A Study on the Efficacy of the Tabletop Roleplaying Game Dungeons & Dragons for Improving Mental Health and Self-Concepts in a Community Sample

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Abstract

Tabletop gaming has seen a rise in popularity over the past ten years, with an influx of interest following the Coronavirus pandemic. Limited research has explored the impact of tabletop roleplaying games on mental health and self-concepts such as self-esteem and self-efficacy. This study employed a repeated-measures design with four measurement points to quantitatively evaluate the effect of playing Dungeons & Dragons (D&D) on mental health and self-concepts in a community sample. Twenty-five community participants took part in 8 weeks of D&D gameplay (one 1 hr session per week), completing pre-, mid-, and post-intervention surveys. Eighteen of these participants also completed a one-month follow up measure. Participants demonstrated significant decreases in depression, stress, and anxiety and significant increases in self-esteem and self-efficacy over the study period. As such, D&D may have potential utility as a wellbeing intervention or prevention program.

Keywords: *mental health, dungeons and dragons, tabletop gaming, tabletop roleplaying games, self-concept*

Introduction

Tabletop gaming is categorised as any game which requires a table surface to play on, excluding those that utilise video[1]. Dungeons & Dragons (D&D) is arguably the most well known of the pen-and-paper tabletop roleplaying games (TTRPGs)[2]. It is typically played with 3-6 people who take on the role of "player characters" (PCs), and one person who takes on the role of the "Dungeon Master" (DM)[3]. The DM is charged with guiding the PCs' journey and playing the role of enemies and "non-player characters" (NPCs) that the PCs interact with. Both the PCs and the DM roll dice to determine the result of certain game actions. The outcomes of these actions are also influenced by PCs' abilities (e.g., a PC with high "charisma" will more easily be able to convince an NPC to do them a favour, requiring a lower dice role for a successful outcome than would be needed otherwise). D&D often takes place in a make-believe fantasy environment of the DM's design[4]. The DM portrays this world via images and words, allowing the players to imagine the space they are playing in. As opposed to other tabletop games, D&D does not have "winners" or "losers". Rather, the game is considered successful as long as the story created is found to be engaging by players[5].

TTRPGs have been suggested as potential therapeutic tools[6-10]. A recent scoping review identified 22 studies into the therapeutic use of TTRPGs[6]. Eight of these studies examined D&D specifically, although most of these are case studies only. These case studies suggest that D&D can be harnessed to minimise the impact of anxiety symptoms. Players of D&D often express that playing D&D is cathartic and provides a space to express emotions in game without having concern of the outside consequences[11,12]. Due to the nature of the game being cooperative, D&D also offers players a sense of connectedness and a safe space to explore their mental health problems, allowing them to feel more at ease[2,11].

Existing literature lends support to the use of TTRPGs to enhance self-efficacy and self-esteem. Self-efficacy refers to beliefs that one is capable to performing a specific behaviour, or set of behaviours, when called for in challenging situations[13]. Self-esteem describes a person's positive or negative attitudes and evaluations of themselves[14]. Both self-efficacy and self-esteem are regarded as self-concepts in that they are self-judgment of one's abilities, thoughts, and feelings. A number of qualitative case studies indicate that TTRPGs benefit self-concepts. Qualitative case study research has demonstrated that a variety of TTRPGs (e.g., *Call of Cthulhu* and D&D) have a variety of psychological and social benefits[15-17]. Quantitatively, Katō reported improved communication abilities and quality of life among adolescences with ASD following extended engagement with a TTRPG[18]. Similarly, a small study (four participants) by Helbig found that children with ASD showed improved social skill acquisition following TTRPG sessions[19]. Further, a randomised controlled trial of males with drug dependence found that those who underwent 4 weeks of a modified TTRPG reported more confidence to refuse drugs compared to a control group[20].

In the past decade there has been an increased interest in therapeutic and preventative uses of D&D[3,21]. However, most of the existing studies into D&D and mental health or self-concepts are qualitative. These findings provide valuable insights into the potential benefits of D&D, however more concrete evidence into the likely magnitude of the effect of D&D on mental wellbeing and self-concepts is needed. To address this research gap, the current study employed a repeated-measures design with four measurement points to quantitatively evaluate the effect of playing D&D on mental health (symptoms of stress, depression, and anxiety) and self-concepts (including self-esteem and self-efficacy) in a community sample. Participants were measured at four timepoints: pre-intervention (T1), mid-intervention (T2), post-intervention (T3), and one-month follow up (T4). The following research questions are addressed:

RQ1: Will symptoms of stress, anxiety, and depression decrease over the study period?

RQ2: Will self-esteem and self-efficacy increase over the study period?

Methods

Participants

Participants were a community sample of residents in a regional city in Queensland, Australia. They were recruited via social media, a radio station, and tabletop gaming clubs in the local area. In order to be eligible for the study, participants were required to be 18-years or older and fluent in English. Power analysis (conducted in G*Power v3.1.9.7) indicated that a sample of 24 would be sufficient to detect a change in an outcome variable with a minimum power of .80 across four measurement points, if assuming a medium effect size and an average correlation between measures of .50. A total of 32 (M_{age} = 27.94 years, SD = 7.98) participants completed the survey at T1, with 11 females (M_{age} = 27.64 years, SD = 8.97), 19 males (M_{age} = 28.53 years, SD = 7.26) and two identifying as non-binary/third gender (M_{age} = 24.00 years, SD = 5.00).

Participants varied in their self-categorised level of prior experience with D&D. Four participants (16%) reported no prior experience, another eight participants (32%) reported a moderate level of experience, eight (32%) reported a lot of experience and five participants (20%) reported a great deal of experience. Seven participants discontinued their participation due to contracting COVID-19, resulting in a final sample of 25 participants who completed all D&D sessions (males = 16, 64%; female = 8, 32%; non-binary/third gender = 1, 4%). Eighteen participants responded to the follow up survey (T4). All but one of these participants indicated that they continued to play D&D after the conclusion of the intervention. This information is important to note when examining the data at T4, as most participants continued to interact with the intervention.

Measures

Demographics. Demographic variables measured included age, gender, and prior

D&D experience.

Mental Health. Mental health was measured by the 21-item Depression, Anxiety and

Stress Scale (DASS-21)[22]. Participants responded to each question on a 4-point scale (0 =

Did not apply to me at all/Never, to 3 = *Applied to me very much, or most of the time/Almost*

Always). The DASS-21 produces a total score for depression, anxiety, and stress (each

measured by 7 items), with higher scores indicating greater depression, anxiety, and stress,

respectively. Sample questions for the depression, anxiety and stress subscales include "If felt

that I had nothing to look forward to," "I felt I was close to panic," and "I found it hard to

wind down" respectively. In the current study, Cronbach's alphas for the subscales were in

the acceptable to good range across all timepoints (depression: α ranged from .84 to .91;

anxiety: .73 to .85; stress: .76 to .85).

Self-Esteem. Self-esteem was measured using the 10-item Rosenberg Self-Esteem

scale[14]. Participants responded to each item (e.g., "I feel that I'm a person of worth") on a 4-

point scale (3 = *strongly agree to* 0 = *strongly disagree*) with some items being reverse

coded. Higher total scores are indicative of greater self-esteem. In the current sample, α

ranged from .72 to .92 across timepoints.

Self-Efficacy. The 10-item General Self-Efficacy Scale was used to measure self-

efficacy[23]. Participants responded to each item (e.g., "it is easy for me to stick to my aims and

accomplish my goals") on a 4-point scale (1 = *not at all true* to 4 = *exactly true*). Higher

summed score are indicative of higher levels of self-efficacy. The Cronbach's alpha for the

current sample ranged from .78 to .88 across timepoints.

Intervention

Participants partook in D&D sessions in small groups of 5 to 7 (six groups in total). Due to participant attrition, the study resolved as five groups with three participants being reallocated to a different group. Each group did the same D&D module, with one of four skilled DMs from a local tabletop gaming club guiding each of the sessions. A typical leisure playing session of D&D lasts between 3 to 8 hr[3]. The current study split up the typical session of eight hours into eight 1 hr sessions over 8 weeks.

A D&D module was specifically developed for the current study. It was written by two of the aforementioned DMs (both of whom reported five years of DM experience and seven years of player experience). The module required participants to collaborate to complete a range of social, mental, and physical dilemmas in a fantasy setting. In the first session, with the guidance provided by the DM, participants chose their characters (e.g., a Dragonborn Cleric or a Gnome Wizard) and received a preface on the rules of D&D. Over the next 7 weeks, participants completed the module quest as their characters. This quest involved players tracking a goblin who had stolen a town's belongings through a cave system (PCs found themselves facing monsters and traps as part of this pursuit). The quest culminated in a social dilemma, in which the goblin confessed to stealing the town's items to feel as if they fit into regular society. Through their combined effort, PCs were able to resolve the conflict with the goblin and return the missing items to the town, where they were heralded as heroes.

Procedure

The Human Research Ethics Committee of xxx University (blinded for peer review) provided ethical clearance for this study (Ref.: H8731). Data was collected via a pen-and-paper survey at the first three collection points. Data was collected immediately prior to the first D&D sessions (T1), immediately after the Week 4 D&D session (T2), immediately after

the Week 8 D&D session (T3), and at a one-month follow-up session (T4). For the T4

survey, participants had the option to complete the survey in person or online using the

Qualtrics platform.

Data analysis

The data was analysed using IBM SPSS Statistics v28 software. Univariate outliers

were detected using the z-score method accompanied by visual inspection of box plots. Mean

substitution was used to replace one univariate outlying datapoint[24,25]. Pearson's product-

moment correlation coefficients were calculated to explore the association between the

outcome variables over the four timepoints. Prior to this, data was checked for normality,

linearity, and homoscedasticity. In response to the high attrition at T4, a series of one-way

repeated measures ANOVAs were performed comparing scores across T1, T2, and T3 only.

Mauchly's test of sphericity was used to test the sphericity assumption. Partial eta-squared

($\eta_p{}^2$) is reported as an effect size measure. In addition to these omnibus tests, paired-samples *t*

tests were performed comparing outcome variables at T1 and T2, T1 and T3, and T1 and T4.

For these tests, Hedge's *g* values are reported as effect size measures.

Results

Means, SDs and intercorrelations among all outcome variables are presented in Table

1.

(INSERT TABLE 1)

Mauchly's test was non-significant for depression ($\chi^2(2) = 2.16$, $p = .339$), anxiety

($\chi^2(2) = 1.70$, $p = .428$), stress ($\chi^2(2) = 0.11$, $p = .945$), and self-efficacy ($\chi^2(2) = 1.23$, $p =$

.540). A significant Mauchly's test for self-esteem ($\chi^2(2) = 7.25$, $p = .027$) indicated that the

assumption of sphericity had been violated. Accordingly, degrees of freedom were corrected

using a Greenhouse-Geisser adjustment ($\varepsilon = 0.79$).

Significant omnibus tests were observed for depression ($F(2, 48) = 8.16$, $p < .001$, η_p^2 $= .25$), anxiety ($F(2, 48) = 4.84$, $p = .012$, $\eta_p^2 = .17$), stress (F$(2, 48) = 9.20$, $p < .001$, $\eta_p^2 =$ $.28$), self-esteem ($F(1.58, 37.79) = 15.97$, $p = <.001$, $\eta_p^2 = .40$), and self-efficacy ($F(2, 48) =$ 6.37, $p = .004$, $\eta_p^2 = .21$), indicating significant changes in these variables across T1, T2, and T3. In all cases, these were large effects as indicated by the η_p^2 values. Paired samples t tests are presented in Table 2. As can be seen, depression, anxiety, and stress were significantly lower at T3 and T4 relative to pre-intervention. These differences were typically large, as indicated by the observed g values. Participants reported greater self-esteem and self-efficacy at T3 and T4 relative to T1. These differences were in the medium to large range. Only anxiety and self-efficacy significantly differed from T1 to T2.

(INSERT TABLE 2)

Discussion

The present study employed a repeated-measures design with four measurement points to quantitatively evaluate the effect of D&D on mental health and self-concepts in a community sample. Results suggest that playing D&D has a positive impact on participants' mental health and self-concepts, with significant reductions in depression, anxiety, and stress, as well as significant increases in self-esteem and self-efficacy being observed from baseline (T1) to T3 and T4. Interestingly, only two of the five outcome variables were found to change from T1 to T2. This could indicate that the positive effects of D&D take time to manifest or that a threshold of exposure is needed before positive effects begin to manifest. Both possibilities would suggest that study timeframe is an important consideration in any longitudinal studies into D&D. Improved mental wellbeing in response to D&D is consistent with existing literature[9,11].

D&D is an example of *play*. Play has been defined as an unproductive activity, governed by rules and facilitated using make-believe[26,27]. It typically occurs in a protected environment and has no certainty of outcome. Given that play facilitates escapism in a form that is usually positive and enjoyable, it may therefore lead to *flow*. Csikszentmihalyi's notion of flow refers to the mental state experienced when an individual intensely, yet effortlessly, engages in an activity that they find rewarding[28,29]. According to Csikszentmihalyi, flow is associated with a loss of self- and temporal awareness[28]. In this way, flow can transport someone into a new world, allowing for feelings of discovery while escaping real-world issues. In flow, people are in control of their mental energy and attention is freely invested to achieve their goals. D&D players may become enraptured with playing their characters with full autonomy and active engagement[30].

According to Csikszentmihalyi, flow is most likely to occur when there is a match between an individual's skill level and task difficulty; when "a person's skills are fully involved in overcoming a challenge that is just about manageable"[31(p2)]. If a D&D game's challenge level is too high, players are likely to feel anxious[32]. If the challenge level is too low, players may feel bored. It is when there is a match between the skills of the player and the challenge level of the game (a balance achieved by the DM) when a flow state can occur, allowing players to be immersed in a feeling of energy and focus, effortless engagement, and enjoyment[28,33]. Csikszentmihalyi conceptualises the flow state as the "optimal experience"[28]. As posited by Csikszentmihalyi, these kinds of optimal experiences may improve quality of life and wellbeing, thereby bolstering mental health.

Moreover, D&D provides players with opportunity for mastery and control (especially when task difficulty is a good match to skill level). As part of D&D play, players are required to overcome traps, combat encounters, and social dilemmas. This may explain the observed increase in self-efficacy over the course of the study. The sense of mastery and

accomplishment gained from overcoming D&D challenges may improve self-concepts and thereby also bolster self-esteem. Other research lends support for the idea that engagement with TTRPGs can increase self-concepts such as self-efficacy and self-esteem[15-17].

There are several limitations of the current study which warrant consideration. First, due to the small sample size, demographic factors (such as prior experience with D&D and COVID-19 experiences) could not be entered into the statistical models as control variables. Being able to compare new and experienced players in terms of response to the intervention would provide information on the inherent benefits of D&D beyond those of simply engaging in a liked hobby.

Second, the single-arm design is vulnerable to participant-related effects (participants responding to the demand characteristics of the research situation and placebo effects) and experimenter expectancy effects. Blinded randomised controlled trials can minimise these kinds of validity threats. Alternatively, future studies may incorporate a measurement of participants' expectancies of the efficacy of the intervention, so that expectancy effects can be statistically assessed[34].

Third, due to the age of participants (mean age was around 28), we should be cautious when generalizing these findings to other groups, such as geriatric or paediatric populations. It should also be recognised that although the findings suggest that D&D has positive effects on mental health, this study engaged a community sample as opposed to a clinical sample. It is possible that D&D would have a lesser effect on wellbeing among clinical populations (e.g., if severe distress impedes individuals' ability to engage fully with the game). Further research into the efficacy of tabletop gaming for mental health and self-concepts among at-risk and clinical populations would be informative.

Conclusion

This study quantitatively evaluated the effects of a TTRPG, D&D, on mental health and self-concepts among a community samples. Eight weeks of exposure to D&D was associated with significant reductions in depression, anxiety and stress and significant gains in self-esteem and self-efficacy. These improvements were maintained at a 1-month follow-up (relative to baseline). The results add to a growing evidence base for the potential use of D&D as a preventative or intervention tool to promote wellbeing. The results provide an impetus to conduct randomised controlled trials into the topic in the future.

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Table 1.

Pearson's correlations and Means (SDs) of depression, anxiety, stress, self-esteem, and self-efficacy between T1, T2, T3, and T4

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
M (SD)	7.25 (4.90)	6.23 (4.36)	4.08 (3.26)	4.39 (3.96)	5.63 (4.27)	5.69 (4.60)	3.84 (3.86)	3.44 (3.11)	8.78 (4.09)	7.69 (3.60)	6.12 (4.02)	6.39 (4.00)	15.59 (4.15)	16.77 (5.06)	18.92 (5.11)	18.67 (5.96)	28.22 (3.67)	30.08 (4.24)	30.52 (4.83)	31.94 (3.98)
1. T1 Dep	-	.76***	.66***	.78***	.44**	.36	.35	.46	.54**	.55**	.35	.46	-.46**	-.58**	-.61**	-.70**	-.40*	-.37	-.36	-.56*
2. T2 Dep		-	.72***	.85***	.36	.40*	.39	.44	.52**	.76***	.49*	.59*	-.42*	-.73***	-.77***	-.83***	-.48*	-.54**	-.65***	-.79***
3. T3 Dep			-	.69**	.16	.22	.59	.55*	.50*	.48*	.72***	.60**	-.64***	-.60**	-.65***	-.53*	-.44	-.35	-.67***	-.63**
4. T4 Dep				-	.35	.29	.49*	.50*	.75***	.61**	.57*	.70**	-.53*	-.67**	-.64**	-.80***	-.64**	-.58*	-.65**	-.80***
5. T1 Anx					-	.81***	.63***	.79***	.55**	.53**	.16	.49*	-.43*	-.46*	-.36	-.53*	-.34	-.21	-.15	-.22
6. T2 Anx						-	.73***	.81***	.51**	.74***	.39	.53*	-.37	-.40*	-.30	-.33	-.37	-.39	-.34	-.31
7. T3 Anx							-	.88***	.63***	.54**	.58**	.69**	-.53**	-.41*	-.37	-.31	-.40*	-.32	-.52**	-.38
8. T4 Anx								-	.61**	.54*	.63**	.79***	-.51*	-.52*	-.36	-.34	-.34	-.32	-.40	-.35
9. T1 Stress									-	.68***	.65***	.85***	-.38*	-.34	-.25	-.53*	-.40*	-.50**	-.54**	-.72***
10. T2 Stress										-	.63***	.62**	-.45*	-.64***	-.57**	-.62**	-.47**	-.67***	-.63***	-.70**
11. T3 Stress											-	.84***	-.57**	-.39	-.42*	-.36	-.38	-.41*	-.61**	-.61**
12. T4 Stress												-	-.49*	-.49*	-.37	-.45	-.34	-.46	-.56*	-.66**
13. T1 Esteem													-	.73***	.81***	.61**	.63***	.54**	.65***	.52*
14. T2 Esteem														-	.91***	.88***	.59**	.62***	.65***	.67**
15. T3 Esteem															-	.85***	.60**	.58**	.69***	.66**
16. T4 Esteem																-	.73***	.57*	.62**	.68**
17. T1 Efficacy																	-	.73***	.70***	.63**
18. T2 Efficacy																		-	.80***	.74***
19. T3 Efficacy																			-	.87***
20. T4 Efficacy																				-

Note: N_{T1} = 32; N_{T2} = 26; N_{T3} = 25; N_{T4} =18; Dep: depression; Anx: anxiety; Esteem = self-esteem; Efficacy = self-efficacy; * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

Table 2.

Paired samples t-tests for depression, anxiety, stress, self-esteem, and self-efficacy between T2, T3, and T4 compared to T1

Variable	M (SD)	M (SD)	t	df	p (two-sided)	g	95% CI around mean difference
T1 vs T2	T1	T2					
Depression	7.15 (5.25)	6.23 (4.36)	1.37	25	.182	0.26	[-.46, 2.31]
Anxiety	6.00 (4.90)	5.69 (4.60)	0.56	25	.580	0.11	[-.82, 1.44]
Stress	9.15 (4.16)	7.69 (3.60)	2.37	25	.026	0.45	[.19, 2.73]
Self-Esteem	15.69 (4.49)	16.77 (5.06)	-1.56	25	.133	-0.29	[-2.50, .35]
Self-Efficacy	28.46 (3.73)	30.08 (4.24)	-2.79	25	.010	-0.53	[-2.81, -.42]
T1 vs T3	T1	T3					
Depression	6.72 (4.86)	4.08 (3.26)	3.59	24	.001	0.70	[1.12, 4.16]
Anxiety	5.68 (4.27)	3.84 (3.86)	2.61	24	.015	0.51	[.39, 3.29]
Stress	8.92 (4.07)	6.12 (4.02)	4.14	24	<.001	0.80	[1.41, 4.20]
Self-Esteem	15.60 (4.56)	18.92 (5.11)	-5.52	24	<.001	-1.07	[-4.56, -2.08]
Self-Efficacy	28.44 (3.81)	30.52 (4.83)	-3.01	24	.006	-0.58	[-3.51, -.66]
T1 vs T4	T1	T4					
Depression	6.89 (4.90)	4.39 (3.96)	3.47	17	.003	0.78	[.98, 4.02]
Anxiety	6.22 (4.67)	3.44 (3.11)	4.06	17	<.001	0.91	[1.34, 4.22]
Stress	9.17 (4.00)	6.39 (4.00)	5.40	17	<.001	1.22	[1.69, 3.86]
Self-Esteem	16.00 (5.26)	18.67 (5.96)	-2.28	17	.036	-0.51	[-5.14, -.20]
Self-Efficacy	28.50 (4.31)	31.94 (3.98)	-4.08	17	<.001	-0.92	[-5.22, -1.66]

Note: N_{T1-T2} = 26; N_{T3} = 25; N_{T4} =18