are legal, socially acceptable, and recovery-promoting. Although video games are not necessarily an essential part of such an environment, they should be given due consideration. Some video games (e.g., those without violent content or those that promote social skill-building) can contribute to a therapeutic environment, but it may be necessary to prohibit others (e.g., mature-rated games) to maintain an appropriate clinical milieu.

The civil rights of hospitalized forensic patients must also be considered. Civil rights advocates might posit that hospitalized individuals should have the same access to video games as those in the community. Lack of access may be seen as infantilizing and therefore antithetical to a recovery model of care. Such advocates might concede that safety considerations warrant prohibiting access to some games, but only if a clear connection can be drawn between an individual patient's risk and the use of such games. Absent this clear connection, advocates could argue in favor of unfettered access to video games and oppose any policy that enacted a blanket prohibition for all patients.

### **Proposed Principles for Video Game Policies**

If financially feasible, patients in forensic hospitals should be granted access to video games as a normalizing, socially acceptable leisure activity.

Several types of limitations might be considered regarding patients' access to games, including:

- Game rating as determined by the Entertainment Software Rating Board
- Specific game content (e.g., violence, sexually explicit material)
- Staff supervision of game use
- Internet access
- Duration of game use
- Location of game use
- Privilege level required to use video games

Limitations on access to particular games or classes of games should be implemented in a fair manner that is grounded in the principles of:

- Individualized risk assessment
- Patient-centered treatment

Recovery-oriented approach

The hospital's healing mission

Respect for victims and their families

Limitations on video game access should be reviewed periodically by a multidisciplinary treatment team, with a focus on:

The nature of the patient's violence history

The patient's current clinical status

The patient's current risk of harm to self and others

The rationale for limiting a patient's access to particular video games should be clearly documented in the clinical record.

The patient's response (e.g., thoughts, emotions, and behavior that surround playing the game) should be documented periodically in the clinical record. The information should be used to guide individualized treatment planning for the patient.

### Conclusion

Evidence regarding the effect of VVGs on psychiatric populations, particularly those in forensic settings, is very limited. Our survey data indicate that forensic hospitals currently handle this subject in very different ways; some state hospitals allow video game use, some require supervision, and some prohibit it entirely. Although the topic is complex, the authors urge forensic hospitals to develop a written policy regarding the use of VVGs. The authors advocate that decisions about video game use should be individualized and based on the competing interests of recovery principles, risk considerations, and victim advocacy. Discussions should be interdisciplinary in nature and should give consideration to the patient's violence history, clinical status, and current behavior. If VVGs are permitted, the patient's thoughts, feelings, and behavior surrounding the game-play should be evaluated periodically and documented in the clinical record, with updates to the treatment plan made as indicated. If the patient is prohibited from playing VVGs, the rationale should be clearly documented. Taking such a rigorous approach to video game access may seem cumbersome, but it should be considered by forensic hospitals because such practices may help combat moralistic objections and negative public perceptions of the use of VVGs by patients in forensic settings. Further, given

the limited research in this area, it would be advantageous to forensic patients for further research to be advanced regarding the safety and potential therapeutic effects that video games may have in forensic settings. Building an evidence base in this area will allow forensic hospitals to utilize an evidence-based approach for such policy implementation in the future.

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