



Published in final edited form as:

*Aging Ment Health*. ; : 1–8. doi:10.1080/13607863.2018.1544218.

## Play Provides Social Connection for Older Adults with Serious Mental Illness::

### A Grounded Theory Analysis of a 10-week Exergame Intervention

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### Abstract

**Introduction:** The number of older adults with serious mental illness (SMI) is predicted to reach 15 million by 2030. Social isolation is known to contribute to morbidity and mortality, and those with SMI experience more social isolation than older adults in the general population. Social isolation in these older adults is complex and involves factors including organic psychopathology, effects of medications and/or other substances, medical co-morbidity, disability, and social stigma. The burgeoning field of inquiry of exergames, which are video games with gestural interfaces, for older adults has found that they are safe, effective, enjoyable, and may decrease social isolation. This qualitative study was conducted to gain insight into the effects of group exergame play on the psychosocial wellbeing of older adults with SMI.

**Methods:** We explored the psychosocial effects of a 10-week group exergame program for 16 older adults with SMI using grounded theory methodology within a symbolic interactionist framework.

**Results:** Participants experienced positive social contact, engaged in social attunement, and expressed motivation to take risks and face problem-solving and physical challenges. Two interrelated concepts emerged from the integrated data: Social connectedness and competence. The theoretical construct that was abducted from these concepts was that play and playfulness were the vehicle for many interacting social processes to take place.

**Conclusion:** Group play through exergames for older adults with SMI may promote recovery and healthy aging by increasing social integration, improving self-efficacy, and promoting physical health through exercise.

### Keywords

aging; mental illness; exergames; play; social connection

## Background

### Healthy Aging among People with Serious Mental Illness

The number of older adults with a serious mental illnesses (SMI), such as schizophrenia or major depression, is predicted to more than double to 15 million people by the year 2030

(Bartels, 2004). SMI is characterized by the American Psychological Association (APA) as distinct conditions that require routine management, produce functional impairment, and interfere with quality of life (Substance Abuse Mental Health Services Administration [SAMHSA], 2016). Illnesses that are considered to be a serious mental illness include schizophrenia, schizoaffective disorder, psychotic disorders, major depressive disorder, bipolar disorder, and borderline personality disorder (SAMHSA, 2016).

Modifiable risk factors and preventable conditions that contribute to poor health in older age groups, such as a lack of exercise, tobacco use, hypercholesterolemia, and hypertension, occur at higher rates in those with SMI compared to those without SMI (Parks, Svendsen, Singer, Foti, & Mauer, 2006; Robson, & Gray, 2007). The health effects of some psychotropic medications, such as weight gain or diabetes mellitus, also contribute to morbidity and mortality in older people with SMI (Bartels, 2004; Parks, Svendsen, Singer, Foti, & Mauer, 2006; Lambert, & Newcomer, 2009). In the United States (US), researchers examining morbidity and mortality among people with SMI in eight states found that suicide accounted for only 30% of the increased mortality while medical issues, such as cardiovascular disease, accounted for 60% of the increased mortality among people with SMI (Parks, et al., 2006). This represents an inequity in health status among a group of people who can generally be considered both vulnerable and marginalized.

The concept of healthy aging includes the promotion of physical, emotional, and psychological wellbeing, which are aspects of life that are recognized as being interconnected (Peel, Bartlett, & McClure, 2004). It is thought that healthy aging requires the establishment of health promoting habits, one of which is socialization and community engagement. Engagement in social activities in people with SMI is a unique challenge for many reasons, including the shared symptom experience of anhedonia, avolition, decreased social cognition, delusions, and psychosis, possible neurocognitive impairment, and physical disability (Cohen, et. al., 2008; Cohen, Pathak, Ramirez, Vahia, 2008; Pounds, 2017).

In addition to research on physical health factors in healthy aging, there is an emerging body of evidence in the general population that social isolation and perceived loneliness are related to greater morbidity and mortality (Leigh-Hunt, et al., 2017; Holt-Lunstad, Smith, & Layton, 2010; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015; Petite, Mallow, Barnes, Petrone, Barr, Theeke, 2015; Nicholson, 2012; Cornwell, & Waite, 2009). For example, loneliness has been found to be an independent indicator of multiple poor health outcomes including heart disease, hypertension, stroke, and lung disease (Petite, Mallow, Barnes, Petrone, Barr, & Theeke, 2015). Although less-studied, it has also been found that social connectedness is an important part of wellbeing in those with SMI (Wang, et al. 2017; Eklund & Hansson, 2007; Leutwyler, Chafetz, & Wallhagen, 2010), and that social isolation and loneliness disproportionately affect those who have SMI (Boardman, 2011; Pounds, 2017).

### **Game Technology & Health in Aging**

Some current, technology-based interventions to improve cognition, physical health, and quality of life among older adults in the general population have utilized activities such as video game play. *Exergames* are video games with gestural interfaces and are also called

whole body games, active-play video games, or exercise video games. Exergames are videogames with an interface that requires physical exertion to play, and the game systems do not require the participant to use a controller. Instead, the participant uses their body to directly control the game. The system uses a sensor to track full-body movements, recognizes the participant's body, and then mirrors movements in the game screen. These user-friendly games can be purchased directly off the shelf for use in any venue.

In 2011, the American Heart Association (AHA) convened a summit at the University of California, San Francisco to discuss the power of exergames in promoting physical activity and health (Lieberman, Chamberlin, Medina, Franklin, Sanner, & Vafiadis, 2011). The AHA report presented a model, conceived by Deborah Lieberman, of the fundamental ways that exergames work to promote better health and decrease healthcare costs (Lieberman et al., 2011). Specifically, Lieberman states that this model includes challenges to player's skills, increasing motivation to keep playing, providing role models for players, performance improvement, performance feedback from the game, and overall enjoyment of play (Lieberman et al., 2011). The mediating factors that lead from game play to better health behaviors are: Improved self-concept, improved self-efficacy, physical skills, fitness, well-being, and communication and social support (Lieberman et al., 2011, pp. 2509-2510).

Exergames have been found to successfully increase physical activity, improve cognition, and improve socioemotional outcomes in older adults, and they are considered both safe and cost effective (De Boissieu, Denormandie, Armaingaud, Sanchez, & Jeandel, 2017; Larsen, Schou, Lund, & Langberg, 2013; Kaufman, 2017; Wollersheim, et al., 2010). Studies of the socioemotional benefits of exergames in the general population of older adults suggest that social connection is a particularly important aspect of exergames (Kaufman, 2017).

However, there is less evidence about the mental or physical health effects of exergames in older adults with SMI.

### **Exergames and Socioemotional Health Outcomes**

Although relatively little is known about the effects of exergames for older adults with SMI, the overall significant, yet small, effect size seen in a recent meta-analysis showed that engagement in exergame play may improve socioemotional health in older people who have mild depression (Li, Theng, Foo, 2016). To further investigate the effects of exergame play on mental health, Li, Theng, Foo, & Xu, (2017) carried out a randomized control trial in Singapore to compare the effect of exergames and traditional exercise on depressive symptoms in older adults. They measured the subjective experiences of self-efficacy and positive emotions in those who participated in the two study conditions, both of which ostensibly delivered the same neurochemical effects associated with physical activity. They found that exergames had a significantly greater anti-depressive effect than traditional exercise (Li, Theng, Foo, & Xu, 2017). However, the source of those positive emotions is difficult to isolate and identify. Part of the reason for this difficulty may be that exergames involve other social processes, such as socialization, communication, role modeling, performance feedback (Lieberman et al., 2011), as well as aspects of play itself such as social attunement, vitality, and the concept of flow (Landreth, 2012; Ryan & Frederick, 1997; Csikszentmihalyi, & Bennett, 1971).

The potential of exergames to affect social outcomes among those with SMI is an under-researched area of inquiry. Yet, recent research from this population suggests a positive effect of exergames or similar programs on social connection and social confidence (Hwang, Wang, Siever, Medico, & Jones, 2018; Schell, Hausknecht, Zhang, & Kaufman, 2016; Meeks, & Stanmore, 2017; Gyllensten, & Forsberg, 2016). Further understanding of the socioemotional benefits of exergames in those with SMI is needed in order to deliver this intervention to more vulnerable and marginalized communities. Therefore, we conducted a study to explore the social process in group exergame play among older adults with SMI.

## Methods

### Study Design.

This study used grounded theory analysis (GT) (Glaser & Strauss, 1967) and the theoretical framework for this methodology was symbolic interactionism (SI) (Blumer, 1986; Stryker, 2008). GT was chosen because of the way that categories are generated and used in this methodology and the reliance on abductive processes in the development of theory (Reichertz, 2007). According to Dey (2007, para 6), “categories play a dual role in grounded theory which transcends the classical definition of concepts in terms of indicators. They can be both ‘analytic’ and ‘sensitizing’.” Charmaz (2006) characterizes GT as “a method of theory construction in which the researcher constructs concepts that count for relationships defined in the empirical data and each concept rests on empirical indications” (Charmaz, 2006 p.187). The abductive process, as described by Reichertz, is described as “sensible and scientific as a form of inference, however it reaches to the sphere of deep insight and new knowledge” (2007, para 9).

Herbert Blumer was the first to use the term symbolic interaction, and he believed that meaning is attributed to objects and events, and this meaning emerges out of the interaction of group members rather than being an inherent property of an object (Blumer, 1986). Corbin & Strauss (2008), experts in GT, say that the complexities of human experience are embedded in social, political, historical, socioeconomic, informational, and technological systems (p. 6). Therefore, using the SI approach within GT allows for a conceptually dense analysis of the meaning of participants’ experiences. This method also promotes the inclusion of vulnerable populations’ experiences in current theoretical constructs about exergames and health in aging.

**Inclusion and Exclusion Criteria.**—Participants were English speaking, 45 years or older, and had a diagnosis consistent with SAMHSA’s SMI definition. Participants completed and passed a capacity to consent test based on their comprehension of the consent form. Subjects were excluded if they had known medical conditions or other physical problems that needed special attention in an exercise program or did not pass the capacity to consent test.

### Participants and Setting.

A sample of 16 participants from a transitional residential treatment facility and an outpatient community treatment center were recruited by facility staff and referred to the

researchers. The inclusion of a broader range of mental illness was decided upon to more accurately reflect the experiences of older adults with SMI receiving treatment at outpatient facilities. We used two recruitment sites to achieve theoretical saturation. Study recruitment began in May 2015 and ended in June 2018.

### **Data Collection and Analysis.**

Three times a week for 10 weeks, participants played an active videogame for 50 minutes using the Kinect for Xbox 360 game system (Microsoft, Redmond, WA, USA). After the end of the 10-week intervention, participants were approached to be part of the qualitative data collection process.

The methodological rigor for this study was based in criteria proposed by Corbin and Strauss (2008). We used a theoretical sampling method for participant interviews, starting with focus groups and then proceeding with individual interviews until theoretical saturation was achieved. Participants were interviewed for approximately 60 minutes using focus groups and one-on-one in-depth interviews conducted by the principal investigator and her research team. We used a semi-structured interview guide that was adaptable to the participant's responses. Some questions include: What have you enjoyed most about the video game based physical activity program you are participating in? What did you look forward to? Why? What do you think is the most important thing that happened in this group? During the intervention and interview process, the researchers made observations, and kept field notes and coding memos. Additionally, each researcher participated in the weekly group exergame activities and this allowed for the ample use of reflection during the analysis. Data collection and analysis were done simultaneously using a constant comparison analysis approach (Charmaz, 2006; Clarke, 2005; Glaser & Strauss, 1967). Interviews were transcribed verbatim and then re-checked to the tape to verify transcription accuracy. Field notes, memos, and interview transcriptions were entered into Dedoose software to assist with data organization (Version 8, Dedoose, 2017). We employed a data analysis process described by Corbin and Strauss and Charmaz (Corbin & Strauss, 2008; Charmaz, 2006) This involved discerning the essence of meaning in the data, linking ideas, and reducing and combining data. The data scaffold moves from basic dimensions, defined as variations that give specificity and range to the data, to categories and concepts, which represent abstracted, relevant phenomena and are subsequently elevated through abductive theoretical construction (Corbin & Strauss, 2008; Reichertz, 2007).

Institutional Review Board (IRB) approval was obtained from the Committee on Human Research, University of California, San Francisco (IRB# 15-16577). Anonymity and confidentiality were maintained according to the IRB-approved study protocol.

## **Results**

### **Demographics.**

After we conducted interviews with 16 participants, we determined that saturation was achieved. No new concepts were emerging from the data and participants were confirming the categories that were emerging from the data. Demographic information for the

participants is summarized in Table 1. In the following sections, the elevated categories are discussed in the form of concepts that focus primarily on social processes, and the relationships between the concepts are explored through abduction using the theoretical basis of symbolic interactionism. Additional details about the dimensions of the major and minor categories of the interviews are described in appendix 1.

### Data Concepts.

Concepts, or the words that stand for ideas contained in data (Corbin & Struass, 2008), are the interpretations of categories that we found to reflect the group social processes. These concepts are *competence* and *social connectedness*.

**Competence.**—Within some of the major categories that comprised competence, we observed dimensions involving competition, problem solving, skill building, feelings of success in facing challenges, internal tension from comparisons among members or losing, and the release of this tension. The participants expressed that the competition of the games was fun, and some felt that the playful competition helped them to engage in game play and provided a way to socialize with others in the group. Nearly all participants expressed that the parts of game play that included competition were uncomfortable or frustrating at times, and could enhance negative self-awareness and tension as individuals made referential comparisons between themselves and others. However, there was a willingness to continue to play and compete even if the associated emotions were challenging.

C: Oh, it feels good, yeah. It feels good when you're doing things right. You want to try to do things right, but it ain't so easy at first. ... At the end of the day I was happy, because I knew I gave my best. ... I think the frustration was with myself that I was rushing more than taking my time. But that was the only frustration I had with myself. I never got to the point of having anger, or sadness, or none of those things. ... I was happy for those that made progress, you know, so even if I didn't succeed the goal I set for myself that day, just to see my peers that were intimidated by it, such as myself, accomplished progress and did good that day, I was happy for that.

The playfulness and competitive atmosphere of the social environment appeared to decline when the group was comprised of less than 3 players. In smaller groups, usually comprising one or two players, participants became more easily frustrated by poor performance or missing points, they displayed less spontaneous verbal and physical feedback, such as commenting, clapping, or cheering, and they appeared to have less interest in the games.

Facilitator: If you ever played the games alone, which I think both of you had a chance to, what did you think about that when you had the opportunity?

...

F: Um, I was trying to do the best I could, and when I wouldn't do as good as I could of did, I got frustrated with myself. ...

Facilitator: But if someone else was there?

F: Yeah, I wouldn't have been as frustrated.



Facilitator: How is it less frustrating [playing] with somebody [else]?

F: Um, because we're working together – because I'll work together with that individual. I just set up a high standard for myself when I'm by myself. If I'm with other people, I don't have that high of a standard, so I can goof off a little bit, I guess you'd say.

Therefore, we found the concept of competence to reflect problem solving and the tangible sense of gaining skills, achievement in completing the program, the motivation to face challenges and take risks, and the drive to engage in competitive group play despite emotional or physical discomfort or perceived failure.

### **Social Connectedness.**

We observed that the social dynamics in each group of participants who started a 10-week program together unfolded in slightly different ways, yet there were commonalities between groups. Some of the most prominent categories in the data reflected the social experiences of playing in a group of peers and staff. We observed and recorded themes of cooperation, belongingness, group cohesion, empathy, altruism, and social connections made between group members and also with staff members. Other dimensions of the major categories in the group included friendship and a strong sense of supportiveness and positivity toward one another.

Q: I liked the social nature, for ability to cheer each other on and have fun.

J: I do like – I do love the socialization ... we really enjoyed ourselves so much, you know. This was the best part of my day when we were doing it. Even though I enjoyed the rest of the day, this was always the best way to end it. And I really liked the videos also. I liked the dancing and we did some things that we probably didn't think we could do, and it was just great. ... with the dancing, I probably did moves I've never done before.

Nearly all participants reported that they felt the staff were a positive part of the group. Role modelling by staff was an important part of the social dynamic and organic group process. Staff cheered and encouraged players while also letting them work to solve problems with autonomy. Autonomy and a non-coercive environment were highly valued by participants.

Participants reported that they received support from the group through encouragement, and that it was also fun to give support to others. Cheering others, friendly teasing, taking turns, and helping others with less skill or impaired cognitive abilities was commonly observed, and this behavior was reinforced by staff. Individuals worked together and gave tips to be more successful in playing the game; They wanted each other to be successful despite the competition between players.

Q: I got more exercise out of the cheer-leading, you know, a handful of times more than the activity. So the socialization and supporting each other ... was important for me.

Over the course of a 10-week program, individuals said they felt increasingly close to their group members. Belongingness facilitated a sense of social safety where they were free to be authentic, lose themselves in the game, and to play free of judgement from others.

Facilitator: What do you think was the most important part of this whole group?

A: Oh, social interaction with other people. ... It got me to know more people. You know, [I] got more of a feeling of where other people are coming from and sort of thing. ... And you became more cohesive as a group the more you played... more as a group where you could kid each other and that sort of thing.

When the players were deeply engaged in playing the game, they were also very engaged in playing with one another. In these moments there was a sense of spontaneity, freedom, and exploration and simultaneously a strong atmosphere of group support. While facilitating the exergame intervention, the members of our research team consistently observed that group members were able to self-regulate their behavior in relationship to others in the group in order to continue with play. They were able to sense tension in other members, or in themselves, and then subtly change their behavior to help ameliorate the tension. This social attunement, which describes how reactive a person is to another's emotional needs and moods, required insight, self-awareness, and empathy..

Importantly, when discussing social processes of the program with participants, they often mentioned playful competition as well as social connection. It appears that playful competition is an important part of the social processes of the group. Competition enhanced group cohesiveness, sense of belonging, and the participants' ability to engage in play so deeply that they could lose themselves in the game.

Q: The only [negative] thing I can think of is when that feeling that you said, like if someone was really good and they bowling and they got a strike every time, and then when you got up there and you didn't do so well, even though you know – but then you got skills, you got better, you know. ... I think it's that feeling, it made you do better..., you kind of helped each other out and we grew as a close-knit, you know, family. And, I look forward to doing other videos with you.

G: I think it was good to really know each other and got close, because we were in here doing some things. It got competitive at times, but that still was nice. It's good to be a little competitive, you know ... It made us keep going. ... You know, everything just kept a balance, I think.

### **Relationships Between the Concepts & Theorization.**

Over time, individuals in the exergame play groups reported and displayed social connectedness and increased competence, and this resulted in an embodied, subjectively felt sense of energy and vitality. In observing the play groups, researchers observed the mutual co-construction of a group social process that heavily involved reciprocal relationships and social attunement. These social processes were the most apparent during play and playful activities, and when there was an atmosphere of playfulness.



One of the most prominent processes we observed was that of experiencing competition within a connected, non-coercive social group. Although there was occasional frustration when a participant performed poorly at a game, these feelings were attenuated by the playful and supportive social dynamic of the group.

In the data from our interviews and observations, as well as our own experiences playing in the groups, exergame play was found to be an enjoyable, energizing experience in which the players lose self-consciousness. When participants were playing the games and being playful with one another, they showed intrinsic motivation to challenge themselves and take risks, such as moving to a higher game difficulty level and building skill in the games. In other words, within the playful group, participants had the opportunity to try, fail, and try again without judgement by others.

Play and playfulness became the vehicle for many interacting social processes to take place. In the context of play, the participants experienced themselves in relationship to one another, gave and received empathy and positive social contact, engaged in social attunement, and became intrinsically motivated to take risks and face cognitive and physical challenges.

## Discussion

In our results, the prominent, interrelated concepts of competence and social connectedness emerged. We theorized that the processes of play and playfulness facilitated social connectedness, promoted competence among participants, and increased intrinsic motivation. Because the field of exergame play research is relatively new, it is important to discuss some of the possible ways in which the particular social and interactive process of play may contribute to social connectedness, self-efficacy, motivation, and socioemotional wellbeing among adults with SMI.

### Play and Playfulness.

At the heart of group exergame activity is play, and playfulness is considered to be the essence of play in both children and in adults (Guitard, Ferland, & Dutil, 2005). In our study, we found that play and playfulness became a vehicle to engage in social relationships, experience positive emotions, improve self-concept, and experience motivational energy. We contend that play, a specific process, manifests social connection and competence and this is a key part of what distinguishes the effects of play from behavioral activation and physical activity.

In 2015, a group of researchers proposed that playfulness and play should be incorporated into the concept of wellbeing as adults age (Waldman-Levi, Bar-Haim, Katz, 2015). They suggest that play and playfulness may help to increase feelings of empowerment, self-efficacy, and positive self-concept and thereby contribute to overall wellbeing in older age groups (Waldman-Levi, Bar-Haim, Katz, 2015). However, much of what is known about the psychology and sociology of play and playfulness comes from research among children. This is partly because of the important role of play and playfulness in human social development. Landreth's (2012) concept of play among children is commonly accepted. He states that children's play is an intrinsically motivated and pleasurable activity that helps to

develop social identity, social attunement, empathy, and to define one's self in relationship to others (Landreth, 2012). A critical aspect of our study is that the social processes embedded in group play and playfulness increased social relatedness among the study participants. Within a playful, non-coercive social group, the study participants felt a sense of social belonging and also showed intrinsic motivation to engage in physical activity. The social processes in adult play may be similar in many ways to those in children's play, and this may be one mechanism by which group exergame play can enhance a sense of social belonging and relatedness.

The study of play as it relates to health in the youth population is an established area of inquiry, and this inquiry is being extended to adult populations as well. However, our understanding of adult play and playfulness is still lacking in many areas. Much of the past research on adult play has focused on identifying playfulness as either a personality characteristic, an internal characteristic, or a propensity. But these early studies about playfulness had significant issues with generalizability, theoretical construct, as well as glaring class, racial, and gender biases (Barnett, 1990; 1990a; 1991). Another critical weakness of research on adult playfulness published in both the 20<sup>th</sup> and 21<sup>st</sup> centuries is the *a priori* assumption that environment and situational contexts do not influence playfulness or play behaviors, and therefore external factors were not considered in the methods used to study playfulness. Most contemporary sociological, psychological, and anthropological paradigms, including symbolic interactionism, refute this supposition and this makes it difficult to rely on the background provided by existing research on adult playfulness.

In order to address the problematic aspects of the existing playfulness research paradigm, Shen, Chick, & Zinn (2014a, 2014b) reconceptualized the framework for studying adult playfulness. They propose shifting the study of playfulness away from measuring play behavior and toward assessing play traits that are not innately part of an individual, but rather assessing cognitive qualities influenced by various environmental factors. Importantly, our study findings support the view of Shen, Chick, & Zinn's that playfulness is not an innate characteristic of the participants in the study, but rather a set of behaviors influenced by the situation of the game play intervention. This has implications for the use of exergame interventions in a variety of settings and highlights the importance of the play environment, which includes facilitation by staff and safe social connections among the group members. For example, in a recent study about exergames and physical fitness among those with SMI in Sweden, an important impeding factor to participant motivation was staff attitudes toward the games and the perceived importance of the exergame groups (Gyllensten, & Forsberg, 2016). Likewise, in a study about physical activity in older adults with schizophrenia, it was consistently reported that staff played a key role in facilitating exercise and encouraging motivation for physical activity (Leutwyler, Hubbard, Jeste, & Vinogradov, 2013).

### **Social Processes in Play and Playfulness.**

The central findings of our study strongly suggest that play and playfulness in group exergames are not only important for physical activity, but also for social connection. Therapeutic play is thought to be effective, in part, because it integrates somatosensory and cerebromodulatory brain processes and because pleasure from play stimulates release of

dopamine in the brain (Perry, & Dobson, 2013). The authors Gaskill and Perry (2014), who study play therapy for children with trauma, say that play provides an effective dose of this neurobiological stimuli when it takes place in “an atmosphere of enjoyment, safety, and attunement” (p. 187). We may surmise that play can have an effect on psychological wellbeing and can be seen as a therapeutic agent when it facilitates emotional and sensory regulation in a safe social environment. In alignment with the ideas of Gaskill and Perry (2014), our study found that playfulness was closely tied to the group environment and particularly to social connectedness.

A published summary of several qualitative studies about the experience of play and other pleasurable and positive events among those with SMI revealed that play can be an important part of recovery (Davidson, Shahar, Lawless, Sells, & Tondora, 2006). In this summary, the mechanisms by which play supports recovery were shown to be interconnected, and were described as imbuing hope, respite from illness, discovering one’s own strength and competence, and reconstructing social agency (Davidson, Shahar, Lawless, Sells, & Tondora, 2006). In our study, we found that several dimensions of social processes in group exergame play for older adults with SMI drove experiences of competence and social connectedness, which align with certain of these purported mechanisms. Caldwell, a somatic psychologist and adult play therapy researcher, says that play allows a person to “witness themselves,” broadcast social signals, and feel seen and understood by others (Caldwell, 2003, p. 307). Play and playfulness in various forms may support social connection when it otherwise may be difficult or lacking. Beyond enjoyment, pleasure, or social support, play may support social cognition.

### **Implications for Practice.**

While the association between social isolation and poorer health in aging has been well-established, research on the role of playfulness in the social aspects of healthy aging is only beginning to be investigated. Researchers are examining the importance of social relationships and perceived loneliness in aging, and particularly how social experiences affect older adults (Cornwell & Waite, 2009; Nicholson, 2012; Kelly, et al., 2017). Older adults with SMI, who are vulnerable individuals that are at higher risk for socioemotional strain, are thought to experience significant societal marginalization and social isolation (Linz, & Sturm, 2013). Additionally, social disconnectedness, social isolation, and perceived loneliness predict excess morbidity and mortality. This is thought to be related to illness-associated factors that are more common among those with SMI, such as medical comorbidities, functional disability, inflammation and immune dysfunction, cognitive impairment, social stigma, and effects of institutionalization and criminalization (Linz, & Sturm, 2013; Wang, et al. 2017; Holt-Lunstad, Smith, & Layton, 2010; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015; Mezuk et al., 2016; O’Luanaigh, et al., 2011). Our study found that group play and playfulness during exergame activities facilitated social connectedness and motivation as well as physical activity in a group of older adults with many of these vulnerabilities. Therefore, we suggest that exergames are an easily accessible, exportable, and low-cost intervention to support social connectedness in older adults with SMI.

The rapidly expanding population of older adults with SMI and the comparatively higher burden of disability and healthcare costs among them has made rehabilitative programs an important area of research. Identification of interventions that ameliorate the social isolation to which aging adults with SMI are vulnerable is a vital aspect of mental health care for these aging communities. Exergames have been found to be safe, cost-effective, and beneficial for older adults with SMI, and may be considered an accessible resource for rehabilitation programs. Playful group exergames can be integrated into various care settings, including inpatient programs, residential treatment facilities, supported permanent housing, outpatient clinics, and long term care facilities. Future research about the role of play and playfulness as a therapeutic intervention for older adults with SMI is needed.

**Limitations**

Our study was limited by the relatively small sample, however our sample size is considered sufficient for a qualitative analysis and we were able to reach theoretical saturation. Another limitation is the data collection and coding process, which was dependent on individual skills of the researchers and therefore may be subject to personal biases and idiosyncrasies. While this may threaten the methodological consistency of the analysis, the researchers used constant comparative methodology to reduce the risk of bias in coding, conceptualization, and in building theory. Additionally, the research team participated in the weekly group exergame activities and thereby developed a sensitivity to the social processes and play.

**Conclusion**

In this study we found that group play through exergames supported the cultivation of social connection, increased sense of competence and self-efficacy, and promoted intrinsic motivation and physical activity. Our abductive conclusion was that play and playfulness were the vehicle for many interacting social processes, and may have lead to these positive outcomes. This study adds to the body of literature about exergames for older adults with SMI, and indicates that play, playfulness, and social connection are an important part of this intervention. Promotion of play and playfulness to facilitate social connections and intrinsic motivation should be a focus of exergame interventions to promote health among adults with SMI.

**Appendix 1**

Major and Minor Categories and their Dimensions.

Major Categories	Dimensions
Competition	Competition is fun, but tension arises from “losing” or doing poorly. This tension can be felt by others in the group too. When the skill level of the task is appropriate, competition is fun. When participants have a similar skill level among peers, competition comes more naturally and is more fun. Competition begins to emerge organically in each group, but not for every group member. Some felt that competitive games were not like playing against other people but instead playing against the computer as an individual. Others said they were trying to beat their own best score, and play against themselves. Still others engaged in strong competition with one or two other participants, and these tended to be the more physically and cognitively skilled players.

Major Categories	Dimensions
Cooperation	Individuals received support from the group through cheering and encouragement. Individuals worked together and gave each other tips to be more successful in playing the game. Fairness was important to the group, even when it was frustrating. Putting aside your own thoughts and needs is important for the good of others' experience in the group.
Energy	Includes descriptions such as sweating, excitement, energy, feeling invigorated, more alert and awake. It is described as a visceral sensation situated in the body. It often occurs in conjunction with feeling of skill improvement or seeing tangible results of improvements in play.
Belongingness & Group Cohesion	Individuals felt close to their group members and felt welcomed. A sense of belonging develops over time. They become a "family" and feel free to be authentic, free of judgement.
Self-Organizing, Dynamic Group Process	The group is dynamic, self-organizing, continuously evolving, and unique for each group of participants. The group as an entity goes through phases. Mutual rules and game preferences are formed in this co-constructed environment.
Accomplishment	Sense of achievement and pride when the groups ended. Sense of self-efficacy in doing something new, gaining a new skill, or seeing improvement in one's performance. This sense of accomplishment helped to build self-efficacy for activities taking place outside of the group.
Minor Categories	Dimensions
Problem Solving/Strategy	Watching others play helped to develop strategy for the next turn to play. Help from staff on strategy was useful.
Pleasure / Fun	Smiling, laughter, "fun." A visceral feeling of happiness, contentment, derived from the process of playing and not necessarily from results (winning/losing). Some said, competition equates to fun, but others said they didn't care if they were competing and that they were having fun regardless. People were happy to be with friends.
Solace	Solace from the outside environment and also solace from oneself; A "break from groups" to enjoy oneself, and to lose oneself in the experience of play. Time to be with others for "social time," insulated from the concerns of the treatment program. Playing distracted them from their worries and from rumination.
Connection with others outside the group	Wanting to play it with friends, with family. Sharing the games with others, like nieces and nephews.
Staff as part of the group	Staff were not simply on the sidelines, but are felt to be a part of the group. Staff involvement and coaching is positive, and some felt very necessary to being able to play the game.
Freedom of Choice / Autonomy	Staff are non-coercive and respect autonomy of individual. Participants are given the freedom to choose when and how they would play in each session. Everyone was given the same chance to play regardless of skill level, and each person had self-determined goals and things they thought were important to them. There was very little extrinsic pressure to attend, participate, or perform.

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**Table 1.**

Characteristics of Participants Interviewed, N=16

	N (%) or Mean (range, $\pm$ SD)
Age (years)	58.8 (70 -51; $\pm$ 5.2)
Male	10 (62.5)
Female	6 (37.5)
White	8 (50)
Black/African American	3 (18.8)
Latinx	1 (6.3)
Asian	2 (12.5)
Other	2 (12.5)
First Language English	13 (81.3)
Past Substance Use Disorder	8 (50.0)
Schizophrenia	9 (56.3)
Major Depression	3 (18.7)
Psychosis (Not Otherwise Specified)	1 (6.3)
Post Traumatic Stress Disorder	2 (12.5)
Age at Onset of First Psychiatric Symptoms (years)	29.8 (9 - 55; $\pm$ 15.6)
Age at First Psychiatric Hospitalization (years)	30.4 (11 - 60; $\pm$ 15.7)
Total Psychiatric Hospitalizations (count)	7.7 (1 - 24; $\pm$ 7.39)

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