But I am a wizard

Character bleed in Dungeons & Dragons

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Abstract

Recently Role Playing Games (RPGs), in specific Dungeons & Dragons (D&D), have sparked in popularity, with mainstream media such as films and series picking up on the phenomenon as well. Particularly during COVID-19 and with the stay-at-home measures, more people have started playing D&D which has been shown to have a positive effect on their players' well-being, underscoring the potential mental health benefits of the game. Academics have so far focussed on areas such as how physical customization possibilities of game characters can affect players or how a bond forms between players and characters. However, little attention has been paid to how a character's personality design and customization options affect the player. This research focuses on how personality design and customization options of the game of D&D affect the player in terms of character bleed over an extended period through a longitudinal experiment. Character bleed in short is the transfer of aspects of the self into the character (e.g. emotions, behavior, beliefs) and vice versa. A new measurement for character bleed was developed and tested for this purpose. Results show that playing a character close to your own personality leads to more character bleed-in than character bleed-out, and playing a character whose personality you wish to have or playing a character whose personality is opposite to your own equally leads to bleed-in and bleed-out. The results also show that when players play a character that has an opposite personality to their own, there is more bleed-out experienced than when they play a character close to their own personality. Continuing, the study provides helpful insights and further directions for future research, such as further developing and validating the measurement tool for character bleed, with the aim to discover how RPGs like D&D and character creation can create a healthcare tool to improve one's well-being.

Keywords: Role-playing Games, Dungeons & Dragons, Character bleed, Well-being

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The relationship between players and their characters is essential to the experience of Role-Playing Games (RPG), with characters being the medium through which players extend their presence and agency into the game (Banks et al., 2019; Bowman et al., 2016; Dimas et al., 2011). Previous research has focused on how physical customization possibilities of the character can affect players' concept of the self and increase perceived body ownership and presence (Waltemate et al., 2018; Yee & Bailenson, 2007), but little is known about how a character's personality design and customization options affect the player. This study aims to fill that gap by focusing on an RPG with wide personality customization options: Dungeons & Dragons (D&D). D&D is originally a tabletop role-playing game (TTRPG) that was published in 1947 and ever since has remained a popular game (Adams, 2013). In this game, the players navigate their self-made characters through adventures made up by another player who poses as a Dungeon Master (DM). Through collaborative storytelling, the players are both audience and author, having a great range of influencing and affecting the narrative. Within the character design, players have a great range of customization options. This can vary from arbitrary choices that do not impact the narrative (such as clothes and hair color), to impactful decisions either to the game (such as the race and class of the character), or the narrative (such as ethical beliefs and the personality of the character). The personality design of the character is open to the player, although if desired prompts can be given based on the chosen background of the character.

When players engage with a story and take on the perspective of the character, they leave behind the real world and their primary identity for the ones in the story, which is called immersion (Irimiás et al., 2021). Especially in D&D, through the imaginary and active nature of the game, the player has to actively use their cognitive capacity to immerse themselves into the game and, moreover, into the character. Through acting, the player gets to pretend they are the character, resulting in characters posing as a medium to experience events, but also feel emotions (Bowman et al., 2016). However, no matter how deep the immersion into a character is, because of the active use of a player's cognitive capacities, certain attitudes and behaviors will always be based on real-life experience, blurring the lines between the self and the character. For instance, when presented with a riddle, players are prone to use their own thought process to find a solution, rather than finding this solution in-character. Transferring aspects of the self into the character (e.g. emotions, behavior, beliefs), which is called character bleed, also happens in the opposite direction, from character to

player. In this situation, players find their self-aspects changed through what happened to their character (Bowman, 2022; We Åker Jeep, 2010). For example in a blog, a player named Nichelle describes how her character had the confidence she desperately wanted and that by playing this character, she got to take control over her own inner struggles as well as her character's (HPCritical, 2022). This example also illustrates role-playing games' impact on a player and their well-being (e.g. Bowman & Lieberoth, 2018; Scriven, 2021).

Next to this study being the first, to the author's knowledge, to look at D&D through means of a quantitative study, it will be relevant in multiple facets (Arenas et al., 2022). Looking at D&D combined with mental health: previous research by Scriven (2021) shows that many players of D&D used the game to mitigate the effects of isolation due to the lockdowns imposed during the pandemic. Especially in times of COVID-19 and the stay-at-home measures, mental health issues have increased, with more people reporting feeling lonely, stressed, or depressed (Baker et al., 2022; Hossain et al., 2020). The study by Scriven (2021) helps emphasize the potential mental health benefits of playing D&D.

While research into D&D, and even broader in RPGs, and their potential health benefits is relatively new, the interactive and improvisational nature of RPGs such as D&D or Live Action Role-playing (LARP) bears a resemblance to improvisational theatre. Within this field, research has looked into how theatre interventions can affect mental health. Schwenke et al. (2021) found that six weeks of improvisational theatre helped improve the creativity and psychological well-being of participants. Felsman et al. (2023) similarly found that improvisational theatre can reduce social anxiety and can be an accessible mental health intervention, that is subject to less stigma than traditional alternatives. Related to this, psychodrama has found that taking the role of someone else helps patients develop new social skills, and feel empathy for others (Bowman & Lieberoth, 2018). An important distinction to make between TTRPG and LARP, which can cause a difference in effects, is that the former relies mainly on linguistic devices such as speech and text, whereas the latter also makes use of physical attributes such as body language and attributes such as clothes and make-up (Lankoski and Järvelä, 2012). The acquiring of these physical attributes can be seen as an extra barrier to entry, making TTRPGs more easily accessible to the public than LARP.

While some literature exists on how RPGs can improve well-being (eg. Antunes et al., 2022; Caltabiano et al., 2018; Henrich & Worthington, 2021; Kovess-Masfety et al., 2016; Martončik & Lokša, 2016; Rønning & Bjørkly, 2019), still many intricacies have yet to be further understood. Yet, the games have been deemed suited for therapeutical practices because of the element of

control in emotional experiences (Mendoza, 2020). To fully grasp how RPGs can be used in healthcare, it is key to understand how, why, and what features in RPGs affect well-being and promote pro-social behavior (Lehto, 2021).

The aim of this study is not to draw directly into how D&D affects well-being, but to give helpful insights into how personality customization options of the character can affect players' concept of the self and guide future research regarding how RPGs like D&D can improve one's well-being. This will be done by looking at the relationship between a character's personality design and the transfer between the self and the character by means of character bleed. Where previous studies look at the effects of the game on a person in a retrospective manner by asking participants to reflect on their experiences, this study will be the first to this author's knowledge to add a manipulation to the experiment design by giving instructions for character creation (Arenas et al., 2022).

This transfer between the self and the character does not happen over the course of playing a single session. Like how relationships between real people take time to form, it can be argued that the relationship between a player and their character takes time to solidify as well. While each player engages with their character differently, creating various forms of player-character relationships according to their motivations and modes of immersion (Bowman & Schrier, 2018), this relationship evolves over time as the character further develops and the player spends more time in-character. Thus, it is crucial to study these dynamics between a player and their character over an extended period of time rather than looking at a single session.

This study aims to explore the phenomenon of character bleed further using the following research question:

> *How does character bleed develop between player and character in an online setting of Dungeons & Dragons over an extended period of time and how does a character's personality design affect this development?*

To answer the research question, a new measurement instrument for the understudied concept of character bleed will be created, by drawing on literature from psychology, narratology, game studies, and previous RPG studies, and testing this instrument through a longitudinal experiment.

Theoretical framework

Dungeons & Dragons

Dungeons & Dragons (D&D) is originally a tabletop role-playing game (TTRPG) that was first published in 1947 and ever since has remained a popular game (Adams, 2013). Since its first release, there have been many editions published, varying in the set of rule systems and the fundaments of the world the game takes place in. While these publications exist, players are encouraged to build their own set of rules and create their own worlds, giving the game a unique freedom of creation.

Usually, the game is played with 4-6 players, in which one person takes on the role of Dungeon Master (DM) and the other players create characters that work together and navigate through a shared game world. The DM designs the game world, including surroundings and characters, outside those the players create, that can be talked to. Furthermore, the DM outlines the prompts that can urge characters to take up missions, tasks, and/or problems, gently guiding players in a direction while harboring the players' freedom of choice.

The other players create characters and while pretending to be the characters they created interact with each other in the game world through dialogue. This leads to a shared storytelling experience between players and the DM. Whenever actions are taken, dice are rolled to determine if this succeeds or fails. For example, a dice roll can establish if your character finds a secret entrance hidden underneath a foliage of leaves. Actions can include exploring and investigating, persuading and deceiving other characters, or fighting in combat.

While much of the experience relies upon the players' imagination and the dialogue around the table, several tools can be used to help this process along, such as character miniatures, or maps of the environment.

Originally, the game is played around a table, it is also possible to be played online. This format of playing especially has spiked in popularity during the social distancing in the COVID years.

While the game mechanics are relatively loose compared to RPG formats found online, such as *Elder Scrolls*, there are still set rules on making characters. For example, each character has a set of numerical ability scores, creating abilities in which characters excel, while they may be bad at others. These abilities include strength, dexterity, constitution, intelligence, wisdom, and charisma. Generally How these ability scores are decided, either through choice or by the rolling of the dice, is up to the DM. Furthermore, players decide which race and class they play from the many options

given by the game itself, or in collaboration with their DM create a unique race and/or class. These choices affect aspects of the gameplay such as if a character can see in the dark or increase the chance of the character succeeding at activities such as swinging a sword or climbing a tree.

These choices can serve as inspiration for a character's personality (for example, a character with a high charisma might be more outspoken than a character with a lower charisma score), but is not a necessity. The player has full control of what the personality of the character is like and can decide how much the personality of the character does or does not align with their own personality. This personality can thus vary in every manner from a player their own personality, however, research shows that players prefer to play characters reflecting their own personality (Park & Henley, 2007).

Looking at the potential healthcare benefits of D&D, research remains underdeveloped (Baker et al., 2022). Studies note that during COVID individuals reported that playing D&D supported their mental health during this time (Baker et al., 2022; Scriven, 2021). While the accounts of these individuals cannot be seen as evidence without research backing it up, they are, together with the increased popularity of the game, underscoring the potential for mental health benefits.

Dungeons & Dragons in an online setting

While the game was originally designed to be played in an offline setting around a table, web-based platforms have arisen, offering countless resources to play the game online. Online, it can be played in a written format by typing only, in an audio format by using voice chats to talk, or in an audiovisual format through video calling where players, next to their voice, can also use hand gestures and expressions to communicate. It can be played with the same group once or multiple times a week, or with a group that changes each session, switching both players and DMs. Each different format of play creates a unique experience.

The format this research will focus on is an online format of D&D, which has been loosely referred to as West Marches. This format differs from traditional D&D in that there is no set group of players and there is no overarching plot. It is often played in communities where there are a large number of players present. The active players on these servers have the option to double as DM, hosting games whenever they see fit. The storyline the DM goes with commonly begins and ends in a single session. The stories and the characters are embedded in an overarching game world that exists within the community. Whereas traditional D&D follows a more branching storyline, West

Marches can thus be compared to a sandbox style of playing, where players may choose whom to interact with and which storyline to follow.

Another difference is the additional opportunities for immersion that come with this particular online format. Often separate channels embody locations, such as a forest or a tavern, in which players can role-play in text with other players. Whereas the above-mentioned sessions take time to organize, the textual role-play only needs two players willing to interact in-character at any time, allowing continuous access to immerse into the story-world and into the character.

With the increased sessions due to not being tied to (the agenda of) a single group and the possibility for continuous immersion through textual role-play, the time that a player can spend in-character in West Marches is higher than that in a campaign setting. Given many possibilities for continuous immersion, this form of play can be seen as a super-play of D&D, giving the advantage that full immersion can be reached at a quicker rate compared to a traditional campaign setting because of the higher exposure rate.

Transportation and immersion

Narratives have the power to take us on an emotional journey where we experience emotions with and for a character (Slater et al., 2014). This can take shape in, e.g., laughing out loud or crying when engaging with media. Through words and images, we feel the agony and we share the joy of whoever their viewpoint we are taking on. Previous academic endeavors concerning traditional narratives explain that stories take us out of our everyday lives and "transport" us into a fictional world. At the base of this phenomenon is the transportation theory, which Gerrig (1993) describes:

"Someone ("the traveler") is transported, by some means of transportation, as a result of performing certain actions. The traveler goes some distance from his or her world of origin, which makes some aspects of the world of origin inaccessible. The traveler returns to the world of origin, somewhat changed by the journey." (p. 10-11)

Being transported by a narrative entails first leaving behind this world. The person interacting with the narrative will remain conscious of the world around them, but leave behind fundamentals in favor of the logic presented in the story world (Green & Brock, 2000; Green, 2021). Another factor in the transportation theory is the strong experience of emotions and motivations, even if the person experiencing the story is aware that the events are not real (Gerrig, 1993; Green & Brock,

2000). A third factor, which takes place after the experience, is that the person may find themselves changed in beliefs and attitudes. For this reason, stories have been accredited to be powerful tools to change the attitudes and beliefs of people (Green & Brock, 2000). Summarizing, transportation consists of attention, imagery, and feelings. By experiencing strong mental imagery and emotions, the experience of a narrative can lead to a change in behaviors and beliefs (Green, 2021).

The transportation theory was originally designed for textual narratives, but over time, narratives have evolved. Through (online) video games a new type of literature has developed, namely interactive narratives. The switch here goes from the person experiencing the story by paying attention to experiencing the story by actively engaging, increasing cognitive efforts. Compared to traditional narratives, interactive narratives give the reader more agency, which brings the experience closer to that of real life, arguably making transportation more readily available (Ryan, 2008; Douglas & Hargadon, 2000). Because of the change in narratives, there has been a change in the terms applied. Immersion came along with the studies of games and interactive narratives and is closely related to transportation. In her book *Hamlet on the Holodeck*, Murray (1997) describes immersion as follows:

"Immersion is a metaphorical term derived from the physical experience of being submerged in water. We seek the same feeling from a psychologically immersive experience that we do from a plunge in the ocean or swimming pool: the sensation of being surrounded by a completely other reality, as different as water is from air, that takes over all of our attention, our whole perceptual apparatus." (p. 98)

The main difference with transportation is that transportation is the overarching term for the experience of losing yourself in a narrative and returning to your own body, while immersion focuses on a single aspect of transportation. Immersion occurs when the person taking in the narrative mentally leaves behind the real world in favor of the fictional one (Irimiás et al., 2021). Immersion can thus be seen as an aspect of transportation, where immersion details the leaving behind of the real world in favor of a fictional one, and transportation entails this as well as the return from the fictional world to the real one. In their paper, Nilsson et al. (2016) describe four general views on immersion: immersion as a property of the system, immersion as a perceptual response, immersion as a response to a narrative, and immersion as a response to a challenge. For this research, I will focus on the latter two.

Immersion as a response to the narrative is defined as immersion that results from people interacting with the game world and taking in the presented narrative, using their cognitive power to such an extent that it occupies all their attention (Nilsson et al., 2016). Second, immersion as a reaction to challenge is more often found in interactive narratives. This type of immersion arises when the person interacting with the narrative is presented with a challenge. These challenges can play into a person's capacity for action, one's intellect, or the use of sensorimotor skills (Nilsson et al., 2016). A key difference between the two is the level of attention required from the person. In narrative immersion, the person can still act relatively passively compared to immersion as a reaction to challenges, where the person is expected to spend their cognitive efforts to overcome this obstacle. I will take immersion as a first prerequisite for building emotional involvement with a character since it is a first step to getting involved in the overall narrative and the fictional world.

Relationships with fictional characters

Given the nature of D&D where the player is not just passively watching a narrative with fixed characters, but instead creates a character and actively participates, it can be argued that players of this game are encouraged to insert themselves into the game environment and become present in the story-world (Christy & Fox, 2016). The transitioning into the imaginary mindset of the character has been called en-roling. Similarly, the transitioning from the imaginary mindset of the character back to that of the primary self is called de-roling (Gualeni & Vella, 2020). This terminology stems from theatre practices and LARP (a combination of TTRPG and theatre practices where players dress as their character and act out their roles in body and voice, with the help of a predetermined set of rules akin to that of TTRPG games) but by academics has mostly been used in VR studies (e.g. Burrell, 2023; Gualeni & Vella, 2020). While most theories see the transfer as instantaneous, Gualeni and Vella (2020) note that this is a complex process. Players, in the example of D&D, need to meet a threshold of basic knowledge of the game, such as how to navigate their character sheet or that the embodiment of their character takes place through linguistic means, as a prerequisite to en-role into their character. Additionally, the role-playing capacities of the group and storytelling capacities of the DM play a big part in creating the shared fictional environment that allows for a player to stay en-roled into character.

When the player is en-roled into their character, they feel as if they are present in the story world described by the DM and shared by the group in their experience. Presence, as this feeling is called, can take place as social presence, physical presence, and self-presence. In this paper, the focus is on the latter. Self-presence refers to the physiological state in which the character is

experienced as the actual self in the perception of the body, physiological states, emotional states, and identity (Biocca, 1997; Lee, 2004). Self-presence thus involves the monadic state of blending with a character. The element of active participation in D&D where players create a character that takes on an active role in pursuing narrative progression has led scholars to believe that the high level of interactivity results in a more monadic experience (seeing the character as the self) in which character role-taking is stronger than in passive media consumption, leading to self-presence (Klimmt et al., 2009; Peng et al., 2010). In this research, I take self-presence as a second prerequisite of emotional involvement with a character, next to immersion.

With characters acting as a lens through which the player experiences a story, research has put great emphasis on understanding the workings of the relationship between players and their characters. While players creating a feeling of attachment to their characters is a likely outcome, there are different ways this "relationship" takes form. Banks and Bowman (2016) found four different player-avatar relationships (PAR) when looking at players of World of Warcraft, a Massively Multiplayer Online RPG (MMORPG). These character types are: (1) seeing the avatar as an object separate from the self, (2) seeing the avatar as an extension of the self where the player has more agency than the character, (3) seeing the avatar as a symbiote where the character is a differentiation of the self, giving the character agency, or (4) seeing the avatar as someone else, where the character has more agency than the player. These character types are strongly associated with different levels of emotional involvement and suspension of disbelief (Banks, Bowman & Wasserman, 2018). Regarding the four categories as a spectrum, Banks & Bowman (2016) suggest that on the extreme of seeing a character as an object, the player-character relationship is purely functional and features low differentiation between the character and the self, low emotional intimacy, high player agency, and focus on combat and competition. On the other extreme, seeing the avatar as someone else, the reverse is true. There is high self-differentiation where characters are perceived as independent entities that have separate lives. The relationship between a player and a character can be highly social and even become parasocial relationship. Furthermore, there is high emotional intimacy, high avatar agency, and a focus on escaping to the game world and protecting it as a distinct, real space (Banks, Bowman & Wasserman, 2018). This illustrates that the player's experience of the game is partially shaped by the attachment style of the player to the character. Thus, the more fleshed out a character becomes, and the more it becomes its own entity, the larger the impact it has on the player.

Putting the research of Banks & Bowman (2016) in the context of this study, an important distinction to make is that World of Warcraft has spatial- and story immersion because you need not focus on what the character looks like or how it acts from scratch since it is already largely pre-determined. The relationship players create with the character is embedded in the story. D&D, however, starts with the character rather than the story. The story-world immersion is embedded in the character creation, thus leading to the belief that D&D creates a unique player-character relationship.

The attachment a player forms with their character partially depends on two things: the intrinsic motivation of the player, and the dependent on facets of the game, such as customization options. on the point of intrinsic motivation, Bowman (2015) notes that players can create alibis for their characters, accepting the premise that any action done is done by the character and not themselves. This is a strategy to lessen the impact a character can have on the player as illustrated by Banks, Bowman & Wasserman (2018). The stronger the alibi players create, the less character bleed experienced (Bowman, 2015). On the point of other facets of the game, previous research in video games found that an increase in character customization options leads to heightened feelings of engagement and presence (Raymond & Lindgren, 2013). Within the field of VR studies, it was found that personalized avatars affect players' body ownership, presence, and dominance compared to more generic avatars (Waltemate et al., 2018). In another VR study, Yee & Bailenson (2007) found that taller avatars behaved more confidently, showing the effects character customization can have on player behavior. Within these two fields, the customization options are visualized to the player, whereas within D&D the customization primarily takes place within the imagination of the player, but can be visualized through externally obtained art.

While the current study isolates the aspect of personality customization of the avatar, it is important to acknowledge the broader construct of the player-character relationship affected by the player, the character, and the (social) environment, both in-game and out-of-game.

Character bleed

Character bleed is a term that originally stems from LARP and has spread to D&D. While the terminology stems from LARP, character bleed can occur whenever a person immerses themselves into a fictional character. The term is widely used in the gaming community, but less familiar in academic contexts. When taking on the imaginary mental state of the character, the player can experience aspects of the self spill over from the player into the character or from the character into themselves. These aspects include emotions, thoughts, behavior, relationship dynamics, physical

states, ideologies, and personality traits, among others (Bowman, 2022). Bowman (2022) also adds that, although it is described in popular culture as either positive or negative, character bleed on its own is a neutral phenomenon. Similarly to the definition above, We Åker Jeep (2010) describes character bleed as follows: “Bleed is experienced by a player when one’s thoughts and feelings are influenced by those of her character, or vice versa.”, with the main difference being that Bowman (2022) includes a wider range of aspects that can be affected by the playing of a character.

One issue with the definition of We Åker Jeep (2010), and can be carried over to the definition of Bowman, as pointed out by Lankoski and Järvelä (2012) is that the character should not have the possibility to affect the player because the character does not exist outside the limits of the player, and does not have its own thoughts and feelings to influence the player. Therefore the existence of this character within the mindset of the player will never be total or continuous. Because adding details takes place predominantly from the mindset of the player (and partially from the shared fictional space within the group of players), it is easier to fill in details already familiar to a player, rather than from an unknown perspective (Lankoski and Järvelä, 2012). Yet, given the accounts of players, characters, both within the mindset of the player and within the shared space of the group playing the game, have the ability to affect players and change aspects of themselves.

To explain this, we look at research into human experiences and behavior in the context of close relationships. One of the basic human motivations is the need to expand the self through “exploration, opportunity, effectance, self-improvement, curiosity, competence, or a broadening of one’s perspective” (Aron et al., 2013, p. 90). An effective way to do this is through the relationships we form with others. We take on the perspective of these others, resulting in the overlap of the construction of the self and the construction of the other (Aron et al., 2013; Possler et al., 2022). Essential in understanding how people understand the actions of others and form empathy are mirror neurons and emotional contagion (Decety & Jackson 2004; Rizzolatti & Sinigaglia 2010). Several studies within the field of psychology have shown that when a person watches an action being performed or an emotion being expressed, similar brain regions activate as when the person would do or perform this themselves. Neuroscientists propose that there are mirror neurons present that activate both as observers and actors (Mafessoni & Lachmann, 2019). Related to this, emotional contagion (EC) is a social phenomenon that stems from the mirroring of others’ emotions and results in the adoption of emotions originally observed in others (Dimas et al., 2011). E.g., when we see someone else smile, we subconsciously mirror this with our lips. Research has looked into our cognitive responses (using EMG) when we mimic others’ emotions and found that the

mirroring of emotional expressions (like smiles) results in a subtle change in our emotions as well (here happiness) (Wild et al., 2003).

Putting this back into the context of D&D, when a player creates their character, they make use of previously established simulators, which are categorized memories specific to different aspects, captured from various instances (Barsalou et al., 2003, p.88). These simulators are cognitive "shortcuts" to make sense of the world and help us comprehend things such as what a happy person should look like or what the social rules are when entering a restaurant. In the character creation in D&D this translates to strength-based characters such as barbarians or fighters being muscular. This simulator is likely to be formed by encounters with previous fiction in which barbarians or fighters are portrayed, such as *Khal Drogo* in *Game of Thrones* (Lankoski and Järvelä, 2012). Thus, rather than mirroring from another person, the person mirrors from the character, which consists of previously established simulators created from information gathered outside the limits of the self.

Thus, to add to the description of character bleed provided by Bowman, character bleed takes place because when taking on the imaginary mental state of a character, we make use of previously established simulators, that we continue to update in-game in the shared setting of the group. Because the character in this case becomes the context in which new simulators are created for the situation, the borders between the two get blurred to such an extent that aspects of the self spill over from the player into the character or from the character into themselves (Lankoski and Järvelä, 2012). The character in this context is to be considered as a theoretical construct within the boundaries of the self that is able to affect the player within the limitations of the player's own mental capabilities and that of the shared group experience.

Character bleed can be experienced in two ways: bleeding in and bleeding out. When experiencing bleed-in, a player (subconsciously) starts acting more like themself than act like the character, making the character so similar to themselves that whatever happens feels like it is happening to them, rather than their character. For example: in a setting of D&D when two players are mad at each other, this feeling may get reflected back into their characters, with their characters being mad at each other as well, while there is no in-game reason for this behavior. Bleed-out is when something that happens in-character affects the player to such an extent that their attitudes and behavior adjust to that of the character. For example: when players of D&D their characters fall in love, it is not uncommon for the players to experience attraction to each other as well without the characters (Waern, 2011). In the setting of healthcare, both serve their own purpose to improve one's well-being. Bleed-in can be a tool for people to make sense of the world around them and to

revisit events from their past from the perspective of a fictional character, feeling more in control (Hughes, 1988). Bleed-out can be a tool to escape from social pressure and be allowed to experiment with new traits, aiding in the gaining of new perspectives and learning new skills (Hughes, 1988).

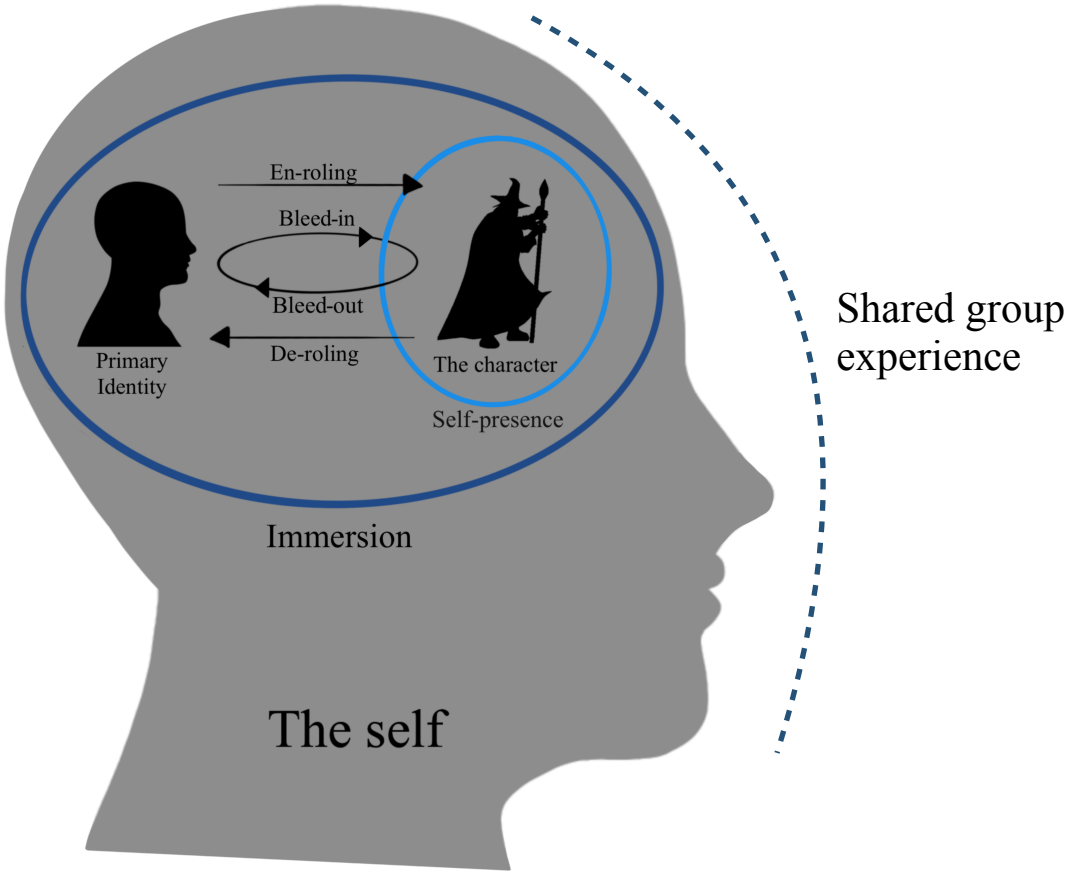
Regardless of the direction of character bleed, there are several types. Bowman (2022) originally named the following types of character bleed: emotional bleed, procedural bleed, memetic bleed, romantic bleed, ego bleed, emancipatory bleed, and design bleed. Within this definition, the impact of categories differs. For example, emotional bleed contains any emotional state, while romantic bleed includes feelings of attraction and/or sexual attraction, which is very niche when compared to emotional states as a whole. After reviewing the categories, I came to four more evenly distributed categories of character bleed that serve this study better: first, bleed on the emotional level, with emotional states carrying over into the character or vice versa. Second, bleed on a societal level, involving one's stance toward other players. It can happen on the level of social dynamics, where the playing of the game results in shifting social dynamics between players, such as friendships, romantic feelings, and/or sexual attraction. Third, bleed on the cognitive level, where someone's stance towards a concept or paradigm changes or their own traits shifts as the result of playing their character. Fourth, bleed on the behavioral level, where someone behaves themselves differently as a result of playing the game. These two directions (in and out) and types of character bleed are used in creating the tool measuring character bleed.

Towards a visual representation of character bleed

Combining the terms explained above, I developed a visual representation of character bleed that can be found below.

Figure 1

A visual representation of character bleed



Based on the literature I built a model presenting the process of character bleed. Since the player is also the designer of the character, the entire process happens within the boundaries of the self, as well as being influenced by the shared group experience when playing the game.

Within this model, I see immersion (into the game world and the narrative) as the first state that needs to be reached to fully experience both self-presence and character bleed. Without it, the player is still present in their own mind, meaning that everyday worries can cloud their experience. As such, I propose the first hypothesis:

> **Hypothesis 1:** A higher degree of experienced immersion leads to a higher degree of self-presence.

Self-presence can be experienced when the player is immersed in the narrative and present in the environment depicted by the DM and is reached when the player is en-roled into the character where it feels like they *are* the character. Given the character-dependent nature of this phenomenon,

this is suspected to be a strong factor in character bleed. When a player still feels a distance from their character, it might be easier for them to differentiate between the character and their primary identity, thus not experiencing character bleed as profoundly. Thus I propose the following hypothesis:

> **Hypothesis 2:** A higher degree of experienced immersion leads to stronger reported character bleed, and this effect is mediated by self-presence.

Looking at character bleed compared to the process of en-roling and de-roling, the process of en-roling is a singular process where at the start of the game the player en-roles into their character by leaving behind the real world and entering the bubble of immersion and self-presence. The process of de-roling is the opposite, where the player leaves the bubble of immersion and self-presence to return to their primary identity. When players are en-roled into their character, players will still be linked to their own identity because of the context in which new simulators are created and updated. Thus, while the majority of the mindset shifts from the player into the character and vice-versa during the en-roling and de-roling process, there is a constant process of going back and forth between the two using and updating the simulators that enables character bleed.

For this research, I will focus on the phenomena of bleeding into a character and bleeding out of a character. As mentioned above, bleed-in can result from a player's own aspects of the self leaking into the character, while bleed-out results from a character's aspects of the self bleeding out into the player. Bleed-in hypothetically should be more pronounced when the personalities of the two are close together because the player can make use of pre-existing simulators they use in their everyday life already. Using the same logic, when the personalities are further apart, there are fewer pre-existing simulators to pull from, with players engaging with less familiar concepts compared to when playing a character whose personality lies close to the player. Because more simulators hypothetically need to be created and updated, there are more aspects to bleed-out into the player.

Next to these two characters' personality types in relation to one's own personality, a middle line is added: wishful identification. Wishful identification is a psychological process where a person desires or attempts to become like a (fictional) other and has been found to occur when these others share similar traits to a person while embodying other traits the person wants to see more of in themself (Hoffner & Buchachan, 2005). A reason this particular character appeals to people is the cathartic release that comes with the strong sense of personal efficacy and achievement that can be obtained by creating a more accomplished character that's still somewhat related to the self

(Hughes, 1988). Within the gaming context, previous studies have focused on how wishful identification has been shown to generate higher levels of immersion and positive affect after gaming (Przybylski et al., 2012). Wishful identification in physical traits (e.g. attractiveness and height) has been shown to affect players, and it was found that characters embodying these wishful traits are a more popular gaming choice and can lead to the proteus effect (Praetorius & Görlich, 2020; Yee & Bailenson, 2007). This effect comprises a person changing their behavior according to a digital (wishful) representation of themselves in-game, such as people embodying a tall character acting more confidently than when they would play a short character (Yee & Bailenson, 2007). With how wishful identity traits already show a change in a player's behavior, the next step is to see the effects this character type has on character bleed. With a character that is close to a person's wishful identity embodying aspects they already possess as well as aspects they do not, this condition falls in between the previously stated two. Thus, I propose these hypotheses:

Hypothesis 3a: Characters that lay closer to the player's own morals and beliefs result in a stronger bleed from the player into the character than out of the character

Hypothesis 3b: Characters that embody a player's wishful identification, equally result in bleed-in and bleed-out of the character

Hypothesis 3c: Characters that lay further away from the player's own morals and beliefs constitute a stronger bleed-out of the character into the player than from the player into the character

Method

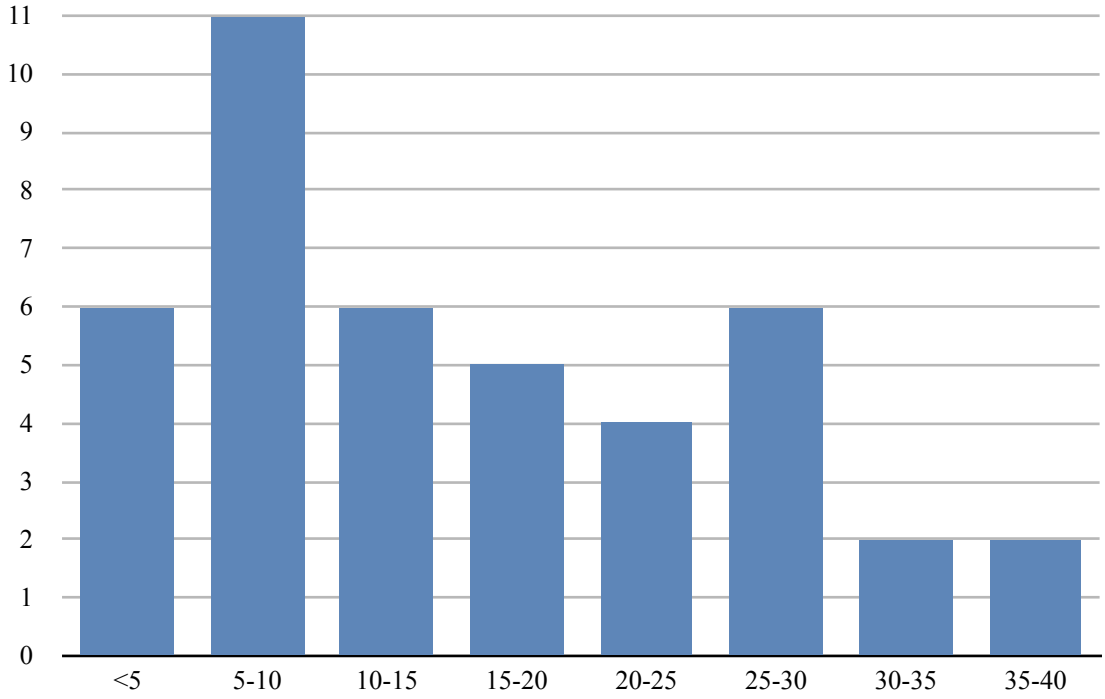
An experimental study was carried out within online D&D communities on Discord, where participants were asked to create a D&D character according to one of the three randomly assigned character creation instructions for a character's personality. All other assets of the D&D character were up to the participant to create. Next, participants were asked to play the character for a period of three months. The study had a between-subjects design where participants were asked to create a character's personality that would either be: close to their own personality, close to who they wish to be, or opposite to their own personality. After the period of three months, participants were asked to fill in a questionnaire measuring the immersion, self-presence and character bleed they experienced.

Participants

A total of 48 volunteers were recruited from four discord servers and through Reddit, each using a similar set of West Marches rules to play the game. Participants had no previous knowledge about the experiment objectives. Of the 48 participants, only 43 participants filled in the second questionnaire. Among the participants who did not complete the second survey, three indicated that they did not get the chance to play the character. The other two did not give reasons for not filling in the second questionnaire. Upon exploring the data, one participant was excluded after they indicated in the open questions that after one attempt at playing D&D, the game itself was not to their liking. Of the 42 participants included in the sample, 64 percent were male (n = 27), 26 percent were female (n =11), five percent were non-binary (n = 2) and five percent did not want to disclose their gender (n = 2). The largest group indicated to be between 25-34 years old (n = 28) with ages ranging from 18 to 44 years old. Looking at nationalities, 38 percent (n = 16) of the participants were from the United States and 29 percent (n = 12) were from The Netherlands. Other countries include the United Kingdom (n = 4), Denmark (n = 2), Malaysia (n = 2), Belgium (n = 1), Brazil (n = 1), Ecuador (n = 1), Indonesia (n = 1), Kuwait (n = 1) and Poland (n = 1). Sixty percent of the sample (n = 25) had a degree in higher professional education or above. Half the participants (n = 21) had at least four years of experience playing D&D, while the other half had less than four. Most participants (n = 11) indicated playing D&D around 5-10 hours a week. The average weekly playing time of the participants can be found in Figure 2 below with the number of hours on the X-axis and the number of participants on the Y-axis.

Figure 2

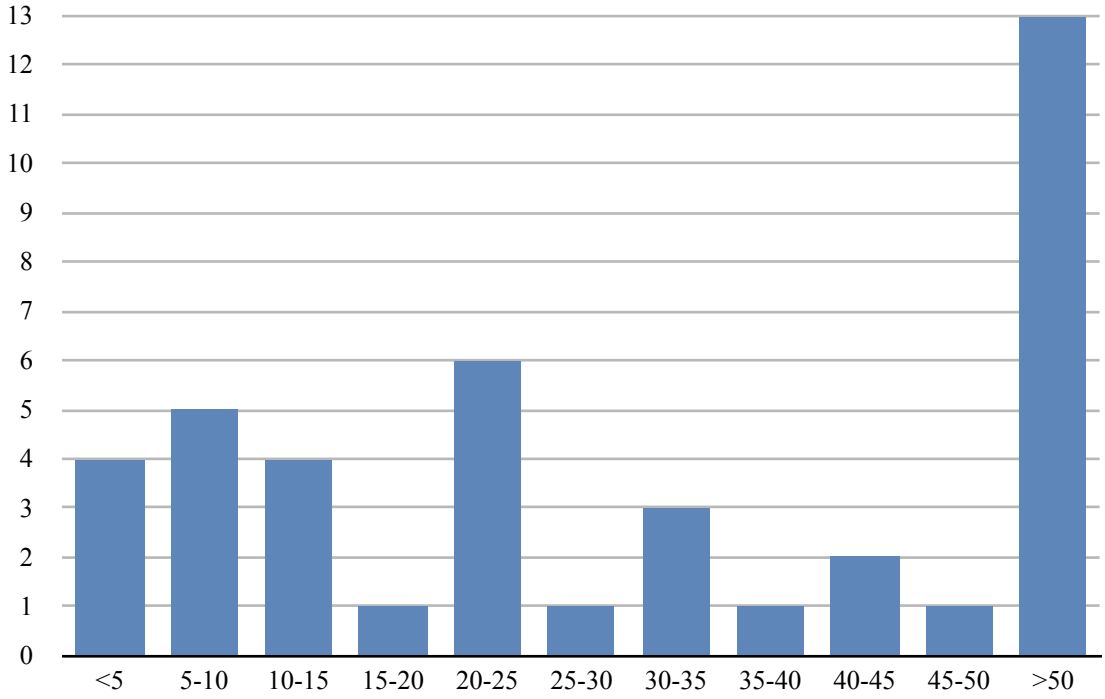
Average hours per week participants spent playing Dungeons & Dragons.



After the experiment, most people indicated to have played their characters for the experiment for more than 50 hours (n = 13). The average time participants spent playing their character for the study can be found in Figure 3 below with the number of hours on the X-axis and the number of participants on the Y-axis.

Figure 3

Average hours participants spent playing their Dungeons & Dragons character for the experiment.



Of the three conditions, 18 participants played a character close to their own personality, 13 participants a character whose personality they wish to have, and 11 participants a character whose personality is far away from their own. The reason for the variance in group numbers, next to not every participant completing the experiment, is that some participants did the first questionnaire multiple times, resulting in the system losing track of the actual number of participants per condition.

Materials and Measures

The questionnaire presented to the participants consisted of two parts. The first part was presented before the experiment, and the second at the end of the data collection period of three months. Both questionnaires were presented to the participants through Qualtrics.

The first questionnaire consists of demographic questions, such as age and gender, and questions about experience playing games, specifically D&D. Following that, participants were given a personality test to determine a baseline that they used to create their character. For the personality test, the test on *16personalities.com* was used. This website is an open and accessible tool to determine someone's personality type based on theories widely used in psychology practices, like the big five personality traits and the Myers-Briggs Type Indicator. This test makes use of the Jungian typology to sort people into one of 16 types of personalities. These 16 types consist of four letters, where the first letter mentions if the person is introverted or extraverted, the second if the person uses mainly intuition or sensations to perceive the world around them, the third letter refers to if the person uses thinking or feeling as a main resource for rational functions such as decision making, and the fourth to display a person's dominant function in consciousness as either judging or perceiving (Weddle, 2015). However, according to critics, Myers-Briggs is unlikely to be a valid measure of personality and is largely refuted by scholars. Reasons for this refusal include but are not limited to, the lack of consistency that stems from having people self-verify the results, and how the test is widely used to explain people's behavior, rather than describe it (e.g. Stein & Swan, 2019; Weddle, 2015). Nevertheless, while the test is not a tool for predicting performance or outcomes, it is helpful to users as a guideline for increased self-awareness and understanding (Stein & Swan, 2019). Within this research, the test is used to give suggestions as to what a person's strengths and weaknesses could be, which they can implement in creating their character, rather than having to rely on a person's self-knowledge for these traits.

The questionnaire after the experiment period of three months consisted of three parts: one measurement to measure immersion, one measurement for self-presence, and one measurement for character bleed. While the feelings of immersion, self-presence, and character bleed likely vary per session, the decision was made to apply the test after the full period of three months to get an overall result, while keeping intact the ecological validity by not disturbing the flow of players by letting them fill in a questionnaire after every session.

For the measurement of immersion the Immersive Experience Questionnaire (IEQ) by Jennett et al. (2008) was used, combined with the understanding media enjoyment questionnaire from Green & Brock (2000) with some modifications in the wording to fit the game of D&D. The IEQ developed by Jennet et al. (2008) is a 31-item scale that measures the subjective experience of being immersed in a game by letting participants report their feelings on a 7-point Likert scale, ranging from "not at all" to "a lot" with questions such as "To what extent did you feel as though you were separated from your real-world environment?". The media enjoyment questionnaire from Green & Brock (2000) is an 11-item scale that measures the subjective experience of being immersed in a narrative by letting participants report their feelings on a 7-point Likert scale, ranging from "not at all" to "very much" with statements such as "While I was reading the narrative, I could easily picture the events in it taking place.". Because D&D is largely a story-based game, the media enjoyment questionnaire was used to replace questions focused on in this context irrelevant game mechanics (such as "At any point did you find yourself become so involved that you were unaware you were even using controls?") with narrative-based questions (such as "While playing the game, could you easily picture the events in it taking place?"). Furthermore, a total of ten questions such as "Did you feel that you were trying your best?" and "How much did you want to "win" the game?" were left out. For these two specific questions, the reasoning is that D&D lacks an objective to win, making these questions unfitting in the context. An assessment of the internal consistency of the measure of immersion, consisting of 21 items, showed Cronbach's Alpha being $\alpha = .87$. The adjusted questions including the reasoning for the adjusted or omitted questions can be found in Appendix D.

For the measurement of self-presence, the Self-Presence Questionnaire (SPQ) provided by Ratan & Hasler (2009) was modified to fit the context of D&D. The SPQ is originally a 23-item scale that measures the subjective experience of feeling self-presence in a virtual environment on a 5-point Likert scale, ranging from "not at all" to "absolutely" with questions such as "When happy events happen to your avatar, to what extent do you feel happy?". A total of five questions less

relevant to the current context from the lack of a virtual environment such as “When using your avatar, to what extent do you feel like your arm is elongated into the game/virtual environment through your avatar?” were deleted. An additional two questions were deleted because of their similarity to other questions in the questionnaire. The reason for this was to increase the likelihood of participants filling in the four questionnaires by shortening the questionnaire as much as possible. An assessment of the internal consistency of the measure of self-presence, consisting of 15 items, showed Cronbach’s Alpha being $\alpha = .84$. The adjusted questions including the reasoning for the adjusted or omitted questions can be found in Appendix D.

The third measurement of character bleed measures both bleeding into a character and bleeding out of a character. This questionnaire has been designed in the context of this study using literature covering related concepts such as identification and emotional contagion and has been evaluated by three experts in the field of D&D. The measures of character bleed were split into character bleed-in and character bleed-out, and on a sub-level split into the four above-mentioned categories of character bleed: social settings (e.g. “I started disliking a player more because of the dislikable character they play”), emotional capacity (e.g. “After the session the emotions I felt during the game often lingered”), cognitive capacity (e.g. “Playing my character has helped me feel more comfortable with myself”), and player behavior (e.g. “When I act out what I say I am doing (for example through hand movements), I notice I connect more with my character”).

An assessment of the internal consistency of the measure of character-bleed, consisting of 18 items, showed Cronbach’s Alpha being $\alpha = .89$. Next, looking closely at the validity of the scale of character bleed, a split was made between bleed-in and bleed-out. For the scale for bleed-in, Cronbach’s Alpha is reported $\alpha = .66$. Taking a closer look at the individual items, the value of Cronbach’s Alpha could increase to $\alpha = .69$ by deleting the tenth item: “My character often holds themselves in a similar way I do (e.g. reacting to problems, the way they hold their own in an argument, the way they walk)”. However, because the improvement is so small it was decided to keep it. Still, the results from the questionnaire of bleed-in should be interpreted with care. For the scale for bleed-out, Cronbach’s Alpha is reported $\alpha = .88$. Looking at the individual items, the value of Cronbach’s Alpha could not be increased. Further analysis of the questionnaire by means of a factor analysis can be found in the analysis.

Because of the novelty of the last scale, open-ended questions about the player’s experience (e.g. “How would you describe the connection you have to your character?”) Were included. If

outliers present themselves, these answers were used to look for explanations. The answers to the open questions also served as further information as to why the character bleed was or was not happening and will be used in the discussion to further explore the results. The full questionnaire can be found in Appendix A-C.

Procedure

An experimental study was carried out within online D&D communities on Discord. Upon clicking the survey link posted in the discord servers and on Reddit, participants were directed to a consent form. After providing informed consent, participants were asked to fill in the demographic questions provided. Then, they were randomly assigned to one of the three conditions and asked to fill in the 16 personality test provided on *16personalities.com*. Based on the outcome of this latter test, they were given instructions (differing per condition) on how to implement the results to design a D&D character. The three types of instructions can be found in Appendix B. They were then asked to continue playing the character as they saw fit and keep track of the hours they spent in-character, both during sessions and role-play through text. Because the period of time would vary between participants, they were told they could start playing right after they completed the first questionnaire, leading to participants having between three months and three months and two weeks of time to play their character. After this period of time, participants were given a survey measuring the amount of immersion, self-presence, and character bleed they experienced over the total period. Because there was a single measurement at the end of the period of three months, this method relies heavily on a participant's ability to self-reflect on their total feelings of immersion, self-presence, and character bleed. However, a single moment of measurement was chosen over multiple moments spread over time to preserve the natural experience of playing D&D and prevent participants from playing the game differently with the questions in mind. The first survey was designed to be completed in 15 minutes, and the second in 20 minutes.

Analysis plan

To test whether a higher degree of experienced immersion leads to a higher degree of self-presence and whether a higher degree of experienced immersion leads to stronger reported character bleed, and whether this effect is mediated by self-presence, a mediation analysis using Hayes' PROCESS macro was carried out. In this analysis, self-presence was the predicting variable for the outcome of experiencing character bleed as a result of immersion.

For the last hypotheses regarding character types resulting in different types of character bleed, the file was split into character types and a paired samples t-test was conducted per condition to determine the effect of character types on bleeding in and out.

Results

Following the preregistration, the results first look into whether the relationship between immersion and character bleed can be explained by self-presence (H1 and H2). After this, the relations between character types and bleed-in and bleed-out are further explored (H3). To unite the two, an additional analysis was carried out unifying the factors into a singular model with a serial mediation analysis.

Character bleed measurement tool

To investigate the validity of the newly designed measurement tool of character bleed, a factor analysis was run on the scale for character bleed. For this analysis, a Varimax rotation was used because of the internal differences between both types of character bleed and the differences of subtypes of character bleed.

Based on a principal component analysis using Varimax rotation, four factors were distinguished with an eigenvalue above 1 (EVfactor1= 6.67, EVfactor2= 1.96, EVfactor3= 1.67, EVfactor4= 1.43). The scree plot also showed that the inflection point lies at Factor 5, meaning that four factors can be distinguished. These factors together explained 65.12 percent of the variance in character bleed. The four factors did not match the predetermined factor structure, either on the level of bleed-in and bleed-out or on the level of the four subtypes. All clusters contain statements from both bleed-in and -out, indicating that the clusters naturally lean into the four intended clusters of subtypes of bleed.

The first factor with an eigenvalue of 6.67 consists of statements related to cognitive and behavioral bleed. Looking at these statements, the factor contains five statements of the mental connection with a character with statements such as “Playing my character has helped me feel more comfortable with myself”. The second factor with an eigenvalue of 1.96 contains five statements of all four subtypes. Analyzing the cluster of statements, they have in common that they relate to a player’s stance on the game’s characters (both their own as well as others) with statements such as “I started liking a player more because my character likes their character”. The third factor with an

eigenvalue of 1.67 contains three statements, of which two are from character bleed-in and one from character bleed-out. Out of the subtypes, all three statements are about emotional bleed. Interestingly, the bleed-in statement "When I start a session with a happy mindset, this often gets reflected into my character" is included in this cluster, while the similar bleed-out statement "When my character is happy, I notice I myself am getting happier too" falls into the second cluster. The fourth factor with an eigenvalue of 1.43 contains five statements of all four subtypes. Looking at these statements, they have in common that they relate to what a player takes away from a game, with statements such as "After the session the emotions I felt during the game often lingered".

However, because the scree plot showed a steep point of inflection between components one and two, and because, in this study, character bleed was conceptualized as one general construct, the factor analysis was re-run but now specifying that one factor should be retained. The second analysis revealed that the nine items that were supposed to measure bleed-out clustered well together, with all factor loadings being .68 or higher. These items together explained 51.47 percent of the variance in character bleed with an eigenvalue of 4.63. It was therefore decided to change the preregistered plan of analysis and split character bleed into bleed-in and bleed-out. Within this split, the data around bleed-in needs to be interpreted with care, whereas the items clustering into bleed-out show these items can be perceived as one factor. The factor loadings of both analyses can be found in Appendix E.

Immersion, Self-presence, and Character bleed

To investigate whether the relationship between immersion and character bleed can be explained by self-presence (H1 and H2), two mediation analyses were performed using Hayes' PROCESS macro. In this analysis, immersion was the predictor variable for the outcome variable character bleed, and self-presence was entered as a mediator. Character bleed was split into two analyses, one analysis focusing on bleed-in as the outcome variable and one analysis focusing on bleed-out as a variable.

Table 1

Means and Standard Deviations of the Variables measured.

Sub-scale	***M***	***SD***
Immersion	3.71	.59
Self-presence	3.66	.68

Sub-scale	*M*	*SD*
Character bleed	3.11	.74
Bleed-in	3.19	.65
Bleed-out	3.09	.89

Before the results of the analysis could be interpreted, the assumptions needed to be checked. For bleed-in The Durbin-Watson test was used to check if the values of the residuals are independent, and with a value of 1.45, it can be assumed that the residuals are uncorrelated. Checking for multicollinearity, with the VIF scores being 1.00 and the tolerances being 1.00, there is no reason to assume multicollinearity. Looking at the standardized residuals and predicted scores plots, there is no reason to assume heteroscedasticity. Checking for normality, both the histogram and the P-Plot show it can be assumed that the assumption of normality is met. There was no cause for concern for significant outliers, with the Cook's distance values all being lower than one, with the highest value being .23. With all the assumptions being met no further action is taken in adapting the data.

For bleed-out The Durbin-Watson gave a value of 1.75, it can be assumed that the residuals are uncorrelated. The VIF and tolerance scores remain unchanged from the above. Looking at the standardized residuals and predicted scores plots, there is no reason to assume heteroscedasticity. Checking for normality, the histogram shows the data to be slightly skewed on the left side, however, checking the P-Plot it can be assumed that the assumption of normality is met. There was no cause for concern for significant outliers, with the Cook's distance values all being lower than one, with the highest value being .54. With all the assumptions being met no further action is taken in adapting the data.

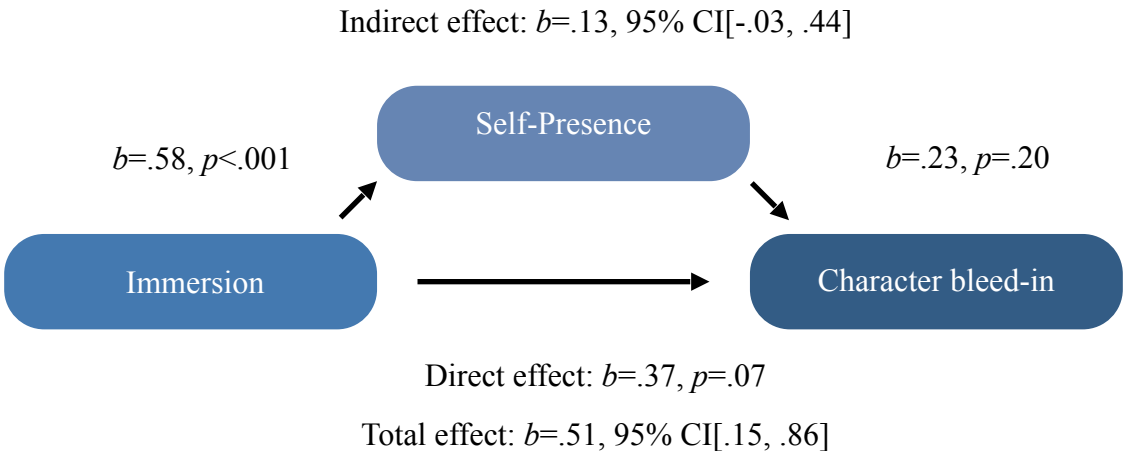
Mediation analysis with immersion, self-presence, and bleed-in

The model with the independent variable immersion and the mediator of self-presence to predict the dependent variable bleed-in is an improvement over the null model (R^2= .17, F [1, 40]= 8.30, p= .01), with the model predicting 17.2 percent of the variance in bleed-in. The model also showed a significant effect of the independent variable immersion on the mediator self-presence (b= .58, SE= .16, p< .001), indicating that a higher immersion score led to higher scores on self-presence. This leads to the acceptance of the first hypothesis that a higher degree of experienced immersion leads to a higher degree of self-presence. Furthermore, results showed there was no

significant direct effect of the independent variable immersion on the dependent variable bleed-in (*b*= .37, *SE*= .20, *p*= .07). There was also no significant effect of the mediator self-presence on the dependent variable of bleed-in (*b*= .23, *SE*= .18, *p*= .20). Additionally, there was no indirect effect fount of the model (*b*= .13, *SE*= .12, 95% BCa CI [-.03, .44]). However, there was a total effect of the independent variable immersion on the dependent variable bleed-in (*b*= .51, *SE*= .18, *p*= .01), meaning that despite immersion not directly, or indirectly through self-presence, affecting bleed-in, the combined influence of the direct effect between immersion and bleed-in and the indirect effect flowing through the mediator of self-presence shows a significant total effect.

Figure 4

Conceptual model of Bleed-in with Immersion and Self-presence



A second model was run where the time participants spent playing their characters was added as a covariate. The second model was a slight improvement over the first model (R^2= .18, *F* [2, 39]= 4.16, *p*= .02), with the model predicting 17.6 percent of the variance in bleed-in. However, the model shows no significant effect of the covariate of hours participants spent in character on the dependent variable bleed-in (*b*= -.01, *SE*= .03, *p*= .67).

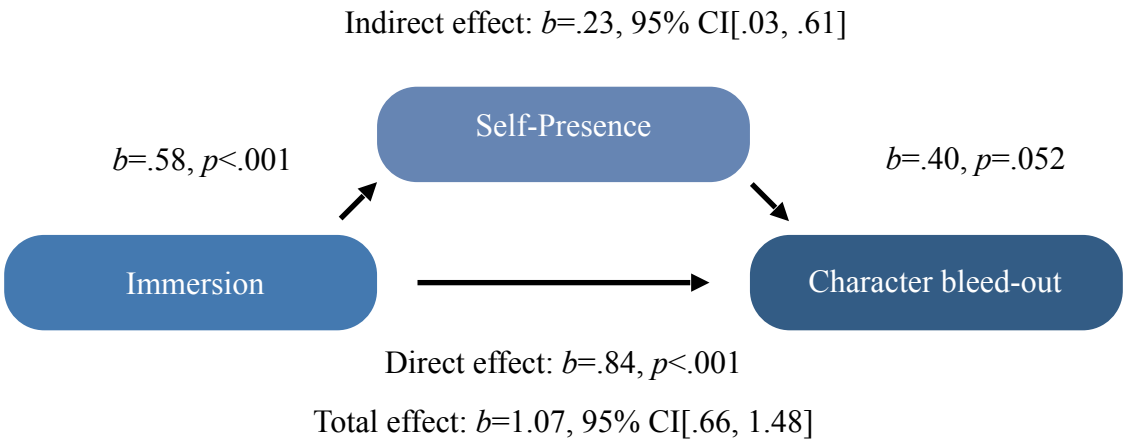
Mediation analysis with immersion, self-presence, and bleed-out

The model with the independent variable immersion and the mediator of self-presence to predict the dependent variable bleed-out is an improvement over the null model (R^2 = .41, *F* [1, 40]= 28.05, *p*<.001), with the model predicting 41.2 percent of the variance in character bleed-out. As expected, just like the model with bleed-in, there is a significant effect of the independent variable immersion on the mediator self-presence (*b*= .58, *SE*= .16, *p*<.001). Furthermore, results

showed there was a significant direct effect of the independent variable immersion on the dependent variable character bleed-out (b= .84, SE= .23, p<.001). There was no significant effect of the mediator self-presence on the dependent variable of bleed-out (b= .40, SE= .20, p= .052). However, there was an indirect effect of the model (b= .23, SE= .15, 95% BCa CI [.03, .61]) and a total effect of the independent variable immersion on the dependent variable bleed-out (b= 1.07, SE= .20, p<.001), meaning that despite self-presence not directly explaining bleed-out, the relationship of immersion on bleed-out is significantly explained by the mediator of self-presence.

Figure 5

Conceptual model of Bleed-out with Immersion and Self-presence



Given how in both models there is a total effect of immersion on character bleed, which is mediated by self-presence, this leads to the acceptance of the second hypothesis that a higher degree of experienced immersion leads to stronger reported character bleed, and this effect is mediated by self-presence.

A second model was run where the time participants spent playing their characters was added as a covariate. The second model was a slight improvement over the first model (R^2=.42, F [2, 39]= 14.24, p<.001), with the model predicting 42.2 percent of the variance in bleed-out. However, the model shows no significant effect of the covariate of hours participants spent in character on the dependent variable bleed-out (b= -.02, SE = .03, p= .42). Because the amount of hours participants spent in character is neither a significant contribution to the dependent variable bleed-in or bleed-out, it can be concluded that the extended period of time does not play a role in the development of character bleed.

Personality types and character bleed

To answer the hypotheses about character types on bleed-in and bleed-out, the file was split on character types.

Table 2

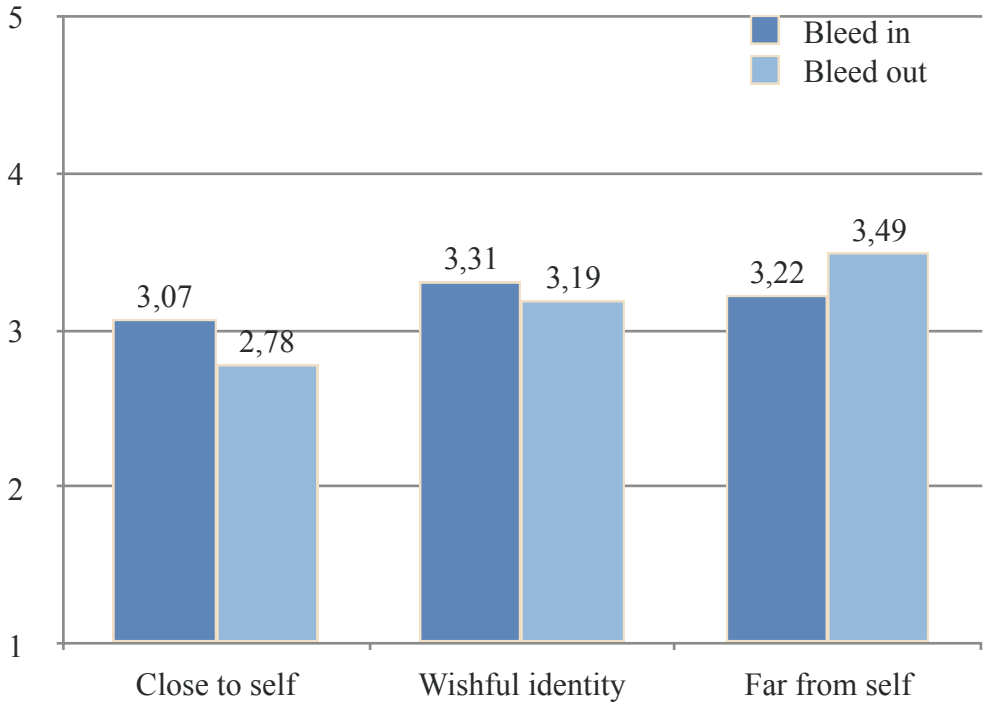
Means and Standard Deviations of the Variables measured.

Sub-scale		*M*	*SD*
Character close to self	Character bleed-in	3.07	.62
	Character bleed-out	2.78	.83
Wishful identification	Character bleed-in	3.31	.67
	Character bleed-out	3.19	.86
Character far from self	Character bleed-in	3.22	.71
	Character bleed-out	3.49	.92

The data in the table above leads to the following figure, visualizing the relations between character types and the amount of bleed-in and bleed-out participants experienced:

Figure 6

Visualized Means of the Variables measured.



Next, a Paired samples t-test was conducted per condition to determine the effect of character types on bleed-in and -out (H3). The results indicate that for characters who lay close to a player's own personality, there is a significant difference between bleeding into a character (*M*= 3.07; *SD*= .62) and bleeding out of a character (M= 2.78; *SD*= .83); [*t* (17)= 3.23, *p*= .01]. This means that the hypothesis "Characters that lay closer to the player's own morals and beliefs result in a stronger bleed from the player into the character than out of the character" (H3a) can be accepted.

For characters who lay close to a player's wishful identity, no significant difference was observed between bleeding into a character (*M*= 3.31; *SD*= .67) and bleeding out of a character (M= 3.19; *SD*= .86); [*t*(12) = .91, *p*= .38]. This means that the hypothesis "Characters that embody a player's wishful identification, equally result in bleed-in and bleed-out of the character" (H3b) can be accepted.

Next, for characters who lay far away from a player's own personality, no significant difference was found between bleeding into a character (*M*= 3.22; *SD*= .71) and bleeding out of a character (M= 3.49; *SD*= .92); [*t*(10) = -1.31, *p*= .22]. This means that the hypothesis "Characters that lay further away from the player's own morals and beliefs constitute a stronger bleed-out of the character into the player than from the player into the character" (H3c) cannot be accepted.

A unified model

To see how all variables relate to one another, an additional analysis was carried out. The purpose of this analysis has been to test the mediating role of immersion and self-presence in the relationship between character types and character bleed. Like the previous mediation model, two models have been run, splitting the dependent variable of character bleed into bleed-in and bleed-out.

Before the results of the analysis could be interpreted, the assumptions needed to be checked. For bleed-in The Durbin-Watson test was used to check if the values of the residuals are independent, and with a value of (2.08), it can be assumed that the residuals are uncorrelated. Checking for multicollinearity, with the VIF scores all being below 10 with the highest being 1.38, and the tolerances being larger than .02 with the smallest being .73, there is no reason to assume multicollinearity. Looking at the standardized residuals and predicted scores plots, there is no reason to assume heteroscedasticity. Checking for normality, the histogram shows the data to be slightly skewed on the right side, however, checking the P-Plot it can be assumed that the

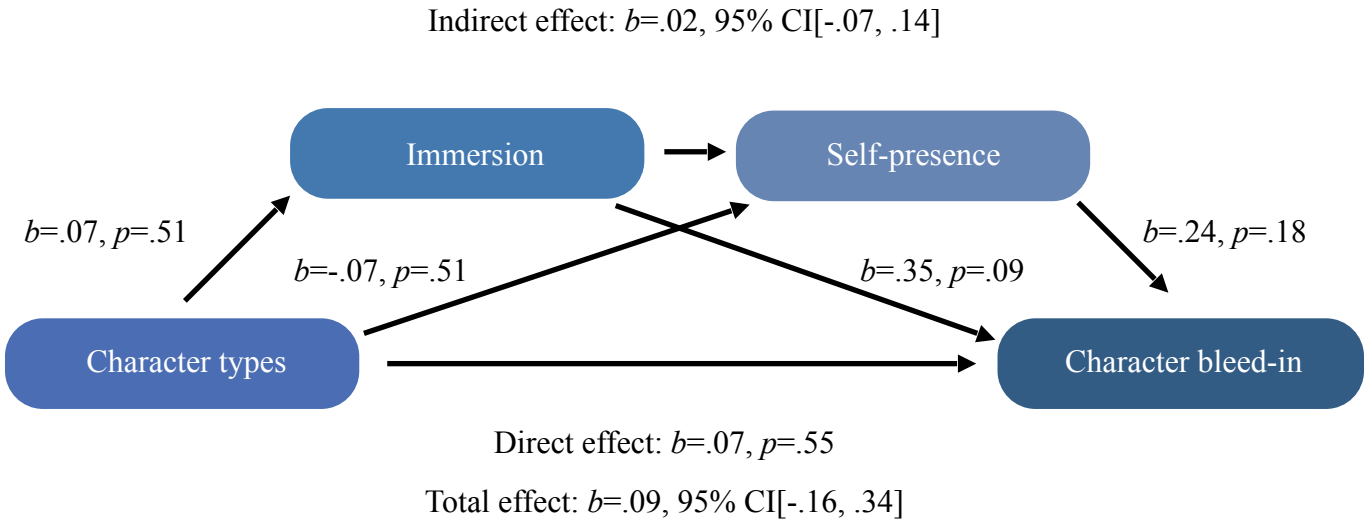
assumption of normality is met. There was no cause for concern for significant outliers, with the Cook's distance values all being lower than one, with the highest value being (.19). With all the assumptions being met no further action is taken in adapting the data.

For bleed-out The Durbin-Watson gave a value of (1.90), it can be assumed that the residuals are uncorrelated. The VIF and tolerance scores remain unchanged from the above. Looking at the standardized residuals and predicted scores plots, there is no reason to assume heteroscedasticity. Checking for normality, the histogram shows the data to be slightly skewed on the right side, however, checking the P-Plot it can be assumed that the assumption of normality is met. There was no cause for concern for significant outliers, with the Cook's distance values all being lower than one, with the highest value being (.18). With all the assumptions being met no further action is taken in adapting the data.

To test the first serial mediation model, Hayes' PROCESS macro was used. In this analysis, character types was the predictor variable for the outcome variable bleed-in, with immersion as the first mediator and self-presence as the second mediator. The model with the character types, immersion, and self-presence to predict the dependent variable bleed-in is not an improvement over the null model (R^2= .01, F [1, 40]= .49, p= .49). The analysis shows a positive effect of immersion on self-presence when the effects of character types are controlled (b= .59, SE= .16, p<.001). The model also shows that character types do not affect immersion (b= .07, SE= .10, p= .51) or self-presence (b= -.07, SE= .10, p= .51). In addition, neither character types (b= .07, SE= .11, p= .55), nor immersion (b= .35, SE= .21, p= .09), nor self-presence (b= .24, SE= .18, p= .18) affect bleed-in. Finally, there is no indirect effect (b= .02, SE= .05, 95% BCa CI [-.07, .14]) or total effect (b= .09, SE= .12, 95% BCa CI [-.16, .34]) either. The results can also be found visualized in Figure 7 below.

Figure 7

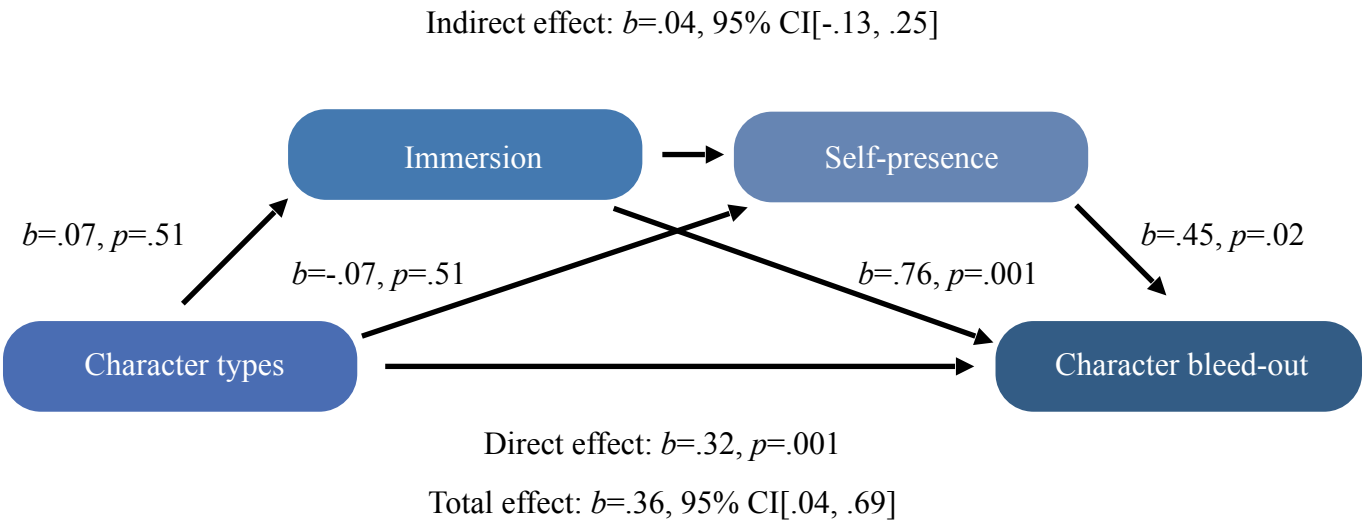
Conceptual Model of Bleed-in with Character Types, Immersion, and Self-presence



In the second serial mediation analysis, character types was the predictor variable for the outcome variable bleed-out, with immersion as the first mediator and self-presence as the second mediator. The model with the character types, immersion, and self-presence to predict the dependent variable bleed-out is an improvement over the null model (R^2= .11, F [1, 40]= 5.06, p= .01). As observed above, character types does not have a significant effect on immersion (b= .07, SE= .10, p= .51) and self-presence (b= -.07, SE= .10, p= .51). Additionally, immersion has a positive effect on self-presence when the effects of character types are controlled (b= .59, SE= .16, p<.001) as does self-presence on bleed-out when character types and immersion are controlled (b= .45, SE= .18, p= .02) and immersion on bleed-out when character types is controlled (b= .76, SE = .21, p= .001). There was no indirect effect found of the model (b= .04, SE= .10, 95% BCa CI [-.13, .25]), however, there was a total effect of the independent variable character types on the dependent variable bleed-out (b= .36, SE= .16, p= .03), meaning that the combined influence of the direct effect between character types and bleed-out and the indirect effect flowing through the mediators of immersion and self-presence shows a significant total effect, next to the significant direct effect of character types on bleed-out. The results can also be found visualized in Figure 8 below.

Figure 8

Conceptual model of Bleed-out with Character Types, Immersion, and Self-presence



Discussion

Immersion, self-presence, and character bleed

Among the results, it was found that immersion leads to stronger feelings of self-presence, which is in line with previous research (e.g. Baños et al., 2004), and leads to the acceptance of the first hypothesis: A higher degree of experienced immersion leads to a higher degree of self-presence. Additionally, it was found that a higher degree of experienced immersion leads to stronger reported character bleed, and this effect is mediated by self-presence, leading to the acceptance of the second hypothesis: A higher degree of experienced immersion leads to stronger reported character bleed, and this effect is mediated by self-presence.

Looking at the research question "*How does character bleed develop between player and character in an online setting of Dungeons & Dragons over an extended period of time and how does a character's personality design affect this development?"*, we can thus conclude that the development of character bleed is for a large part dependent on the degree of experienced immersion, which is mediated by self-presence. It was expected, like the bond between player and character (Giles, 2002), that the amount of experienced character bleed would grow stronger over time, this did not seem to be the case, indicating that character bleed as a concept is more tied to immersion and self-presence than it is to time.

Looking at the player's experience of the game, Banks, Bowman & Wasserman (2018) note that this (although their findings are on the game WoW) is partially shaped by the attachment style of the player to the character. Putting that notion in the light of this study, future research should further investigate this relationship to create more clarity on the role player-character relations have on character bleed and how this ties into the role that immersion and self-presence have. While this study did not measure the bond players felt with their characters, the answers to the open questions already show an interesting incentive for this research. One participant also noted: "I feel like my character is more of a friend than a part of myself, it was very unlike myself so I see it more as a friend I had to act as rather than an extension of myself." (P29, far from self). This example shows that player-character relationships, while heavily dependent on the player's preferred style of playing, can change according to the personality they create for their character, and can thus vary per character.

To answer the other half of the research question about how a character's personality design affects the development of character bleed between players and characters, further analyses were conducted that are discussed below. Important to note is that upon analysis, it turned out that the questions to measure bleed-in were not as valid as intended. The factor analysis also showed the statements regarding bleed-in not clustering well together. A reason for this can be that some statements were too specific. For example, in "When I act out what I say I am doing (for example through hand movements), I notice I connect more with my character", participants may not feel directly more connected to their character through hand motions, or abide from using them if their character is not that expressive. The results regarding bleed-in thus need to be interpreted with caution.

Character design - close to oneself

Looking at the type of character created in relation to the amount of bleed-in and bleed-out experienced, there are several interesting results. First, it was found that when participants played a character that lay close to themselves, there was more bleed-in experienced than bleed-out, leading to the acceptance of hypothesis 3a: characters that lay closer to the player's own morals and beliefs result in a stronger bleed from the player into the character than out of the character.

As briefly mentioned above, this result needs to be interpreted with caution. Turning to the open questions for further explanation of these results, it was found that bleed-in is not always recognized because of how close their own state of mind is to that of their character. For example,

one participant mentioned: “I found myself connecting to the character in a way that let me try to feel as if I had lived in the setting myself and taken the actions that my character did” (P20, close to self) while later on saying “I could not name an example [of bleed-in] myself”. Next to that, because of how well-known character bleed is within the D&D community, some participants may have answered the questions based on their own definition, which can be fully negative, not being aware of positive character bleed. These two reasons result in the statement that playing a character closer to oneself resulting in more bleed-in than bleed-out should be evaluated with a critical eye.

Regardless, when looking at the open-ended questions for additional insights, participants do report experiencing bleed-in. For example, one participant mentioned “I do feel like my mood can bleed into the way I play more than anything. If I'm feeling down, I usually don't try to speak up as much during role-play.” (P23, close to self), illustrating how someone’s emotions can bleed into the character. On the social level, another participant noted: “I felt the connection I had to other players. I felt my character interacted easier with players I knew and were comfortable with, whether it be a hostile interaction or a friendly one.” (P29, close to self). This continues to show that, while the results should be interpreted with care, participants playing a character close to themselves report experiencing bleed-in.

Continuing to shed more light on the results by looking at the open-ended questions: participants reported that playing characters close to themselves made them more self-aware, while also making them feel more vulnerable. For example, one participant said:

“Deliberately making a character with some of my own flaws and strengths didn't make me enjoy being the character any more than others I've played, but it did make some emotional moments resonate more. Like, “Oh, if he can do this thing in this situation, despite having the same flaw related to it that I do, maybe I can do it, too.” (P17, close to self)

While another participant mentioned: “I felt very vulnerable and exposed playing this character” (P11, close to self). This shows that while playing a character close to one’s own personality might lead to new insights regarding how other people and participants themselves accept their flaws, participants generally did not enjoy it a lot because of how vulnerable it made them feel. This also shows that when looking at applications for healthcare, playing a character that lays closer to oneself, while easier to identify with, might be less suited for healthcare applications because of how vulnerable it could make people feel, which goes against the previously mentioned

purpose of bleed-in of giving people a sense of control while revisiting events of their past in a different setting.

Character design - wishful identification

When analyzing the data, it was found that participants playing a character close to whom they want to be, by using one's assessed strengths and weaknesses turned into strengths, it was found that bleed-in and bleed-out were experienced equally, leading to the acceptance of hypothesis 3b: characters that embody a player's wishful identification, equally result in bleed-in and bleed-out of the character.

Looking at the open questions for further insights into this result, participants in this condition did overall like the experience of playing a character closer to who they want to be, while also being able to learn something about themselves. For example, one participant said "[I have experienced this as] positive. A bit of self-searching, taking a step back and realizing I could be myself a bit more at times." (P3, wishful identification), while another reported:

"My character definitely had me thinking about some of the ways I handle situations. While my initial intentions might have been to please the majority of others, I had to step back and think about how my character would handle it in not being a people pleaser. It made me more aware of my everyday situations, and made me more confident to say 'no' or to do what I needed and not what I thought someone else wanted." (P13, wishful identification).

These examples continue to illustrate how playing a character tied to one's wishful personality can make one realize that they have the power to become who they want to be. Adding elements of yourself and someone you wish to be into a character can lead to both bleed-in and bleed-out. However, critically reflecting on this condition, it is up to debate to determine if this measure truly measured wishful identification. The condition was determined by participants turning the weaknesses the personality test gave them into strengths. These weaknesses do not necessarily align with the personal weaknesses of the participant, nor does it mean that the participant wants to be someone who does not have those weaknesses. Nevertheless, by turning weaknesses into strengths, this condition formed a middle line between the other two conditions.

While participants in this condition did not score the highest on reported bleed-in and bleed-out when compared to the other conditions, the comfort people reported when playing this type of

character in contrast to the other two conditions could make this a viable option for healthcare applications.

Character design - Far away from the self

When looking at characters far away from the self, bleed-out was not found to be significantly stronger than bleed-in, meaning that hypothesis 3c: characters that lay further away from the player's own morals and beliefs constitute a stronger bleed-out of the character into the player than from the player into the character, is not accepted. However, looking at the serial mediation when accounting for immersion and self-presence, the contribution of character types to bleed-out does become significant, with the model explaining 41,2% of the variance in bleed-out. This means that the further away a character's personality gets from the player (measured in the three steps of close to self, wishful identification, and far from self), the stronger bleed-out gets, and this effect is mediated by immersion and self-presence.

Seeking an explanation for the found effect by looking at the open questions, participants in the third condition mentioned they had a hard time connecting to their characters and that it often felt unnatural to play them, yet often described the experience as a positive one, both giving insights into themselves and strengthening their acting skills. For example, one participant said: "I think this may have helped me a bit with my self-confidence. Even if I did not like the process." (P15, far from self). While another mentioned:

"[I have experienced this as] absolutely positive - it was an exciting challenge to undertake, to play someone as contrary to myself, and playing a build I find compelling and interesting. Even though [my character] and I have different personalities and I found his aloof nature sometimes to be aggravating to myself, it built my social and role-playing skills significantly." (P33, far from self).

This illustrates that, despite participants mentioning they had a hard time connecting to their character, they still experienced bleed-out. Because it is harder to take on the role of the character, immersion and self-presence become more important than when looking at the serial mediation model for bleed-in, where character types did not seem to affect bleed-in when accounting for immersion and self-presence. While research into D&D shows that players prefer to play characters reflecting their own personality (Park & Henley, 2007), this study shows that the connection to a character in terms of similarity might not be fully necessary to gain new insights and learn new

skills through bleed-out. The results of this study are also in contradiction to earlier research where Bowman (2015) states that when players play a character that is closer to home, the alibi created becomes weaker, leading to more character bleed. The contradiction found in this study could indicate that the creation of an alibi is more in the hands of the player themselves than the facets of the game such as character creation, leading to participants that created a character far away from themselves experiencing significantly more character bleed-out than participants that created a character close to themselves.

Given that bleed-out gets significantly stronger when the character goes further away from the player, it is a strong potential tool for healthcare applications to learn more about yourself or even acquire new skills. However, for this to be workable, the hurdle to play this type of character needs to be made smaller, since playing a character with an opposite personality to their own was already a challenge for people having experience with D&D, and potentially is too challenging for people without experience in role-playing.

Directions for future research

In the sections above there are already suggestions for directions future research could take on to create new insights into how character creation can be used as a tool to create healthcare applications. Continuing on those insights, another direction in future research lies in taking a few steps back.

Within this study, we perform a study among people already familiar with playing D&D, but if the goal is to create a module that can be used in healthcare applications, research first needs to focus on the appeal of D&D to a wider public. Questions to be asked are, e.g., who are the people that play D&D? What is the appeal of playing D&D to these people? What withholds people who don't play D&D from playing it? As previous research notes, the process of en-roling into character is not instantaneous and requires knowledge of the system (Gualeni & Vella, 2020). Mapping out the threshold will be the first step to answering the above-mentioned questions.

Another focus point would be to learn more about the narrative power the player holds in terms of creating an immersive experience. Because the player dictates the dialogue of the character, there is a lot of player agency, but the downside is that if the player feels uncomfortable talking in-character or simply uses fewer words, this may take away the power of narration, which in turn could take away some of the immersion both for the player themself as for the other players of the game. Figuring out more about how much of the immersion and enjoyment is in the hands of

the player, how much is in the hands of the DM, and how much is in the hands of the other players would greatly benefit the further understanding of the dynamics of the game. A possible way to do this would be to repeat the current experiment, but instead of measuring one time at the end of the extended period of time, measure after each session. That, combined with an added questionnaire about the group dynamic split into the other players and the DM, could give insights into the baseline level of power the player has, and the amount of power the other people in the game have on a player's immersion, self-presence and character bleed.

Continuing on this point, it can be argued that bleed-out is not unique to high player-agency role-playing games like D&D, because the spillover of a character to a player could happen whenever there is a character present in whose point of view the player is immersed in. Thus, figuring out how much player agency plays a role in bleed-out by framing it in the gaming landscape, and potentially larger within the media landscape, should greatly help increase the understanding of the concept of bleed and what its prerequisites are for taking place to what extent.

When looking more directly into the translation of this experiment into a tool for healthcare applications, from the field of grounded cognition, it is said that the fictional mindset of the character is never continuous or total because of the character's placement within the self. Because the adding of details takes place predominantly from the mindset of the player (and partially from the shared fictional space within the group of players), it is easier to fill in details already familiar to a player, rather than from an unknown perspective (Lankoski and Järvelä, 2012). For example: someone who is naturally more reserved might not know how to conversely be very outgoing. The knowledge to play this trait comes from previous experiences, such as seeing other outgoing people or reading about it, but the feeling that goes accompanied with being outgoing might be different from the act that the reserved person puts up in the condition of playing a character opposite to themselves. Because of the nature of this experiment, that means it remains up to debate how well-executed the adding in of the details was to participants in the condition playing a character opposite to their own personality. When creating a tool suited for healthcare applications it is thus important to note that this method might not be suited to let participants learn new traits per selection, because of the potential gap between the intended effect of bleed-out and the actual effect. However, participants point out they did learn new skills and gain new insights when experiencing bleed-out, showing that for purposes of self-exploration, this method is suited to help the player learn more about themselves.

Furthermore, to create an effective healthcare tool, more research is needed to determine if the skills participants mentioned they picked up in the experiment linger after they stop playing the character. This can be measured by repeating the current experiment and adding an additional post-test after a period of time to measure how well the effects of character bleed lingered. This will lead to a better understanding of the effectiveness and longevity of the found effects of character bleed, which in turn gives more clarity on which character types work best in the design of a tool for healthcare.

Conclusion

The aim of this study was to investigate the new and under-researched concept of character bleed in D&D. In order to do so, a new measurement instrument was developed, and a longitudinal experiment was conducted using this measurement to see how people experience character bleed, and how their experience is affected by character design. Over the three types of character designs these results were found: first, while participants playing a character close to themselves reported feeling vulnerable, they still felt immersed, self-present and experienced character bleed. For participants within this condition, bleed-in was significantly more present than bleed-out. Second, participants that created a character's personality by turning their own weaknesses into strengths, reported overall enjoying playing the character. They experienced immersion, self-presence, and character bleed. The amount of bleed-in did not significantly differ from the amount of bleed-out. Third, participants playing a character whose personality was opposite to that of themselves reported having a hard time connecting to their character in terms of role-play. There was no significant difference in the amount of bleed-in and bleed-out experienced. However, when running a model for character bleed overall, including immersion and self-presence as mediators, it was found that the further away a character gets from their own personality (measured in the three steps of close to self, wishful identification, and far from self), the higher the amount of bleed-out experienced. Immersion and self-presence were not affected by character design. Interestingly, time did not seem to have a significant contribution to the development of character bleed.

Which character design is more useful in healthcare applications needs further investigation. Out of the three conditions, playing a character close to oneself, while easier to identify with, might be less suited for healthcare applications because of how vulnerable it could make people feel. For the other two conditions, while participants in the condition creating a character far away from their

own personality generated the highest scores in bleed-out, they also reported having a hard time getting into the role of their character, leaving the question if this type of character is well-suited for people less experienced with role-playing. Participants in the wishful identity condition did not report this struggle but reported equally experiencing bleed-in and bleed-out. More research on character bleed is needed to determine the amounts of which character bleed is desirable to create positive changes in behavior and potentially gain new insights and learn new skills to determine which personality for a character is the most suited to create a tool for healthcare.

This research contributes by shedding light on how a character's personality design and customization options affect the player in the context of character bleed. Furthermore, this research presents a first version of a measurement tool for character bleed and provide insight into how this concept relates to immersion and self-presence. Last, this research provides helpful insights and further directions for future research with the aim to discover how RPGs like D&D can create a healthcare tool to improve one's well-being.

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Appendix

Appendix A. Questionnaire before the experiment

Hello and thank you for participating!

Role Playing Games such as Dungeons & Dragons are becoming more and more popular, but academic research on the topic remains scarce. The goal of this study is to make a first step in connecting Dungeons & Dragons to mental healthcare by diving further into what it is like to play a character. In order to do this, we will provide you with a personality type with which you can create a character. After creating a character, we will ask you to keep track of the hours you spend playing this character both through text and voice chat, in the context of D&D or role playing in Discord. For the rest, you are free to play the character to your heart's desire. The experiment will end on the 12th of May 2023, after which we will send the final questionnaires to ask you about your experience.

If before this date you are unable to play this character any longer (for example because of character death), it is possible to end the experiment earlier. In that case, get in touch with the experimenter through the contact details below for the final questionnaire.

Your participation in this experiment is completely voluntary. The data will be collected and temporarily stored under your discord name, which will later be anonymized, and will be solely used for research purposes stated above. This study was approved by the Research Ethics and Data Management Committee (REDC) of the Tilburg School of Humanities and Digital Sciences. For additional information, feel free to read the detailed information below, or contact me through Discord (Fairytalest#8358) or through m.p.m.scholtealbers@tilburguniversity.edu

Kind regards,
Maxime Scholte Albers

Study purpose

When playing a character, we transport our mindset to that of someone else. This phenomenon has potential implications for mental health and has been researched in the context of books, series, and

digital games. To add to the variety of contexts, we want to take a look at this phenomenon in the context of Dungeons & Dragons.

Procedure and length of the study

This after-experiment questionnaire will take around 15 minutes to complete. There will be 3 lists of multiple-choice questions regarding your emotional involvement with the character, after which there will be some open-ended questions where you can elaborate on your experiences.

Possible risks and benefits

Participating in the study will not involve any risks of negative consequences, although some questions might be considered personal and sensitive. You do not have to answer questions you do not wish to answer. The benefit of participating is that you got to explore a new type of character to play and to reflect on your experiences.

Privacy and confidentiality

All data that will be gathered in this study, will be processed and stored in accordance with the General Data Protection Regulation (GDPR). In the questionnaire we will ask for your discord name, this will be to link the answers to the questionnaire before the experiment to that of the answers on the questionnaire after the experiment. After this, the discord name will be removed from the data set. At no point it is possible to link your answers to the survey to your personal data. The data will be stored for 10 years. The study has been given ethical clearance by Research Ethics and Data Management Committee of the Tilburg School of Humanities and Digital Sciences. You can request to see your data or to have it deleted by sending a message containing your discord name to the researcher (see 'Contact').

Voluntary participation

Participation in this study is on a voluntary basis. If you agree to participate, you may still decide to quit at any point without giving a reason. This will not entail any negative consequences for you and your data will then be deleted.

Contact

If you have any questions about the study, you can contact the experimenter of the study (Maxime Scholte Albers, m.p.m.scholtealbers@tilburguniversity.edu). If you have any remarks or complaints

regarding this research, you may also contact the 'Research Ethics and Data Management Committee' of Tilburg School of Humanities and Digital Sciences via tshd.redc@tilburguniversity.edu.

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1. What is your discord name? (this information will be used to connect the answers of this questionnaire to that of the answers on the one after the experiment)
2. For how many years have you played Dungeons & Dragons?
   - <1 year
   - 1-2 years
   - 2-3 years
   - 3-4 year
   - 4-5 years
   - 5-6 years
   - 6-7 years
   - 7-8 years
   - 8-9 years
   - 9-10 years
   - >10 years
3. How many hours a week do you roughly spend playing Dungeons & Dragons?
   - <5 hours
   - 5-10 hours
   - 10-15 hours
   - 15-20 hours
   - 20-25 hours
   - 25-30 hours
   - 30-35 hours
   - 35-40 hours
   - 40-45 hours
   - 45-50 hours
   - >50 hours
4. If you had to choose, what aspect do you like best about Dungeons & Dragons?

- The roleplay
- The mechanics

5. How old are you? (please answer in a round number)
   - Under 18
   - 18-24
   - 25-34
   - 35-44
   - 45-54
   - 55-64
   - 65-74
   - 75 or older
6. What gender do you identify as?
   - Male
   - Female
   - Non-binary/third gender
   - Prefer not to say
7. What is your Nationality? (if you have multiple, select the one you associate with most)
   - List with nationalities based on country
8. What is your highest completed educational level?
   - Less than secondary school
   - Secondary school
   - Community College (mbo)
   - Higher Professional Education (hbo)
   - Academic Higher Education - Bachelor (wo)
   - Academic Higher Education - Master (wo)
   - PhD
   - Doctorate
   - Other
   - Prefer not to say

Appendix B. Character creation instructions

Condition A: close to self

For this experiment we want you to connect your character to your own personality. In order to do this, we will ask you to fill in the personality test provided on 16personalities.com. If you go to the website, you can take the test if you go to the top-right corner and click **take the test**.

Once you're done and have a personality type assigned, please go to strengths and weaknesses. For the character creation, please try and use some of these personality traits in the creation of your character. For example: if the test says you're curious, you could make a curious character. You don't need to use all but try to implement at least one strength and weakness.

Condition B: wishful identification

For this experiment we want you to connect your character to your own personality. In order to do this, we will ask you to fill in the personality test provided on 16personalities.com. If you go to the website, you can take the test if you go to the top-right corner and click **take the test**.

Once you're done and have a personality type assigned, please go to strengths and weaknesses. For the character creation, please look at weaknesses and choose an attribute you wish you would see more of in yourself. When creating your character, try to implement this. For example: if you want to be more organized, try to make a character that is organized by nature. You don't need to use all given attributes, but try to implement at least one weakness turned into a strength.

Condition C: far from self

For this experiment we want you to connect your character to your own personality. In order to do this, we will ask you to fill in the personality test provided on 16personalities.com. If you go to the website, you can take the test if you go to the top-right corner and click **take the test**.

Once you're done and have a personality type assigned, please look at the letters and turn them around according to the following table:

I	E
N	S

T	F
J	P
A	T

So, for example: if your personality test gives you INTJ-A, you turn it around to ESFP-T. Once you have your new personality type, go to the navigation column at the top of the page to **personality types** and navigate to your new personality type.

Once you're on the page, please go to strengths and weaknesses. For the character creation, please try and use some of these personality traits in the creation of your character. For example: if the strengths give curious as a strength, you could make a curious character. You don't need to use all but try to implement at least one strength and weakness.

Appendix C. Questionnaire after the experiment (excluding measurement tools)

Hello again! And thank you for taking your time to fill in the last questionnaire of this experiment. This questionnaire consists of four parts and will roughly take 15 minutes to complete. If you want to reread the detailed information about this experiment, you can do so below, otherwise, you can continue to the question part.

Kind regards,
Maxime

Study purpose

When playing a character, we transport our mindset to that of someone else. This phenomenon has potential implications for mental health and has been researched in the context of books, series, and digital games. To add to the variety of contexts, we want to take a look at this phenomenon in the context of Dungeons & Dragons.

Procedure and length of the study

This after-experiment questionnaire will take around 15 minutes to complete. There will be 3 lists of multiple-choice questions regarding your emotional involvement with the character, after which there will be some open-ended questions where you can elaborate on your experiences.

Possible risks and benefits

Participating in the study will not involve any risks of negative consequences, although some questions might be considered personal and sensitive. You do not have to answer questions you do not wish to answer. The benefit of participating is that you got to explore a new type of character to play and to reflect on your experiences.

Privacy and confidentiality

All data that will be gathered in this study, will be processed and stored in accordance with the General Data Protection Regulation (GDPR). In the questionnaire we will ask for your discord name, this will be to link the answers to the questionnaire before the experiment to that of the answers on the questionnaire after the experiment. After this, the discord name will be removed

from the data set. At no point it is possible to link your answers to the survey to your personal data. The data will be stored for 10 years. The study has been given ethical clearance by Research Ethics and Data Management Committee of the Tilburg School of Humanities and Digital Sciences. You can request to see your data or to have it deleted by sending a message containing your discord name to the researcher (see 'Contact').

Voluntary participation

Participation in this study is on a voluntary basis. If you agree to participate, you may still decide to quit at any point without giving a reason. This will not entail any negative consequences for you and your data will then be deleted.

Contact

If you have any questions about the study, you can contact the experimenter of the study (Maxime Scholte Albers, m.p.m.scholtealbers@tilburguniversity.edu). If you have any remarks or complaints regarding this research, you may also contact the 'Research Ethics and Data Management Committee' of Tilburg School of Humanities and Digital Sciences via tshd.redc@tilburguniversity.edu.

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1. What is your discord name? (this information will be used to connect the answers to this questionnaire to that of the answers on the one after the experiment)
2. How many hours did you roughly spend playing the character you made for this experiment?
3. Which type of character were you asked to create?
    - (Partially) close to your own personality
- Someone whose personality you (partially) like to have
- (Partially) far away from/opposite to your own personality

Appendix D. Measurement tools

Immersion scale

Modifications made to the original Immersive Experience Questionnaire (IEQ) to create the RPG IEQ (changes in bold). Questions marked with * are taken from Green and Brock (2000)

Original quesion	Modified question	Reasoning
1. To what extent did the game hold your attention?	To what extent did the game**s overall** hold your attention?	
2. To what extent did you feel you were focused on the game?	To what extent did you **overall** feel you were focused on the game**s**?	
3. How much effort did you put into playing the game?	How much effort did you **overall** put into playing the game?	
4. Did you feel that you were trying your best?	*Left out*	Without a winning or losing objective, “doing your best” gets a different meaning
5. To what extent did you lose track of time?	*Unchanged*	
6. To what extent did you feel consciously aware of being in the real world whilst playing?	*Unchanged*	
7. To what extent did you forget about your everyday concerns?	*Unchanged*	
8. To what extent were you aware of yourself in your surroundings?	*Unchanged*	
9. To what extent did you notice events taking place around you?	*Unchanged*	
10. Did you feel the urge at any point to stop playing and see what was happening around you?	*Unchanged*	
11. To what extent did you feel that you were interacting with the game environment?	**To what extent could you overall picture yourself in the scenes the DM sketched?***	
12. To what extent did you feel as though you were separated from your real-world environment?	*Unchanged*	
13. To what extent did you feel that the game was something you were experiencing, rather than something you were just doing?	*Unchanged*	
14. To what extent was your sense of being in the game environment stronger than your sense of being in the real world?	*Unchanged*	
15. At any point did you find yourself become so involved that you were unaware you were even using controls?	**While playing the game, could you easily picture the events in it taking place?***	
16. To what extent did you feel as though you were moving through the game according to you own will?	**To what extent did you find yourself thinking of ways the story could have turned out differently?***	

Modifications made to the original Immersive Experience Questionnaire (IEQ) to create the RPG IEQ (changes in bold). Questions marked with * are taken from Green and Brock (2000)

Original quesion	**Modified question**	**Reasoning**
17. To what extent did you find the game challenging?	*Left out*	This is dependent on the session and not a guarantee for more immersion
18. Were there any times during the game in which you just wanted to give up?	Were there any times during the game**s** in which you **rather stopped playing**?	
19. To what extent did you feel motivated while playing?	*Unchanged*	
20. To what extent did you find the game easy?	*Left out*	This is dependent on the session and not a guarantee for more immersion
21. To what extent did you feel like you were making progress towards the end of the game?	*Left out*	Sometimes games can go by where the characters don't leave a tavern. Progress is too vague a concept in Dungeons and Dragons
22. How well do you think you performed in the game?	*Left out*	Without a winning or losing objective, game performance gets a different meaning
23. To what extent did you feel emotionally attached to the game?	*Unchanged*	
24. To what extent were you interested in seeing how the game's events would progress?	*Unchanged*	
25. How much did you want to "win" the game?	*Left out*	There is no winning or losing objective
26. Were you in suspense about whether or not you would win or lose the game?	*Left out*	There is no winning or losing objective
27. At any point did you find yourself become so involved that you wanted to speak to the game directly?	*Left out*	This is a part of the game mechanics
28. To what extent did you enjoy the graphics and the imagery?	*Left out*	N/A
29. How much would you say you enjoyed playing the game?	*Unchanged*	
30. When interrupted, were you disappointed that the game was over?	When **finished**, were you **overall** disappointed that the **session** was over?	
31. Would you like to play the game again?	*Left out*	Players already play the game on a regular basis

Self-presence scale

Modifications made to the original Self-Presence Questionnaire (SPQ) to create the Dungeons and Dragons Self Presence Questionnaire (changes in bold).

Original quesion	**Modified question**	**Reasoning**
1. When using your avatar, do you feel physically close to the objects and other avatars in the game/ virtual environment?	When **playing** your **character**, do you feel physically close to the objects and other **characters** in the game?	
2. When playing the game/using the virtual environment, how much do you feel like your avatar is an exten- sion of your body within the game/virtual environment?	*Left out*	More VR related
3. When something happens to your avatar's body, to what extent does it feel like it is happening to any part of your body?	When something happens to your **character**, to what extent **do you emotionally experience that it is happening to you**?	
4. When using your avatar, to what extent do you feel like your arm is elongated into the game/virtual envi- ronment through your avatar?	*Left out*	More VR related
5. When using your avatar, to what extent do you feel like you can reach into the game/virtual environment through your avatar?	When **playing** your **character**, to what extent do you feel like you **are present in the** game environment through your **character**?	
6. When playing the game/using the virtual environment, to what extent do you feel like your hand is inside of the game/virtual environment?	*Left out*	More VR related
7. When playing the game/using the virtual environment, how much do you feel your avatar is a part of your body?	When playing the game, how much do you feel your **character** is a part of you?	
8. When happy events happen to your avatar, to what extent do you feel happy?	When happy events happen to your **character**, to what extent do you feel happy?	
9. When surprising events happen to your avatar, to what extent do you feel surprised?	When surprising events happen to your **character**, to what extent do you feel surprised?	
10. When sad events happen to your avatar, to what extent do you feel sad?	When sad events happen to your **character**, to what extent do you feel sad?	
11. When upsetting events happen to your avatar, to what extent do you feel angry?	When upsetting events happen to your **character**, to what extent do you feel angry?	
12. When arousing events happen to your avatar, to what extent do you feel aroused?	When arousing events happen to your **character**, to what extent do you feel aroused?	

Modifications made to the original Self-Presence Questionnaire (SPQ) to create the Dungeons and Dragons Self Presence Questionnaire (changes in bold).

Original quesion	Modified question	Reasoning
13. How much effort did you put into making your avatar's sex clear to others?	How **comfortable do you feel playing your character**?	The original question is too similar to question 21, and there was still missing a general question about how comfortable the players feel
14. How much effort did you put into making your avatar's race clear to others?	*Left out*	Measuring too similar to question 17
15. How important is it for your profile to portray a specific identity for your avatar?	*Left out*	There are not always profiles in the game
16. How much do you care about the age of your avatar?	How much do you care about the age of your **character**?	
17. How much do you care about the race of your avatar?	How much do you care about the race of your **character**?	
18. To what extent has the experience of using your avatar helped you learn more about your own identity?	*Left out*	Used in the character bleed questions
19. To what extent have you customized your avatar to make it look the way it does?	To what extent **are** you **comfortable role playing the way your character acts**?	Putting in questions for the aspects of both appearance and personality, where the original questionnaire had only appearance
20. To what extent does your avatar's appearance represent some aspect of your identity?	To what extent does your **character's** appearance represent some aspect of your identity?	
21. How much do you care about the sex of your avatar?	How much do you care about the sex of your **character**?	
22. How much effort did you put into making your avatar's age clear to others?	*Left out*	Measuring too similar to question 16
23. How much do you care about how your avatar looks?	How much do you care about how your **character** looks?	

Character bleed scale

Questionnaire for Character Bleed

Quesion	Type of bleed	Subcategory
1. After the session the emotions I felt during the game often lingered	Bleeding out	Emotions
2. Playing my character has helped me feel more comfortable with myself	Bleeding out	Cognitive
3. I sometimes find it hard to separate what other players do and what their characters do	Bleeding in	Social dynamics
4. I feel like I have to justify which actions are my own and which are my character's when my mood and my character's mood are similar	Bleeding in	Cognitive
5. I am grateful when other players clarify which actions are their character's and which ones are theirs	Bleeding in	Social dynamics
6. I started liking a player more because my character likes their character	Bleeding out	Social dynamics
7. When I start a session with a troubled mindset, this often reflects into my character	Bleeding in	Emotions
8. I started disliking a player more because of the dislikable character they play	Bleeding out	Social dynamics
9. When I start a session with a happy mindset, this often gets reflected into my character	Bleeding in	Emotions
10. My character often holds themselves in a similar way I do (e.g. reacting to problems, the way they hold their own in an argument, the way they walk)	Bleeding in	Behavioral
11. When my character is troubled I myself notice that I am feeling more under the weather too	Bleeding out	Emotions
12. When I like a player, my character is quick to like their characters too	Bleeding in	Social dynamics
13. Playing my character helped me develop myself further in real life (in terms of skills such as confidence, leadership or reading social situations)	Bleeding out	Cognitive
14. When I act out what I say I am doing (for example through hand movements), I notice I connect more with my character	Bleeding in	Behavior
15. Playing my character has opened up my eyes in terms of seeing a concept differently	Bleeding out	Cognitive
16. My characters tend to have the same stance on current political topics (such as LGBTQ rights and environmental issues) as I do	Bleeding in	Cognitive
17. I notice the way I hold myself changes after playing my character	Bleeding out	Behavioral
18. When my character is happy, I notice I myself am getting happier too	Bleeding out	Emotions

Open questions

1.	How would you describe the connection you have to your character?
2.	How did this connection develop over time? (did it become stronger? If so, why do you think so?)
3.	If you experienced bleed into your character (your own mood or feelings becoming that of your character), could you name an example?
4.	If you experienced bleed out of your character (your character's personality or feelings taking over your own judgments), could you name an example?
5.	Did you learn more about yourself while playing this character? If yes, please explain why.
6.	Would you overall describe your experience as a positive one or a negative one? Please explain why.
7.	Is there anything else you want to share about your experience playing this character?

Appendix E. Factor analyses loadings

Factor Loadings and Communalities Exploratory Analysis Character Bleed

	Factor loadings				
Questions	1	2	3	4	**Communalities**
13. Playing my character helped me develop myself further in real life (in terms of skills such as confidence, leadership or reading social situations)	.90				.83
2. Playing my character has helped me feel more comfortable with myself	.77				.69
17. I notice the way I hold myself changes after playing my character	.71				.59
15. Playing my character has opened up my eyes in terms of seeing a concept differently	.70				.61
14. When I act out what I say I am doing (for example through hand movements), I notice I connect more with my character	.68				.54
5. I am grateful when other players clarify which actions are their character's and which ones are theirs		.83			.79
18. When my character is happy, I notice I myself am getting happier too		.76			.79
4. I feel like I have to justify which actions are my own and which are my character's when my mood and my character's mood are similar		.72			.64
12. When I like a player, my character is quick to like their characters too		.54			.64
6. I started liking a player more because my character likes their character		.46			.60
9. When I start a session with a happy mindset, this often gets reflected into my character			.87		.76
7. When I start a session with a troubled mindset, this often reflects into my character			.85		.80
11. When my character is troubled I myself notice that I am feeling more under the weather too			.52		.66
10. My character often holds themselves in a similar way I do (e.g. reacting to problems, the way they hold their own in an argument, the way they walk)				.76	.64

16.	My characters tend to have the same stance on current political topics (such as LGBTQ rights and environmental issues) as I do	.63	.56
1.	After the session the emotions I felt during the game often lingered	.57	.61
3.	I sometimes find it hard to separate what other players do and what their characters do	.46	.49
8.	I started disliking a player more because of the dislikable character they play	.44	.48

Factor Loadings and Communalities of Character Bleed with Single Factor

Questions	Factor loadings	Communalities
13. Playing my character helped me develop myself further in real life (in terms of skills such as confidence, leadership or reading social situations)	.75	.57
15. Playing my character has opened up my eyes in terms of seeing a concept differently	.74	.55
6. I started liking a player more because my character likes their character	.74	.55
17. I notice the way I hold myself changes after playing my character	.73	.53
18. When my character is happy, I notice I myself am getting happier too	.72	.51
2. Playing my character has helped me feel more comfortable with myself	.71	.51
1. After the session the emotions I felt during the game often lingered	.70	.49
8. I started disliking a player more because of the dislikable character they play	.68	.46
11. When my character is troubled I myself notice that I am feeling more under the weather too	.68	.46