Do casual gaming environments evoke stereotype threat? Examining the effects of explicit priming and avatar gender.

Declaration of Competing Interests: There are no potential conflicts of interest associated with this article.

Abstract Word Count: 200

Article Word Count: 6029

Abstract

Despite relatively equal participation rates between females and males in casual gaming, females often report stigmatisation and prejudice towards their gaming competency within this sub-domain. Applying the theoretical framework of "stereotype threat", this research examined the influence of explicit stereotype priming on females' casual gameplay performance and related attitudes. It also investigated whether the gender of the game avatar heightens susceptibility to stereotype threat. One hundred and twenty females were allocated randomly to one of four experimental conditions in a 2 (Condition: Stereotype threat, Control) x 2 (Avatar gender: Feminine, Masculine) between-subjects design. They completed a short gaming task and measures of social identity, competence beliefs, gameplay self-efficacy and self-esteem. Findings indicate that priming explicitly a negative gender-related stereotype did not appear to have a significant detrimental impact on gameplay performance or gameplay-related attitudes. Additionally, gameplay performance was not affected significantly by manipulating the gender of the gaming avatar. These findings suggest that, although females appear to be knowledgeable about negative gender-gaming stereotypes, these might not impact performance. Moreover, females tend not to endorse these beliefs as a true reflection of their gaming ability, representing a positive finding in view of the prevailing negative attitudes they face in gaming domains.

Keywords: Stereotype threat; digital gaming; competence; self-concept; gender; avatars

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1. Introduction

Females often experience harassment and discrimination within digital gaming communities, and face negative stereotypes pertaining to their gaming competence compared to males (Kuznekoff & Rose, 2013; Jenson, Fisher, & de Castell, 2011). The recent "#GamerGate" debate served to illuminate the hostilities shown towards female players, with some disclosing that they received online harassment in the form of rape or death threats from male players (Chess & Shaw, 2015; Massanari, 2017; Wingfield, 2014). Empirical research has also shown that successful gaming performance is attributed to ability rather than luck for males more than females, and that lower-skilled males may exhibit hostility towards female players for fear of losing status in the gaming domain (Deaux & Emswiller, 1974; Kasumovic & Kuznekoff, 2015). As such, gaming is viewed predominantly as a masculine pursuit by both genders (Lewis & Griffiths, 2011) and consequently females have reported being marginalised within gaming communities and have represented themselves as male (gender swapped) in an attempt to dispel gender-related gaming stereotypes (Hussain & Griffiths, 2008; Martey, Stromer, Banks, Wu, & Consalvo, 2014; Todd, 2012).

Much of the mainstream media and empirical literature focuses upon the negative experiences that females face in respect of "hardcore" forms of gaming, such as online multi-player games (Cote, 2017; Paaßen et al., 2017) and competitive and violent videogames (Vermeulen & Van Looy, 2016). Here, research suggests that exposure to gender stereotypical attitudes might influence females' unequal participation in hardcore digital gaming (Cote, 2017; Shen, Ratan, Dora Cai, & Leavitt, 2016) and preclude them from the positive consequences of gameplay, such as increased access to Science, Technology, and Engineering (STEM; Lewis & Griffiths, 2011; Paaßen et al., 2017). Nevertheless, females

have also reported experiencing negative gender-related stereotypes in the sub-domain of casual gaming, in which numbers of males and females are relatively equal (Casual Games Association, 2007; Krotoski, 2004; Paaßen et al., 2017). For example, many females report instances of sexism within casual forms of gaming because this leisurely form of gaming confirms the stereotype that "women aren't real gamers" (Nixon, 2014; Paaßen et al., 2017). Casual gaming therefore holds a stigmatised status in the gaming hierarchy (Sweedyk & de Laet, 2005; Taylor, 2012), with assumed lower skill underpinning the prejudice held against female casual gamers (Paaßen, Morgenroth. & Stratemeyer, 2016).

Indeed, recent research has begun to explore the impact that negative gender-gaming stereotypes exert on females' gameplay performance and related self-perceptions (c.f., Kaye & Pennington, 2016), and has examined further whether the saliency of such stereotypes can be evoked within the gaming environment itself (e.g., leaderboards; Vermeulen, Castellar, Janssen, Calvi, & Van Looy, 2016). However, such research is very much in its infancy and additional work is needed to explore the influence of gender-related stereotypes in distinct sub-domains of gaming. Underpinned by the theoretical framework of "stereotype threat", the current study investigates the effects that negative gender-related stereotypes have on females' casual gaming performance, competence beliefs, self-efficacy and self-esteem. It also explores whether manipulating the gender of an avatar within the gaming context (e.g., playing as a female relative to a male) may act as a subtle threat to bring about performance decrements and associated negative self-perceptions.

2. Literature Review

Steele and Aronson (1995) coined the term 'stereotype threat' to refer to situations whereby individuals' performance may be hindered by stereotype-salient cues. Early studies in this area demonstrate that, after controlling for prior ability, females' mathematical performance

is impacted adversely when a mathematics test is framed as diagnostic of gender differences (Spencer, Steele & Quinn, 1999). Yet, such group-performance differences are eliminated when the same test is framed as a non-diagnostic indicator of ability (Spencer et al., 1999; Steele, 1997). Replicating this basic premise, research has identified performance decrements across a wide range of performance domains, including intelligence and academic tests (Aronson et al., 1999; Aronson, Fried & Good, 2002; Spencer et al., 1999; Steele & Aronson, 1995), athletic tasks (Stone, Lynch, Sjomeling & Darley, 1999), and memory tasks (Hess & Auman, 2003). Although the situational phenomenon of stereotype threat has been well documented over the past two decades (c.f., Pennington, Heim, Levy, & Larkin, 2016 for review), further research is required to explore these principles in the understudied domain of gaming. This is particularly pertinent given that digital gaming is stereotypically considered a "male" pursuit (Lewis & Griffiths, 2011) and gaming tasks themselves may afford stereotype threat effects that remain relatively unexplored.

The few initial studies that have investigated the impact of stereotype threat in the sub-domain of causal gaming have thus far presented somewhat contrasting findings. For example, Vermeulen et al. (2016) utilised leadership boards to manipulate implicitly negative stereotypes pertaining to females' gaming competence. Findings indicated that females' gaming performance was comparatively worse under stereotype threat priming conditions relative to a stereotype nullifying condition. Conversely, utilising a causal game and explicit priming techniques, Kaye and Pennington (2016) found that stereotype threat did not affect females' gaming performance. Highlighting an alternative, positive identity bolstered females' gaming performance compared to a control condition, however. One explanation for these disparate findings may be due to the varying game stimuli used across studies and the differences in stereotype priming techniques (e.g., explicit vs. subtle; Nguyen & Ryan, 2008). This raises the question of how explicit and subtle priming techniques might evoke stereotype

threat, such as explicitly priming negative gender stereotypes or manipulating the gameplay environment to make gendered features more salient. To develop these findings, we explored whether variations in game presentation result in differential performance outcomes under stereotype threat.

2.1.Game presentation as a subtle threat

Experimentally, there are many ways in which the presentation of a game can be manipulated to foster masculine versus feminine conditions to elicit experiences of stereotype threat. One obvious manipulation is that of avatar representation, with studies demonstrating the consequences that identity representations can have on many different outcomes. For example, research has studied the correspondence of avatar characteristics with players' own self-perceptions of their attributes (Bessière, Seay, & Kiesler, 2007) and has shown how avatar physicality influences game performance, as well as real-world attitudes and behaviours (Yee & Bailenson, 2006, 2007; Yee, Bailenson, & Ducheneaut, 2009). In this way, physical characteristics of avatars (e.g., attractiveness and height) have been found to affect the way in which individuals interact subsequently with people in the "real world", in line with the "Proteus effect" (Yee & Bailenson, 2007). Additional research has demonstrated that females may select male game characters in an attempt to feel less vulnerable as a female gamer in a male-dominated world (Lewis & Griffiths, 2011). Such research suggests how avatars may serve a role in alleviating females' experiences of negative attitudes pertaining to their gender.

In respect of performance outcomes, previous research has found differences in females' performance following a gaming task utilising gendered avatar customisation (male versus female). Specifically, Ratan and Sah (2015) evoked stereotype threat by manipulating avatar embodiment, and found that females underperformed on a mathematical gaming task

when operating as a female relative to a male avatar, possibly because they conformed to gender stereotypes regarding their mathematical ability. Highlighting a social comparison effect, females have also been found to underperform academically when leaderboards in educational games are presented as being more male compared to female-dominated (Christy & Fox, 2014). However, these performance decrements appear to be reversed when females play under a gendered-alias because this encourages them to conform to gender stereotypical behaviours in line with that avatar and lessen experiences of prejudice (Lee, Nass, & Bailenson, 2014; Ratan & Sah, 2015). As such, experiences of stereotype threat may be heightened or lessened dependent on subtle factors in the gaming environment. Building upon such work, the current study explored how performance implications associated with avatar gender may act as a subtle stereotype threat to evoke performance deficits.

2.2. The impact of stereotype threat on self-concept

A breath of research suggests that self-efficacy – an individual's capability to achieve a goal or an outcome – can be shaped by environmental cues to influence motivation and performance (Bandura, 1986; 2006; Schunk, 1984). Although largely understudied, the salience of negative gender-related stereotypes within digital gaming has been shown to affect females' self-concept attributions and competence beliefs associated with this domain (c.f., Lee & Nass, 2012; Vermeulen et al., 2016). In particular, experiences of stereotype threat have been found to reduce females' confidence and predict experiences of negative affect within casual digital gaming, particularly for those who highly identify with the domain (Vermeulen et al., 2016). Corresponding evidence also suggests that games which represent females in a gender-stereotypical way may lessen females' task confidence and self-efficacy (Behm-Morwitz & Mastro, 2009; Milner & Hoy, 2003; Solmon, Lee, Belcher, Harrison, & Wells, 2003). Specifically, females report lower confidence in their ability to

learn when they perceive a task to be designed for males, relative to when presented as more gender-neutral (Solmon et al., 2003). In a similar vein, females report lower competence beliefs when they are led to believe that they are playing against a male opponent (Vermeulen, Núñez Castellar, & Van Looy, 2014), and lower self-efficacy when playing a game as a sexualised female character (Behm-Morwitz & Mastro, 2009). It is thus conceivable that negative societal stereotypes pertaining to females' incompetence in casual digital gaming might undermine their self-concept perceptions. As such, the current study examined gameplay-related competence beliefs and self-efficacy as a function of stereotype threat.

In addition to domain-related self-efficacy and competence beliefs, negative self-salient stereotypes might also affect other aspects of self-concept, such as self-esteem (Crocker, 1999). In particular, females' competence is often questioned within digital gaming communities and this is likely to hold negative implications for their self-regard. Such rationale is underpinned by the principles of the self-evaluation maintenance model (SEM; Blanton, Crocker, & Miller, 2000), in which self-evaluations are established through social comparison with others. As such, "upward comparisons", which can be primed through an explicit threat about gender-gaming competence, may be associated with more negative self-evaluation and reduced self-worth (Blanton et al., 2000). Game features have been found to influence females' sense of self-worth, with female players reporting lower self-esteem when playing as a sexualised heroine compared to when playing as a non-sexualised character (Behm-Morawitz & Mastro, 2009), and when players perceive they are not as competent as the game character (McDonald & Kim, 2001). Accordingly, it is plausible that explicit stereotype priming and avatar gender representation might also diminish females' self-esteem, because of the negative performance implications that such stereotypes hold for their sense of "self".

Building upon this prior research, the current research aims to assess whether explicit and subtle stereotype primes have an adverse effect on females' casual gaming performance and associated gameplay self-perceptions. To evoke stereotype threat explicitly, female participants were informed that their gaming performance would be evaluated in line with gender-related stereotypes. To manipulate stereotype threat subtly, females played the game as either a female or male avatar. Such game modifications were selected to be relevant yet subtle enough for the purposes of this research and to overcome concerns that the tasks and instructions used within previous stereotype threat research may allow participants to guess the nature of the research and, perhaps consequently, promote negative performance outcomes (Frantz, Cuddy, Burnett, Ray & Hart, 2004; Nguyen & Ryan, 2008; Stone & McWhinnie, 2008). In addition to exploring performance, we assessed the impact of stereotype threat and avatar gender on a range of other psychological outcomes, namely self-esteem, domain-specific self-efficacy and competence beliefs (see Figure 1). Accordingly, our research was underpinned by the following experimental predictions:

[Figure 1 here]

Hypothesis 1. Female participants will perform worse on a gaming task when primed with an explicit stereotype threat pertaining to their gameplay competence compared to those who are not primed with a negative gender-related stereotype (control condition).

Hypothesis 2. Female participants will perform better on a gaming task when playing under the alias of a male compared to female avatar, consistent with expectation that this may reduce the salience of gender stereotypes (c.f., Lee et al., 2014; Ratan & Sah, 2015).

Hypothesis 3. Participants in both the explicit and subtle stereotype threat conditions will report lower gaming competence beliefs, self-efficacy and self-esteem relative those in the control conditions.

3. Methodology

3.1. Participants and Design

One hundred and twenty female participants (*M*age = 20.56, *SD* = 3.14, 95% below 25 years) were recruited for a study that examined ostensibly social processes in gaming. Within this sample, 78.3% reported that they played digital games of any kind, 69.2% identified themselves as a "casual" player and 39.2% reported playing for an average of 1-5 hours per week. Of these, however, only 6.7% reported specifically that they identified with being a "gamer". Participants were assigned randomly and equally to one of four experimental conditions in a 2 (Condition: Stereotype Threat) x 2 (Avatar gender: female, male) between-subjects design. Specifically, they played a digital game as a female or male avatar under conditions of stereotype threat or a non-threat control. A total of 7 participants were removed across the two stereotype threat conditions due to failing a manipulation check that asked them whether they were knowledgeable about negative gender-gaming stereotypes. This resulted in a total of n = 28 playing as a female avatar and n = 25 playing as a male avatar under stereotype threat and n = 30 in each of the two control conditions.

3.2. Measures

3.2.1. Social identity

The *Three dimensional strength of group identification scale* (Cameron, 2004) was employed as a measure of social identity (i.e., identification with being a female). This was included based on previous evidence highlighting that social identity in respect of gender can moderate

the stereotype threat-performance relationship (Wout, Danso, Jackson & Spencer, 2008). Specifically, those with highly gender identified may be more susceptible to threat effects than those with low gender identification (ibid). As such, we employed this measure of social identity to ensure there were no significant differences in gender identification between our experimental conditions. The 12-item measure comprises three sub-scales, namely centrality (e.g., "I often think about being a female"); in-group affect (e.g., "In general, I'm glad to be a female") and in-group ties (e.g., "I feel strong ties to other females"). Participants responded on a 7-point Likert scale anchored between 1 (Strongly disagree) and 7 (Strongly agree), with this scale showing satisfactory internal consistency (Cronbach's a = .74), similar to previous research (Kowert & Oldmeadow, 2015). Participants' mean social identity score was 60.50 (SD = 8.58, range 33-81), suggesting a moderate-to-high level of social identification (c.f., Obst & White, 2005). Furthermore, social identity did not differ as a function of stereotype threat or avatar gender condition, suggesting that this factor was adequately controlled for (both $p > .05$).

3.2.2. Competence Beliefs

To measure competence beliefs after gameplay, participants were asked "To what extent do you think that you were competent in the gaming task?" and "To what extent was it important to you to be competent in the gaming task?". Responses were recorded on a 9-point Likert scale anchored between 1 (Not at all) and 9 (Extremely), with mean responses to these questions analysed separately.

3.2.3. Self-esteem

The *Self-esteem scale* (Rosenberg, 1965) was utilised to measure participants' self-reported self-esteem. Participants respond to 10-items including "I take a positive attitude towards

myself" on a 4-point Likert scale anchored between 1 (Strongly disagree) and 4 (Strongly agree). This questionnaire resulted in satisfactory internal consistency (Cronbach's *a* = .83), supporting previous research (Fleming & Courtney, 1984; Hagborg, 2006), and a total score of self-esteem was computed.

3.2.4. Gaming Self-efficacy

An adapted version of the General Self-efficacy scale (Schwarzer & Jerusalem, 1995) was utilised to measure gaming self-efficacy. Participants responded to 10-items including "I could solve most problems if I was to invest the necessary effort" on a 4-point Likert scale anchored between 1 (Not at all true) and 4 (Exactly true). This questionnaire resulted in satisfactory internal consistency (Cronbach's α = .83), supporting previous research (Luszczynska, Scholz, & Schwarzer, 2005). A total self-efficacy score was computed for use in analyses.

3.2.5. Gameplay Performance

Given the negative experiences that females have reported in casual gameplay, a casual game was employed to examine the impact of explicit stereotype priming and implicit game manipulations on females' gaming performance. Moreover, casual games represent as a viable tool to utilise in experimental environments because factors in the gameplay environment can be manipulated easily, and players are able to navigate and understand the instructions of casual gaming quickly (Juul, 2009). To this end, participants played an online casual game called *"Kiba and Kumba: High Jump"*, in which participants had to jump up onto a series of platforms to obtain points. This game was played on a PC platform for a period of 5-minutes in a controlled laboratory environment. Two metrics were obtained as measures of gameplay performance; the first was a total score that was obtained at the end of

the five-minute period, and an additional performance metric of total score/death ratio was computed. This latter measure was computed by dividing participants' overall gameplay score by the number of game iterations played within the session.

3.2.6. Stereotype Threat Manipulation

We employed a typically-used experimental paradigm in our manipulation of stereotype threat, whereby half the participants were primed with an explicit stereotype threat pertaining to female incompetence in gaming and the other half of participants being informed that the task was non-diagnostic of ability (control; see Schmader & Johns, 2003). As such, participants in the stereotype threat condition received the following written information:

> "We are interested in researching gameplay performance in a range of different populations. As you may know, research has demonstrated that males are more competent in gaming than females. There is therefore a negative stereotype that females are incompetent gamers compared to males. This study is aimed at better understanding what factors might predict these gender differences in gameplay performance. Your performance on the gaming task will therefore be compared to that of other female and males who have participated in this study. One specific question is whether males are more competent than females at all types of gaming."

In contrast, participants in the control condition were not primed with any gender-related stereotypes, and instead provided with the following written information:

> "In today's session, we want to assess various factors relating to gameplay. This task is **not diagnostic of ability**".

3.2.7. Manipulation of Avatar Gender

Participants in the "female avatar" condition were randomly assigned to play the game as a female character, whereas those in the "male avatar" condition played as a male. The same game with these variations was selected rather than using two different games to ensure that the only difference between conditions was in respect of the avatar. Indeed, two different games would pose a threat to the validity of the research by introducing confounds, primarily in the form of game variations impacting differentially upon player experiences (Elson, Breuer, Van Looy, Kneer, & Quandt, 2013).

3.2.8. Manipulation Checks

To examine the validity of the avatar manipulation, participants rated how masculine/feminine they perceived the game to be after playing (1 = Feminine, 4 = Neutral/neither, 7 = Masculine). To ensure the effectiveness of the stereotype threat primes, participants rated the extent to which they believed that males would be more competent gamers than females at the game they had just played (1 = Females better, 4 = Neutral/no difference, 7 = Males better). They were then asked whether they were knowledgeable of the negative stereotype regarding females being less competent as gamers compared to males (Yes/No), with those who reported not knowing about the negative stereotype (n = 7) excluded from the stereotype threat condition to ensure reliable analyses.

3.3. Procedure

A male research assistant undertook all data collection. After obtaining written consent, participants were asked to complete a demographics questionnaire and a measure of social identity. Following this, they received the stereotype threat primes (stereotype threat, control conditions) and then completed a gaming task for five minutes, playing as a male or female

avatar. Within this, the researcher assigned participants randomly to either the masculine or feminine version of the game and asked them to select the relevant avatar. Participants were then asked to complete measures of self-esteem, gameplay competence beliefs and self-efficacy. Finally, they completed three manipulation checks before being fully debriefed regarding the true purpose of the experiment and receiving a small monetary reward.

4. Analysis and Results

4.1. Analytic Strategy

Data analysis was performed within SPSS Version 23, with gameplay performance scores and related self-perceptions (self-efficacy, self-esteem, and competence beliefs) analysed in a series of 2 (Condition: Stereotype threat, control) x 2 (Avatar gender: Male, Female) between-subjects Analysis of Variance (ANOVA). Outlying scores, determined by stem and leaf plots, were replaced with the next highest or lowest extreme score in the dataset (Tabachnick & Fidell, 2013). This analytic strategy was decided upon prior to running any statistical analyses and outlier exclusion did not alter the reported findings. Simple main effects and interactions were elucidated using a Bonferroni-correction and effect sizes were computed in line with Cohen's *d* indices (Cohen, 1992). Positive effect sizes denote that the findings are consistent with experimental predictions, whereas negative effect sizes denote that they are contrary to predictions.

4.2. Manipulation Checks

4.2.1 Avatar manipulation.

A main effect of avatar gender revealed that the manipulation of avatar gender was successful, $F(1,109) = 13.36$, $p = .001$, $\eta_p^2 = .09$. Participants who played as a male avatar (*M*

= 3.96, *SD* = .86) reported that the game was more masculine compared to those who played as a female avatar (*M* = 3.40, *SD* = .88), *p* = .001, *d* = .64.

4.2.2. Stereotype threat manipulation.

There was no significant main effect of stereotype threat ($F(1, 109) = .1.36$, $p = .25$, $\eta_p^2 = .01$) or avatar gender ($F(1, 109) = .03$, $p = .87$, $\eta_p^2 < .001$) for explicit stereotype endorsement. There was also no significant interaction between stereotype threat condition and avatar gender, $p > .05$.

4.3. Gaming Performance

There was no significant main effect of stereotype threat on total gameplay score, $F(1, 109) = .32$, $p = .58$, $\eta_p^2 = .003$, or score/death ratio, $F(1, 109) = .69$, $p = .41$, $\eta_p^2 < .01$. Similarly, no significant main effect was found for avatar gender on total score, $F(1, 109) = .04$, $p = .84$, $\eta_p^2 < .001$, or score/death ratio, $F(1, 109) = .06$, $p = .81$, $\eta_p^2 = .001$. All interactions were also non-significant, $p > .05$.

4.4. Competence Beliefs

There was no significant main effect of stereotype threat condition on perceptions of task competence, $F(1,109) = .001$, $p = .98$, $\eta_p^2 < .001$, or task importance, $F(1, 109) = .02$, $p = .90$, $\eta_p^2 < .001$. Likewise, no significant main effects were found for avatar gender on task competence, $F(1, 109) = .61$, $p = .44$, $\eta_p^2 < .01$, or task importance, $F(1, 109) = .36$, $p = .55$, $\eta_p^2 < .01$. There was also no significant interactions between stereotype threat condition and avatar gender on these measures, $p > .05$.

4.5. Self-esteem

There was no significant main effect of stereotype threat condition on self-esteem, $F(1, 107) = 1.39$, $p = .24$, $\eta_p^2 = .01$, nor any significant main effect of avatar gender $F(1, 107) = .25$, $p = .62$, $\eta_p^2 < .01$. There was no significant interaction between stereotype threat condition and avatar gender, $p > .05$.

4.6. Self-efficacy

There was no significant main effect of experimental condition on self-reported gaming self-efficacy, $F(1, 107) =$, $p = .25$, $\eta_p^2 = .01$, and no significant main effect of avatar gender, $F(1, 107) = .70$, $p = .41$, $\eta_p^2 = .006$. There was no significant interaction between experimental condition and avatar gender, $p > .97$. See Table 1 for descriptive statistics for all dependent variables.

[Table 1 here]

5. Discussion

Female and male participation rates in casual gaming are relatively equivalent compared to other forms of gaming (Casual Games Association, 2007; Krotoski, 2004; Paaßen et al., 2017). Despite this, females report frequently that they experience stigmatisation and prejudice towards their gaming competence in this sub-domain. Prior research on "stereotype threat" has demonstrated the deleterious effects that such negative societal views can exert on performance (see Pennington et al., 2016; Spencer, Logel, & Davies, 2016 for reviews). Yet, such research is lacking within the domain of casual gaming (c.f., Kaye & Pennington, 2016; Vermeuelen et al., 2017 for exceptions). Bridging the gap within this literature, the current

study examined the impact of explicit and subtle stereotype threat on females' casual gaming performance and related self-perceptions. To explicitly prime stereotype threat, females were presented with information pertaining to their societally perceived incompetence within gameplay. To examine whether subtle game manipulations may evoke stereotype threat, females were assigned to play under a male or female gaming avatar. Findings indicate that priming explicitly a negative gender-related stereotype did not influence adversely females' gaming performance, self-efficacy, self-esteem and competence beliefs. Moreover, manipulating the gender of a game avatar, to elicit greater in-group/out-group categorisation, did not appear to significantly hamper performance. The discussion now turns to potential explanations for these findings, as well as offering some future research recommendations.

5.1. Explicit stereotype threat

Contrary to the principles of "stereotype threat" (Spencer et al., 1999; Steele, 1997), the current research demonstrates that priming female participants with an explicit stereotype did not hold any significant detrimental impact on casual gaming performance or self-perceptions. Indeed, there appears to be current corresponding evidence that stereotype priming alone may not evoke consistent performance deficits within the context of casual digital gaming (Vermeulen et al., 2016). Perhaps, therefore, other factors such as domain identification play a moderating role that heightens females' susceptibility to stereotype threat (Vermeulen et al., 2016; Wout et al., 2008). Specifically, research shows that those who identify strongly with the stereotyped domain are more likely to experience performance decrements under stereotype threat compared to those with lower domain identification (Vermeulen et al., 2016; Wout et al., 2008). Despite reporting that they played digital games, only 6.7% of the current sample identified specifically as a "gamer", and this may explain why no performance deficits were observed. This is an interesting issue more generally and

questions the role of identity for females in the gaming domain. For example, research suggests that female game players may be more constrained to self-identify as gamers compared to their male counterparts, particularly because of the stigma and discrimination they face because of their gender (Shaw, 2012; Vermeulen, Bauwel & Van Looy, 2017). This implies that females avoid the identity of "gamer" perhaps as a protective mechanism against discrimination. This is concerning because such negative experiences may erect barriers to greater female participation in gameplay. However, other evidence has found that bolstering female players' awareness of their gamer identity and respective competence in this domain bolsters gaming performance (Kaye & Pennington, 2016). As a practical strategy, simply priming females' gamer identity may therefore not be enough to help protect them against negative experiences in gaming, particularly as this has been shown to have a detrimental effect on gameplay outcomes (Vermeulen et al., 2016). Instead, it may be more important to endorse positively their identity in respect to their gaming competence with an aim to dispel inaccurate societal stereotypes (Kaye & Pennington, 2016).

In a similar vein, females' participation within the sub-domain of casual gaming is significantly greater compared to other forms of gaming, such as hardcore and competitive gameplay (Casual Games Association, 2007; Krotoski, 2004; Paaßen et al., 2017). As such, it may be that females are more susceptible to stereotype threat-performance decrements in domains in which they are underrepresented and consequently feel marginalised (see Pennington & Heim, 2016 for a similar perspective). Moreover, despite females being well represented in casual gameplay, they are underrepresented within the gaming environment itself, with the majority of female characters presenting as non-playable or sexualised (Behm-Morawitz & Mastro, 2009; Ivory, 2009; Miller & Summers, 2007). This has led many females to feel invisible within the gaming community, harvesting the stereotypical view that gaming is a "masculine pursuit" (Lewis & Griffiths, 2011). Consistent with such view, the

majority of our sample reported being knowledgeable of negative gender-game related stereotypes, and other research has shown that females might present themselves as males in a bid to protect themselves from such negative prejudiced attitudes (Hussain & Griffiths, 2008; Martey, Stromer, Banks, Wu, & Consalvo, 2014; Todd, 2012). Although our research may indicate that women's performance and self-concept is not affected adversely by negative stereotypes, there is still a lot of work required to dispel such negative and inaccurate stereotypes within the gaming arena and to enhance positive gaming experiences.

Another potential explanation for the current findings is that casual gaming context is not a "high stakes" environment in which a negative situational threat would be detrimental to oneself in the long-term. Previous research that explores academic or intellectual impacts is arguably more concerning for individuals because these are "high stakes" for their societal standing. Casual gaming, as an enjoyable leisure pursuit, does not typically hold the equivalent importance in society, unless the target population refers to professional or elite players, such as those in eSports (British ESports Association, 2017). In this regard, the presentation of threat in the casual gaming context is perhaps not one that elicits the same level of concern compared to other more academic domains. With this in mind, it might be fruitful to explore whether female professional players, who might have economical or financial investment in the gaming and experience greater situational performance pressure, might experience stereotype threat. Experimental work that manipulates players' perceptions of the stakes associated with gaming performance may also elucidate this possibility.

The nature of the task itself might also proffer another explanation for why the current study did not capture stereotype threat-performance decrements. Previous literature has theorised that stereotype threat disrupts performance through demands on working memory, particularly for difficult tasks (c.f., Beilock, Rydell & McConnell, 2007; Pennington & Heim 2016; Pennington et al., 2016; Schmader & Johns, 2003). It has been proposed that the

salience of a negative societal stereotype influences verbal ruminations, which limit the extent to which an individual is able to utilise fully their verbal working memory capacity to attend to and process task demands (Schmader & Johns, 2003). Gaming is arguably a task that requires proceduralised and often implicit skills, however, and is less reliant on working memory resources that require more conscious processing. As such, it could be argued that gaming may not be as prone to the threat effects, which have been previously found in tasks that utilise other aspects of working memory (Schmader & Johns, 2003). Future research that examines factors such as expertise and task difficulty in different types of gaming could proffer a means by which to acknowledge the role of implicit learning and how this may vary based on task demands. Indeed, this has been examined in respect of some tasks including academic and athletic performance (e.g., Beilock, Jellison, Rydell, McConnell, & Carr, 2006; Stone, Lynch, Sjomeling & Darley, 1999; Keller, 2007), but it would be interesting to explore its relevance for different types of gaming.

5.2. Subtle stereotype threat

In addition to the previously discussed findings, it was found that manipulating stereotype threat subtly through avatar gender did not impact upon performance and self-perceptions. This is in seeming contrast to prior research, which shows that greater in-group/out-group categorisation may heighten stereotype threat effects (Christy & Fox, 2014; Lee, Nass, & Bailenson, 2014; Ratan & Sah, 2015), and refutes the notion of a dual process model operating for both blatant (explicit prime) and subtle (avatar) stereotype threat cues upon performance (Stone & McWhinnie, 2008). This is intriguing especially given that female participants assigned to the male avatar condition perceived the game to be more masculine compared to those who played in the female avatar condition. Therefore, even though the presence of masculine cues was recognised as being different between conditions, this did not

appear to have any impact on performance or self-perceptions, even for those under stereotype threat. In this sense, we present alternative findings to the existing literature (Christy & Fox, 2014; Lee, Nass, & Bailenson, 2014; Ratan & Sah, 2015), in that gendered game cues do not always appear to influence performance outcomes. However, a difference here perhaps relates to the fact that, in the current study, the "subtle threat" (i.e. avatar) was integrated within the task measuring performance itself, rather than performance being measured in a separate task after the presentation of a subtle prime in a game. In this sense, we used the game as both the stimuli and the environment for obtaining the primary outcome measure rather than as solely as a stimuli tool. This may be one explanation for the divergent findings relative to previous research in this area.

5.3. Limitations and Future Research Directions

As with all research, this study is not without its limitations. One issue may be the testing environment of the study. Arguably, a laboratory within a university setting is not a typical context in which gaming is experienced. In contrast, for previous research exploring academic impacts of stereotype threat, a university setting is perhaps a more valid or representative environment to explore these domain-specific impacts. This may explain why academic impacts have been found in respect of stereotype threat, given their relevance to the context of testing, and suggests that the testing context in stereotype threat research should be effectively aligned to the respective domain of interest. In the case of gaming, home or arcade environments are the physical settings that would be more relevant to exploring these issues. However, this presents practical issues that might challenge the viability of such research. To counter these issues, additional work is warranted on exploring how stereotype threat operates online.

Perhaps one issue with the performance metrics in the current research is that participants did not have a means by which to appraise their performance on a relative basis. That is, the total score presented on the computer screen did not provide participants with any indication about their task performance relative to others. In turn, this may have reduced participants' ability to make performance appraisals of their ability. In previous research, the use of leaderboards in gaming tasks that enable relative-level performance appraisals have been found to successfully induce stereotype threat effects (Vermeulen, Castellar, Janssen, Calvi, & Van Looy, 2016). Given that performance appraisals, expectancies and goals have been found to be relevant in stereotype threat research (Brodish & Devine, 2009; Cadinu, Maas, Frigerio, Impagliazzo & Latinotti, 2003; Rosenthal, Crisp & Suen, 2007; Sekaquaptewa & Thompson, 2003), the nature of the performance metrics in the current study may have prevented participants' capacity to judge what was "poor" performance, and thus did not operate as a continued threat upon task performance. In subsequent research, utilising in-game performance displays (e.g., real-time leaderboards) may be one operational means to provide relative-level performance feedback and evoke stereotype threat.

6. Conclusion

In summary, our findings highlight that although females appear generally to be knowledgeable about negative stereotypes pertaining to their gameplay competence, they do not appear to be susceptible to stereotype threat in the domain of casual gaming. Moreover, female players tend not to endorse these beliefs as a true representation of their gaming ability, which represents a positive finding in view of the prevailing negative attitudes that they face in gaming domains. These findings thus contribute to a developing area of research which is starting to establish the efficacy of the stereotype threat framework to sub-domains of gaming. It appears that this framework may not be entirely relevant to represent

experiences within casual gaming contexts, and instead additional research and application of alternative theoretical approaches are required to ameliorate negative societal stereotypes and consequently the prejudice that females experience within the domain of digital gaming. Further, basic game presentation itself does not appear to be a pragmatic solution to this issue, whereby avatar gender does not seem to alleviate any experienced threat effects. As such, avatar representation, although is important, is arguably not likely to be a sufficient solution to reducing stereotypical experiences for female players. Instead, these issues may be better approached from an identity perspective and the affordances which are associated with being a "female gamer" relative to that of a "gamer" (which is typically associated with masculine connotations). Applying principles from social identity theory (Tajfel & Turner, 1979; Tajfel, 1978, 1979) may prove useful here to explore how gender and/or domain identity affordances are established within different gaming environments, and to pinpoint how these may foster more superordinate forms of identity in an attempt to alleviate inter-group discrimination towards females.

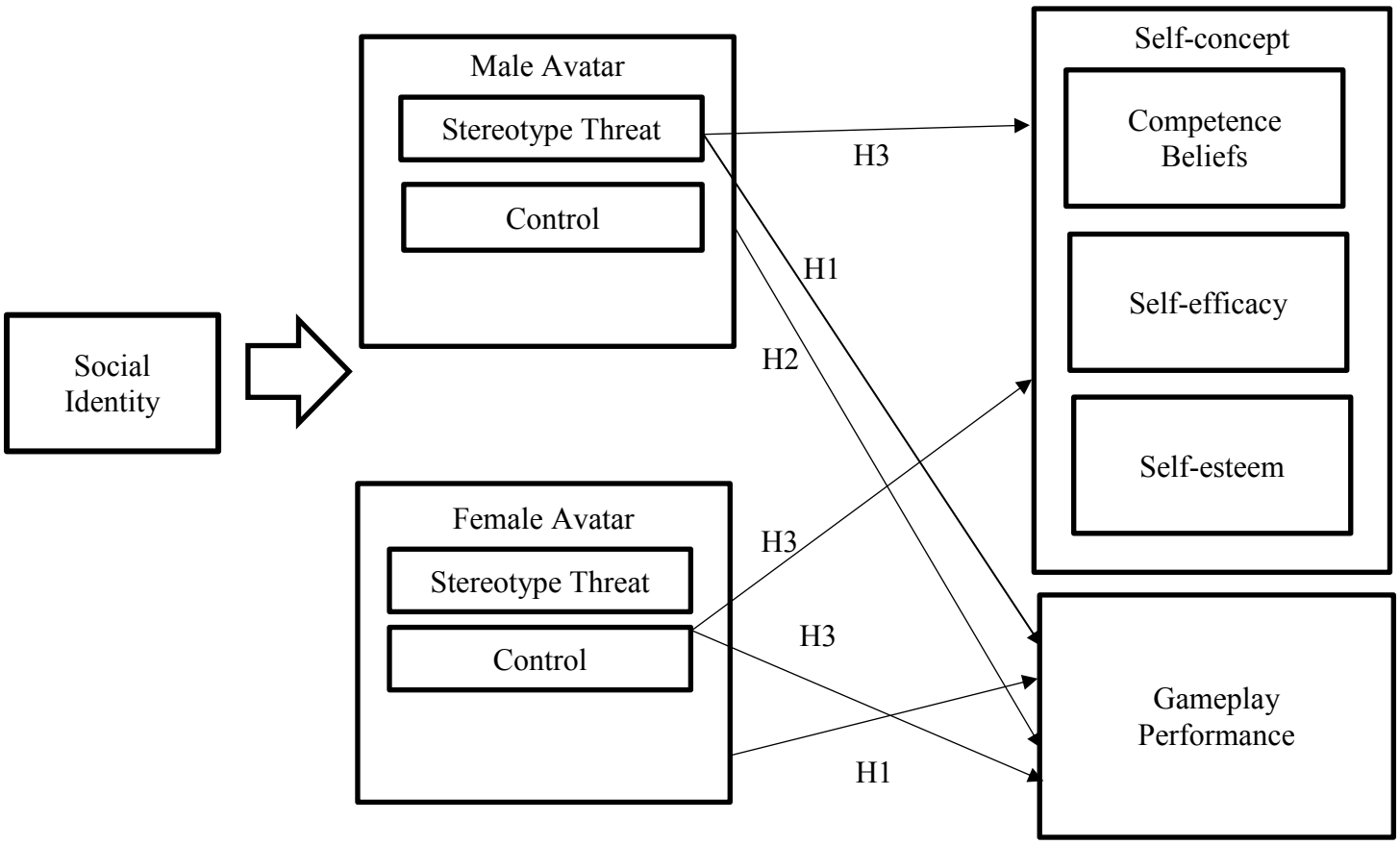

Figure 1: Overview of conceptual framework

Table 1.

Means (and corresponding standard deviations) for all dependent variables as a function of experimental condition.

	Experimental Condition			
	Masculine		Feminine	
	Stereotype Threat	Control	Stereotype Threat	Control
Avatar Manipulation	3.84 (1.14)	4.07 (.52)	3.46 (.84)	3.33 (.92)
Stereotype Endorsement	4.52 (1.05)	4.50 (.82)	4.75 (.89)	4.33 (1.18)
Total Gameplay Scores	2618.28 (1810.33)	3227.13 (2065.70)	3082.04 (2445.38)	2926.30 (2155.88)
Score/Death Ratio	316.40 (268.56)	462.56 (428.00)	392.65 (333.02)	354.27 (311.48)
Task Competence	5.48 (2.02)	5.30 (1.53)	5.04 (1.50)	5.23 (1.87)
Task Importance	4.80 (2.35)	4.87 (2.49)	5.18 (2.18)	5.00 (2.00)
Self-esteem	29.16 (3.30)	29.23 (4.54)	28.37 (2.72)	28.72 (4.85)
Self-efficacy	27.71 (2.68)	28.27 (3.34)	27.85 (2.73)	28.73 (3.78)
Social identity[1]	62.12 (9.21)	60.04 (8.40)	61.30 (8.88)	60.19 (6.83)

[1]Social identity was measured before the experimental primes but is denoted here for reference.

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