



Demographics do not matter?: Exploring the impact of gender and ethnicity on users' identification with AI-generated personas

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ABSTRACT

Demographics are considered foundational information in most persona profiles. However, the effect of persona ethnicity and gender on designers' identification with the persona has limited evaluation in the human-computer interaction literature. We conducted a study with 64 professional designers from the United States, Indian, Korean, and Mexican nationalities to investigate the effects of AI-generated persona ethnicity and gender on persona identification. The personas were created using Generative AI in the persona narratives and the persona video creation. The contribution of this work is that, against assumptions, neither persona ethnicity nor gender play a major role in persona identification among designers with different ethnic backgrounds. While there were some insinuations of ethnicity and gender in the open-ended feedback from the designers, the emergent qualitative themes describing persona identification were overwhelmingly universal and applicable regardless of ethnicity or gender. This implies that professional designers can effectively use personas with different demographic backgrounds, and effects of demographic attributes in personas leading to stereotyping are less impactful than presumed.

1. Introduction

Personas are fictitious representations of user segments that aim to increase designers' empathetic understanding of users' circumstances (Anvari and Richards, 2016, 2018; Goodman-Deane et al., 2018; Grudin, 2006; Pruitt and Grudin, 2003). With more immersive technologies such as *Generative AI* (artificial intelligence) (Amin et al., 2023), personas are becoming more realistic and human-like. Personas are rapidly transforming from *static profiles* (Nielsen et al., 2015) into *immersive video experiences* where the persona engages in a dialogue with the designer or explains itself verbally.

When generated with AI, such immersive persona videos are called *AI-generated personas*. AI-generated personas seek to mimic human interaction (Kaate et al., 2023) and more human-like personas contain subtle information about human factors such as culture, skin tone, mood, and so on – more so than static persona profiles (Hamilton, 2009; Jansen et al., 2020). Hence, new research questions about the user experience among designers emerge, dealing with the effects of more

immersive AI-generated personas. For example, AI-generated personas nearing humanlikeness can result in the infamous uncanny valley effect (Kaate 2023; Salminen et al., 2021; Stein et al., 2020) or reinforce stereotypes that the AI-generated persona user has about a demographic group (Marsden and Haag, 2016). Yet, the primary idea behind AI-generated personas has been to make the personas as humanlike as possible.

The opposite is also possible; personas can positively influence the design process, especially given the goal of inclusive design, i.e., design that serves demographically diverse groups (Goodman-Deane et al., 2018, 2021). As both possibilities exist, there is a research gap in how demographic profiling in immersive video personas affects designers' identification with and use of the persona, which, to our knowledge, has not been studied in the prior human-computer interaction (HCI) literature. In this study, we focus on gender and ethnicity as demographic variables. Persona identification is *the degree to which a user relates to and empathizes with a persona*. Persona identification helps designers understand their target users' needs, goals, and behavior and create more

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user-centered products and services. Persona identification can be measured by various factors that we delve into in our study.

Studies on persona perception have observed the effects of ethnicity and gender, among other variables, on human-to-human interaction (Brown Jr. et al., 1998; Junior et al., 2020; Rice et al., 1974). Because such effects may be “inherited” to persona application, the HCI research community needs to be aware of these effects. Ethnicity and gender are central attributes in personas, yet their effects on AI-generated persona perception are unclear, with possible effects on system designs and interaction. For example, homophily, a theory according to which individuals with similar characteristics tend to gravitate toward one another and behave in comparable ways, is well-documented in prior studies (Chang et al., 2024; Horta et al., 2022; McPherson et al., 2001). Designers might be more prone to favor and identify with an AI-generated persona of their kind. There has been an extensive number of studies on the role of ethnicity in human-to-human interaction, HCI, and studies on the problems and risks of more immersive personas (Brown Jr. et al., 1998; Chen et al., 2022; Emmanuel and Polito, 2024; Junior et al., 2020; Kaate, Salminen, Jung, et al., 2023, 2023; Pratt et al., 2007); however, there has not been a specific study on how the ethnicity and/or gender of an AI-generated persona affects the user perception of the persona.

To study this prominent knowledge gap in HCI research that deals with AI-generated persona identification among different ethnic groups, motivational questions guide our study, “What are the effects of persona’s ethnicity on AI-generated persona perception in different ethnic groups?” and “What are the effects of persona’s gender and end user’s gender on AI-generated persona perception?”. So, the problem we address is investigating the effect of AI-generated persona ethnicity and gender on designers’ AI-generated persona perceptions (see Fig. 1). Derived from this motivation, our study focuses on two research questions (RQs):

- **RQ1:** How do an AI-generated persona’s demographic traits, including (a) ethnicity and (b) gender, affect designers’ perceptions of the persona?
- **RQ2:** How does the designer’s demographic similarity, including (a) ethnic and (b) gender similarity, with the AI-generated persona correlate with their perceptions of the persona?

To address the RQs, we performed a user experiment with 64 professional designers. Each participant examined two personas generated using the Generative AI technology; one persona represented the participant’s ethnic group, and the other persona was of the young Caucasian ethnic group. Our findings help scholars and practitioners

understand how persona ethnicity affects identification among persona users from different ethnic backgrounds, and the findings also shed light on the identification process between personas and designers. The results are valuable when examining the effects of persona ethnicity on the universality of personas, especially when developing personas with AI technology in a world where a large portion of users from demographically underrepresented groups could be represented by personas created with the help of Generative AI. To our knowledge, the study is the first of its kind to evaluate the effect of ethnically diverse AI-generated personas, and the findings offer impactful insights for the global application of personas in design.

2. Literature review

Personas are fictional characters used by designers to represent user types with certain characteristics and behaviors (Anvari and Richards, 2018; Goodman-Deane et al., 2018; Grudin, 2006; Pruitt and Grudin, 2003). Personas provide focus and direction to designers by helping them better understand user needs, goals, and motivations (Cooper, 1999). Identification is important for the application of personas because identification allows to the creation of relatable and realistic personas that facilitate the process of designers empathizing with users’ needs, goals, and behaviors (Nielsen and Storgaard Hansen, 2014). In this study, we refer to *persona identification* as “a person’s sense of identity with [a persona]” (Oxford English Dictionary, 2023), i.e., “how well does a person feel that the persona is like him/her?”.

In HCI research, the identification of similarity between humans and personas has been referred to as *persona perception* (i.e., how persona users perceive personas as people) (Salminen et al., 2020c), which in turn originates from the social psychology concept of *person perception* (Marsden and Haag, 2016). The literature explaining and promoting personas often omits a detailed discussion of the antecedents and consequences of persona identification. However, the *theory of personas* (i.e., a body of literature that discusses why personas work and what the underlying psychological mechanisms are) sheds light on and justifies this identification process. In the following section, we review central prior work in this area.

The mechanism or theory behind personas was laid out by Grudin (2006), exploring the psychological justification for personas. His work was based on the seminal publications of Cooper (1999) and Grudin and Pruitt (2002). Grudin (2006) recognized three persona usability points on “why personas work”: (a) Personas are humanlike, (b) users’ ability to engage with models of real people transforms into engagement with

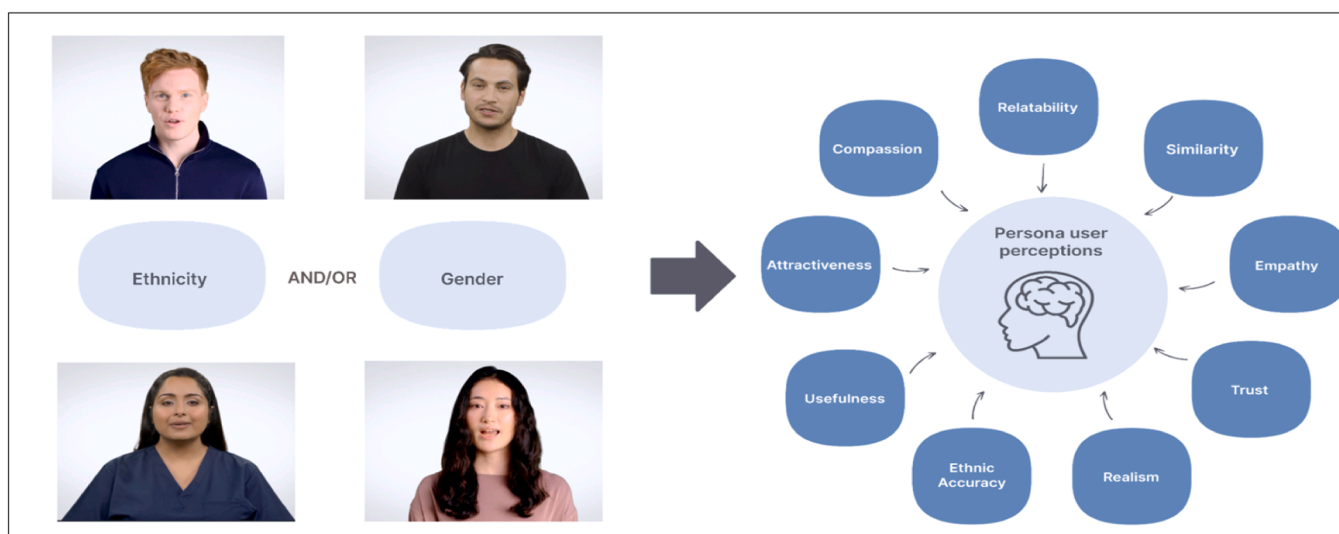


Fig. 1. This research tested for ethnicity, gender, AND ethnicity/gender effect on the nine study variables and impact on persona perceptions. The theoretical underpinning suggests that ethnicity, gender, and ethnicity AND gender combined affect persona user perceptions composed of perceptions that matter for design.

personas, and (c) users' models of real people are complex and personas offer similar models of fictional people. Our study adds to the human-likeness aspect of personas the idea of *identification* with personas. According to Grudin (2006), personas serve the purpose of compressing user information into tangible and relatable artifacts; the process is also known as *mental modeling* (Benedictis et al., 2023). Grudin (2006) also acknowledges some potential criticisms of personas, such as the risk of oversimplifying the user base or the danger of relying too heavily on stereotypes (these risks are also cited by other authors (Marsden and Haag, 2016; Marsden and Pröbster, 2019; Turner and Turner, 2011)). However, he argues that personas can be valuable tools that promote collaboration, empathy, and user-centered design when used correctly. Overall, Grudin's investigation into personas supports the effectiveness of personas in the design process, emphasizing their role in establishing a shared understanding, fostering empathy, aiding decision-making, and ultimately creating better user experiences. Since Grudin (2006), the theory of personas has remained quite stable, and the basic premises of persona identification have remained mostly unchallenged, with most persona-related articles repeating the premises, thereby contributing to the narrative of "how" and "why" personas work rather than delving directly into the effect of ethnicity or gender of personas on persona identification. Considering the consideration for multiple identities, such as gender, ethnicity, occupation, and hobbies, can facilitate the creation of designers can create personas that better reflect represent the nuances and varied experiences of the target audience. Crucially, this view is not in conflict with the drive to build "data-driven" personas; in fact, Chapman et al. (2008) specifically pinpoint that data can be sliced in infinitely different ways, leading to multiple different persona realities that can co-exist and be traceable back to the data.

Although gender is usually considered in persona creation, the role of gender in persona perception has been challenged. It is not necessary that the persona user has the same gender as the persona for the sake of persona perception (Matthews et al., 2012). As a way to neutralize the effect of gender, Lopes and Vogel (2021) propose using gender-neutral personas that yield a higher gender-inclusivity in design requirements. However, the exclusion of gender from the personas, specifically when compared to persona profiles containing a graphical representation of the user (typically a profile picture of sorts) may decrease the degree of realism perceived by the persona users (Salminen et al., 2021).

Overall, prior studies have shown that ethnicity and culture play a role in the development of personas (Jensen et al., 2017). Adding to this, taking the effects of ethnicity and gender into account while creating and using an AI-generated persona can affect the information-carrying potential of AI-generated personas. However, how AI-generated persona representation affects this process remains unclear. Our experimental study addresses this unclarity.

3. Methodology

3.1. Experiment design

3.1.1. Study procedure

We conducted a between-subjects experiment in which the AI-generated persona ethnicity was the between-subject factor. Each study participant was exposed to an AI-generated persona of their own ethnic group of random gender and a persona of the Caucasian ethnic group of random gender; Caucasian study participants were exposed to Caucasian and Indian AI-generated personas since these were the personas using the English language. Our ethnic group division adheres to a list of ethnic groups presented by the Office for National Statistics (gov.uk, 2023; Minahan, 2014) (Caucasian (USA), Indian, Korean, and Hispanic (Mexico)). The groups were selected for practical reasons. First, the availability of UX designers, and second, the availability of ethnic AI personas. Second, these four ethnic groups represent different regions of the world (North America, Asia, and Latin America) and different racial categories (White, Hispanic, Asian, and South Asian), and the four

ethnic groups have sufficient and accessible data sources and AI models to create personas with Generative AI systems with different ethnic and gender characteristics.

The study also focuses on two genders (biological sex): male and female. These genders were selected based on simplicity and availability. By limiting the gender options to two, the study simplifies the analysis and interpretation of the results. The study acknowledges that gender is a complex and fluid construct that goes beyond the binary categories of male and female. Still, for clarity and feasibility, the study opts for a simpler approach.

Also, the AI-generated persona creation methods are more readily available for male and female genders than for other gender identities at the time of the study (Kaate et al., 2024). The primary reason for this lies in the datasets used for training the systems, which often lack sufficient representation of non-binary identities (Wagner and Blewer, 2019). We leave the investigation of other genders for other research. Fig. 2 describes the study procedure from the participant's point of view.

The experiment was implemented using Qualtrics, a platform enabling the creation of randomized controlled trials. The order of personas presented to participants was randomized to control for ordering effects. After the first persona video, the participant completed a task and answered a survey, after which the second persona video was shown to the participant, and the same task and survey were completed. After the second task, the survey, and filling in the background information, the participant was thanked, and the experiment ended.

3.1.2. Briefing the participants

To ensure a foundation for all participants, participants were explained that personas are fictitious representations of groups of people that help designers understand user needs. Participants were informed that they would be shown two different AI-generated persona videos. After each video, they would create an idea of a digital tool that would help the persona reduce impulsive buying. The participants were informed that the data collected was used anonymously and only for research purposes, that they could contact the study administrator at any time, and that they could cancel their participation at any time. After this, their consent to participate was asked. The participants were instructed with a persona description before the persona examination to ensure that every participant had the same basic understanding of personas and personas' purpose. A persona description was a short verbal introduction given by the study administrator to the participants: "A persona is a fictitious person that describes a certain type of user or customer. It is not a real person but a representation of a group of people. Personas help designers understand user needs." The work task scenario (WTS) presented to participants before the persona examination dealt with designing an idea for a digital tool that helps the persona reduce impulsive buying (see Appendix 1 for precise instructions). WTSs are a widely used methodology in HCI user experiments to test system usability (Kaate et al., 2023b; Salminen et al., 2020a). After examining the first persona, the participants were directed to perform the WTS and answer a survey, after which the same cycle was performed for the second persona.

3.2. Persona creation

The persona narratives were created using GPT-3.5 (June 2023 version), which is an AI language model created and developed by OpenAI (2023). GPT-3.5 uses a user-generated prompt as an input to generate text as an output. The GPT model belongs to the family of Generative AI technologies, which is a rising technology with extremely interesting implications for design practice and HCI research, including the creation of personas (Zhang et al., 2023b). Particularly, GPT belongs to the Generative AI subcategory of large language models (LLMs), which are models that output text based on instructions called prompts (Jansen et al., 2023).

By leveraging Generative AI, personas can be imbued with the

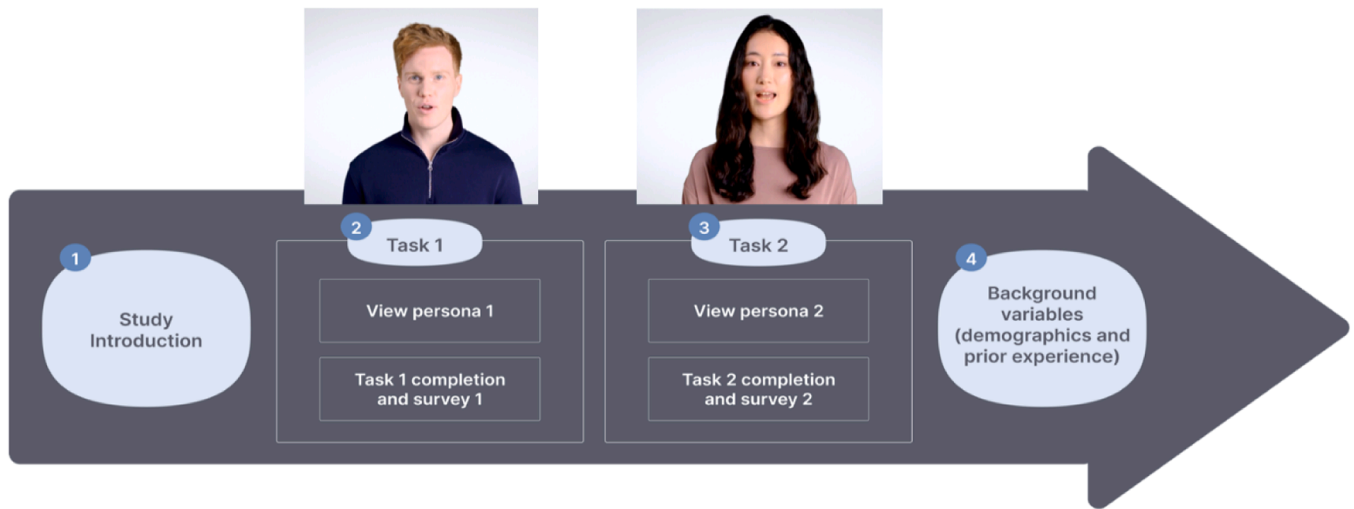


Fig. 2. Experiment design from the participant's perspective.

appearance and mannerisms of real individuals, bringing a sense of familiarity and authenticity to their interactions with designers. For these reasons, we used Generative AI to create a persona for this study. To create the personas, we prompted GPT-3.5 with a request to separately describe a female and a male persona in their mid-thirties who would like to decrease their impulsive shopping behavior but are struggling to do so (See Appendix 2). GPT-3.5 outputs were modified to persona narratives for input in the persona AI video generation tool Synthesia. A minor modification was made to the male persona narrative to avoid the profanity blocking in Synthesia. Given the predominance of English in Indian professional society and the many languages spoken on the Indian subcontinent, we opted for English for the Indian ethnic group. The GPT-3.5 code for replicating the requests is available in Appendix 3. The principal scientist checked videos created in Synthesia for proper lip-sync and any inconsistencies between the voice (speech) and the demographic attributes of the AI-generated persona. No such discrepancies were detected in our assessment.

Persona narratives modified from GPT-3.5 outputs were used as scripts for persona video generation in Synthesia, which is a commercial online tool for humanlike video generation (Synthesia, 2022). This procedure follows the example set in prior work that created personas using deepfake video technology (Kaate et al., 2023). The personas were generated for each of the eight ethno-gender groups resulting in eight persona videos (Table 1). The ethnic portrayal accuracy of the personas was accomplished by randomly asking two potential user study participants on Upwork whether the person in the image they see portrays a person of their own ethnic background (Hispanic, Indian, or Korean). The principal scientist determined the ethnic representativeness of the Caucasian persona. Example screenshots of the persona videos are in Table 2. The voice for each persona video was determined as the country-specific voice offered by Synthesia since those voices are used by all the system users.

The persona videos were created for each ethno-gender group (Table 1) by manually choosing ethnically and gender-wise appropriate persona avatars from Synthesia and uploading a persona narrative. Scripts for Caucasian and Indian personas were in English, the script for

Table 1
Personas generated using synthesia.

Ethnicity	Male	Female
White (Caucasian)	John	Ashley
Hispanic	Pablo	Isabel
Indian	Rahul	Priya
Korean	Sung-Min	Min-Ji

the Hispanic persona was translated into Spanish, and the script for the Korean persona was translated into Korean. Names of the personas were altered according to the common names of corresponding ethnic groups (Table 1) with GAN2Name (<https://acua.qcri.org/tool/GAN2Name>), which is a tool for assigning demographically appropriate names (Jung et al., 2021). The spoken language of the persona was chosen in Synthesia according to the language of the persona (English, Spanish, or Korean). Persona videos created were exported from Synthesia in mp4 format for the experiment. The persona videos are available as supplementary material online.¹

3.3. Recruiting participants

Participants were recruited in Upwork² which is an online talent acquisition platform. Participants were not required to be individuals who function frequently with people with varying ethnic backgrounds, but as the participants offer their expertise on a global talent acquisition platform, their work involves working with a potentially global audience. Participants were explained the study procedure, and informed consent was obtained as described in Section 3.1.2. A total of 69 participants were recruited from four ethnic groups (Table 3). All recruited participants had a background in UX and/or software development. The average age of participants was 29.15 years (SD=5.28), and the average experience in UX and/or software development was 3.95 years (SD=3.84). 33 participants were male (47.83 %) and 36 were female (52.17 %). The experience with personas was as follows: *I had never heard of personas* (10, 14.5 %), *I knew what personas are but I hadn't used them* (17, 24.7 %), *I had used personas before* (9, 13.0 %), and *I had used and created personas before* (33, 47.8 %). Screening criteria in Upwork for participants were (a) language (English, Spanish, or Korean), (b) place of residence (USA, Mexico, India, or Korea), (c) declared gender, (d) age between 25 and 40, and (e) work history in UX and/or software development. Each participant also went through a visual screening of their Upwork profile image, which was used to determine the ethnic background of the participant in addition to the place of residence. Each participant was invited to take part in the Upwork experiment. Every participant who completed the experiment was compensated USD 17 for their time.

¹ https://osf.io/8whjc/files/osfstorage?view_only=fec9c6927dad4c5ea88935e1d4af2aa19

² <https://www.upwork.com/>

Table 2

Example screenshots of persona videos. (a) Caucasian male (John), (b) Hispanic male (Pablo), (c) Indian female (Priya), and (d) Korean female (Min-Ji).

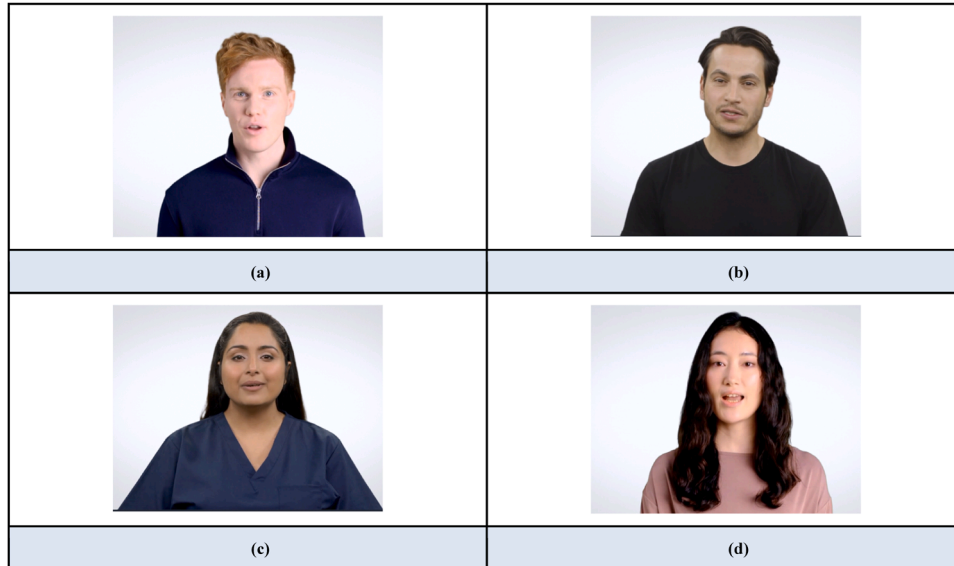


Table 3

Study participants by ethnicity and gender. Values in parentheses are the remaining participants in the final analyses after data cleanup.

Participant ethnicity and gender	Number of participants
Caucasian male	5 (5)
Caucasian female	9 (9)
Hispanic male	10 (10)
Hispanic female	8 (7)
Indian male	9 (8)
Indian female	10 (9)
Korean male	9 (7)
Korean female	9 (9)
Total participants	69 (64 remained in the final analysis)

3.4. Study variables

Study variables are presented in Appendix 4. The chosen variables have been used in persona perception studies, human perception studies, or usability studies before our study to study how persona users perceive personas and how users perceive the usability of a system (e.g., Brooke, 1995; Gefen, 2002; Latoschik et al., 2017; Salminen et al., 2020c). Each study variable in the survey was also accompanied by an open question where participants were encouraged to elaborate on their thinking about the persona. In addition to the variables in Appendix 4 and accompanying open-ended questions, we recorded participants’ background information (age, gender, experience in current occupation, experience with personas, experience in UX and/or software development).

3.5. Analysis

3.5.1. Quantitative data analysis

After gathering survey results from all 69 participants, data was exported from Qualtrics and preliminary cleaned in Excel. Due to superficial task completion, 6 (8.70 %) participants were excluded from further analysis. After preliminary cleaning, 64 (92.75 %) participants were left in the data for further analysis, meaning a 7.25 % data loss. For the quantitative data analysis, a *multilevel logistic regression* was performed. This means that there were various levels for the data. In each case, a participant saw two personas. The participant is on one level, and each persona is on another level. A simpler way to put this is that personas were nested within the participants, i.e., within-subjects design, where each participant was exposed to multiple conditions, in this case, multiple personas. At a practical level, this only means that we were considering that each pair of personas was observed by the same participant. Thus, we are accounting for within-subject variability (e.g., individual response patterns). The dependent variables are coded as dummies, with 1 indicating the presence of that attribute (same ethnicity, or same gender, or same gender and ethnicity), and 0 as the absence of that attribute. For the multilevel logistics regression, variables of gender and ethnicity were converted to dummy variables indicating similarity of gender/ethnicity (1) or dissimilarity (0). The 7-point Likert scale variables were used in the analysis as such. Multilevel logistics regression was performed for each construct separately, meaning that ethnicity, gender, and ethnicity and gender were all separate models. In general terms, the formula for each model is given by the following equation:

$$\text{logit}(\text{Pr}(\text{Identical} = 1)) = \beta_0 + \beta_{\text{age}}X_{\text{age}} + \beta_{\text{UX_experience}}X_{\text{UX_experience}} + \beta_{\text{persona_experience}}X_{\text{persona_experience}} + \beta_{\text{deepfake_experience}}X_{\text{deepfake_experience}} + \beta_{\text{gender}}X_{\text{gender}} + \beta_{\text{ethnicity}}X_{\text{ethnicity}} + \beta_{\text{reliability}}X_{\text{reliability}} + \beta_{\text{similarity}}X_{\text{similarity}} + \beta_{\text{realism}}X_{\text{realism}} + \beta_{\text{trust}}X_{\text{trust}} + \beta_{\text{usefulness}}X_{\text{usefulness}} + \beta_{\text{empathy}}X_{\text{empathy}} + \beta_{\text{compassion}}X_{\text{compassion}} + \beta_{\text{attractiveness}}X_{\text{attractiveness}} + \beta_{\text{accuracy}}X_{\text{accuracy}} + u_{\text{PID}}$$

where $\text{logit}(\text{Pr}(\text{Identical} = 1))$ are the log-odds of the outcome variable being 1; β_0 is the intercept term; X_m represents each of the predictor variables (such as participant age, persona experience, and so on, all explicitly noted in the equation) and β_M is the corresponding coefficient; and finally, u_{pID} is the random intercept for each participant ID, capturing variation at the participant level.

3.5.2. Qualitative data analysis using generative AI-led topic analysis

Open-ended survey answers from the participants were thematically analyzed with the help of ChatGPT (September 2023 version) to form an understanding of the underlying ideas each participant had on the effects of ethnic similarity between the participant and the persona. Thematic analysis is analyzing qualitative data via reading a set of usually textual data to detect patterns in the data and create themes. As such, thematic analysis is an active reflexivity process for making sense of the data (Braun and Clarke, 2006). ChatGPT was prompted to find themes, i.e. to code the open-ended answers to themes, from the open-ended answers from the point of view of *ethnicity*. Prompts were formulated as follows: “I have survey data for you. Find mentions of ethnicity from these survey answers and formulate themes based on your findings. When you find something interesting, interpret the finding from the point of view of ethnicity and how the ethnicity of the persona affected the respondent. Illustrate each theme with actual quotes from the responses.”

Themes generated by GPT-4 were cross-checked and critically validated by the principal researcher by going through the qualitative data (open-ended survey answers) and example user quotes which GPT-4 rose from the open-ended answers within themes and ensuring the quotes were real quotes by participants and that the themes were risen from the actual data. GPT-4 has been successfully used for thematic analysis and coding in prior research (Turobov et al., 2024; Zhang et al., 2023a). The validation process was performed to ensure that GPT-4 performed the thematic analysis in a way a human researcher would have performed it and to avoid GPT hallucinations in the user quotes, thus ensuring a human researcher-like approach to the qualitative data. A stratified random sample of 90 participant quotes (10 quotes per construct in Appendix 4) was selected and thoroughly examined by the leading researcher to ensure the themes found by GPT-4 were real and present in the qualitative dataset. GPT-4 named similar themes with different names, such as Authenticity, which was present in the data for several constructs with the same definition but varying names (Authenticity, Authentic Appearance, Authentic, Looks). The researcher combined these and similar themes into larger themes; in this case, Authenticity and coding for the themes were adjusted accordingly and verified again by going through the stratified sample of 90 participant quotes. Qualitative themes and example codes for themes are presented in Appendix 5.

After the leading researcher validated GPT-4 generated themes, the same stratified random sample of 90 participant quotes (10 quotes per each construct in Appendix 4) was used, and an independent human rater was provided GPT-4 generated themes and codes for the themes (Appendix 5). The independent human rater rated each participant quote to a theme (see Appendix 5). Interrater agreement between the human rater thematic ratings and GPT-4 thematic ratings were calculated, indicating a high level of agreement between the human rater and GPT-4 with an 84.4 % percentage agreement and Cohen's Kappa of 0.785, indicating substantial agreement (Sun, 2011).

4. Results

4.1. Results overall

The study dataset is available in the online supplementary material.³

³ https://osf.io/8whjc/files/osfstorage?view_only=fec9c6927dad4c688935e1d4af2aa19

Table 4

Results for multi-level *logistic regression*. Robust standard errors are in parenthesis. Asterisks show the p values, but there are no statistically significant results. (a) Same ethnicity, (b) Same Gender, and (c) Same Ethnicity and Gender refer to similarities between the AI-generated persona and the participant. No construct was significantly correlated with ethnicity, gender, or ethnicity and gender.

Construct	Same Ethnicity	Same Gender	Same Ethnicity and Gender
Relatability	-0.104 (0.190)	-0.053 (0.187)	-0.064 (0.249)
Similarity	0.084 (0.132)	0.111 (0.147)	0.165 (0.175)
Empathy	0.057 (0.191)	0.036 (0.270)	-0.188 (0.320)
Trust	-0.408 (0.215)	0.107 (0.173)	-0.294 (0.234)
Realism	0.037 (0.232)	-0.511 (0.269)	-0.233 (0.287)
Ethnic Accuracy	0.147 (0.125)	0.012 (0.142)	-0.026 (0.139)
Usefulness	0.120 (0.173)	0.136 (0.184)	0.284 (0.223)
Attractiveness	-0.132 (0.121)	-0.038 (0.121)	-0.130 (0.155)
Compassion	0.054 (0.102)	0.106 (0.142)	0.214 (0.143)
Age	-0.028 (0.022)	0.003 (0.050)	0.030 (0.055)

Robust standard errors are in parentheses. *** $p < .001$, ** $p < .01$, * $p < .05$.

The results of the logistic regression modeling (see Table 4) show that none of the regression coefficients are statistically significant at 0.05, which we found surprising, as our premise was that there would be a difference. A participant with the same ethnicity as the AI-generated persona negatively affects trust toward the persona, although the result is not statistically significant. A participant having the same gender as the AI-generated persona has a negative effect on realism, although the result is not statistically significant. A participant having the same ethnicity AND gender as the AI-generated persona has a negative effect on trust and realism (the result is not statistically significant). Finally, a participant having the same ethnicity AND gender as the AI-generated persona has a positive effect on compassion, although the result is not statistically significant.

However, a one-way ANOVA was conducted to determine the effect of experience with personas ((a) I had never heard of personas, (b) I knew what personas are but I hadn't used them, (c) I had used personas before, and (d) I had used and created personas before) on each of our study constructs. For *Similarity*, there was a statistically significant effect of experience with personas on *Similarity*, $F(3, 124) = 3.20, p = .026$. For *Empathy*, there was a statistically significant effect of experience with personas on *Empathy*, $F(3, 124) = 4.22, p = .007$. For *Compassion*, there was a statistically significant effect of experience with personas on *Compassion*, $F(3, 124) = 2.67, p = .05$. These results show that experience with personas had an effect on users perceived similarity, empathy, and compassion towards the personas.

The following subsections report the quantitative and qualitative results for RQ1 and RQ2.

4.2. RQ1: how do an AI-generated persona's demographic traits, including (a) ethnicity and (b) gender, affect designers' perceptions of the persona?

4.2.1. Relatability

Our results show that there was no significant relationship between (a) ethnic similarity and relatability ($b = -0.104 (0.190)$), (b) gender similarity and relatability ($b = -0.053 (0.187)$), and (c) ethnic and gender similarity and relatability ($b = -0.064 (0.249)$). However, despite no significant differences between ethnicity and/or gender and AI-generated persona relatability, we found patterns between ethnic and/or gender similarity and relatability from the qualitative analysis of the open-ended survey data supporting ethnicity and/or gender similarity affecting relatability. From the analysis of the open-ended answers for

relatability, we recognized specific themes: (1) *Cultural, national, or behavioral differences or similarities* and (2) *Authenticity*. For *Cultural, national, or behavioral differences or similarities*:

- “I being a westerner probably have much different kind of impulsive buying habits than a person from India. I am probably financially better off” (P16, Caucasian male).
- “I am not an Indian male who is a software engineer.” (P07, Caucasian female)

The quotes reflect the importance of culture, nationality, and behavior in relatability. For a Westerner (USA resident in this study), for example, it can be difficult to relate to the life situation of an Indian due to the different cultural background. The suggestion from P16 being financially better off as a Westerner reflects the assumption that a person from the Western world has more opportunities to spend money than a person from India. In contrast, P16 and the persona have different ethnic backgrounds and different gender backgrounds and genders. These observations indicate that ethnicity affects the relatability of users to personas. For *Authenticity*:

- “She represented what seemed like a real, convincing person based on her accent and appearance and the content of what she said.” (P05, Caucasian female)
- “A reminiscent of real-life people that also have spending issues.” (P17, Caucasian male)
- “This persona is very rare in India, as most of the 34-year-old women in India are married and have families.” (P55, Indian male)

The quotes reflect the importance of *Authenticity* in relatability. As P17 said, the persona was reminiscent of real-life people, indicating that there are authentic properties in the persona that help relate to it. P55 exemplifies the effect of the personas’ non-traditional life situation on authenticity. To P55, the persona does not seem authentic because of P55’s experience of similar women in India. P05 (Caucasian female) noted the realistic accent of the persona she observed (Indian). P05 felt that the persona was real. These observations indicate that the ethnicity of users affects the relatability to personas.

4.2.2. Similarity

Our results show that there was no significant relationship between (a) ethnic similarity and perceived similarity ($b = 0.084$ (0.132)), (b) gender similarity and perceived similarity ($b = 0.111$ (0.147)), and (c) ethnic and gender similarity and perceived similarity ($b = 0.165$ (0.175)). We found no patterns between ethnic and/or gender similarity and perceived similarity from the qualitative analysis of the open-ended survey data. However, despite no significant differences between ethnicity and/or gender and perceived similarity, we found specific themes from the open-ended answers affecting the perceived similarity of users toward personas: (1) *Empathetic life situations*, and (2) *Individual uniqueness*. For *Empathetic life situations*:

- “The way of thinking same as to me” (P41, Indian female)
- “I feel like we have a similar background and problems” (P21, Hispanic female)
- “I also face similar problems than the person” (P47, Indian female)

The quotes reflect that *Empathetic life situations* affect perceived similarity with the persona. All presented participant quotes show the role of *Empathetic life situations* on perceived similarity. However, no mentions that indicate ethnicity and/or gender affecting *Empathetic life situations* and perceived similarity. These observations indicate that ethnicity or gender do not significantly affect the perceived similarity of users toward personas. For *Individual uniqueness*:

- “I am totally opposite of the persona.” (P60, Indian female)

- “I felt different because I didn’t have a spending pattern like her.” (P79, Korean male)
- “Everyone is unique in their own way.” (P54, Indian male)

The quotes reflect that the persona being too unique or different from the user can affect perceived similarity. P60 (Indian woman) said she is completely opposite to the persona she observed (Caucasian male). However, P54 noted that everyone is unique in their own way, implying that there is a unique factor in every human being and persona. In P54’s quote, *Individual uniqueness* can be interpreted as a universal factor since ‘everyone is unique’ and should be observed with their unique properties. However, there are no mentions of ethnicity or gender affecting *Individual uniqueness*. These observations indicate that ethnicity or gender do not significantly affect the perceived similarity of users to personas.

4.3. RQ2: how does the designer’s demographic similarity, including (a) ethnic and (b) gender similarity, with the AI-generated persona correlate with their perceptions of the persona?

4.3.1. Empathy

Our results show that there was no significant relationship between (a) ethnic similarity and empathy ($b = 0.057$ (0.191)), (b) gender similarity and empathy ($b = 0.036$ (0.270)), and (c) ethnic and gender similarity and empathy ($b = -0.188$ (0.320)). However, even though there were no significant differences between ethnicity and/or gender and empathy, we found specific themes between ethnic and/or gender similarity and empathy from the qualitative analysis of the open-ended survey data: (1) *Empathetic life situations* and (2) *Language*. For *Empathetic life situations*:

- “I don’t have the same problem, but I can surely imagine what she is going through.” (P54, Indian male)
- “I do understand that hard work and stress can cause impulsive buying. What she has said in Korean is quite an understandable idea. Since this might be because Korea has a long working time culture.” (P67, Korean male)
- “I have some developer friends so for me it easy to picture a day in the life of Pablo.” (P36, Hispanic male)

The quotes reflect the role of *Empathetic life situations* on perceived empathy. P67 noted his familiar situation with the Korean persona and having the same ethnic background as the persona. P54, even if the problem is not the same as the observed persona, could empathize with the persona with the same ethnic background. For P36 (Hispanic) it was easy to empathize with the persona (Hispanic) by knowing people like the persona. However, there are no mentions of ethnicity or gender affecting empathy. These observations indicate that ethnicity or gender does not significantly affect the empathy of users toward personas. For *Language*:

- “Language used in the persona’s description was empathetic and focused on humanizing their struggles” (P47, Indian female)
- “When I listened to the English version, it didn’t feel like this [empathetic], but hearing it in my native language makes it sound more like a machine reading it, lacking intonation and realism. It’s fascinating how the auditory factor can make such a difference even though the content remains the same.” (P73, Korean female)

The quotes from P47 and P73 reflect the effect of *Language* to empathy. P47 focused on how *Language* was used by the persona and P73 focused on what *Language* was used by the persona. Especially, P73 showed that listening to the native language (Korean) spoken by the persona made it sound more unrealistic while listening to English. This effect was not observed by P73. This reflects users’ sensitivity to hearing flaws when spoken in their native language. These observations indicate

that *Language* influences users' empathy towards personas.

4.3.2. Trust

Our results show that there was no significant relationship between (a) ethnic similarity and trust ($b = -0.408$ (0.215)), (b) gender similarity and trust ($b = 0.107$ (0.173)), and (c) ethnic and gender similarity and trust ($b = -0.294$ (0.234)). However, even though there were no significant differences between ethnicity and/or gender and trust, from the qualitative analysis of the open-ended survey data, we found a specific theme: *Authenticity* illustrated in the following quotes.

- “Why wouldn't I trust him? He's talking about himself. I have no reason to doubt him. He didn't say anything outrageous.” (P29, Hispanic female)
- “I don't see how the persona could be lying.” (P39, Hispanic male)
- “This [compulsive buying] is a common issue nowadays and this persona highlights the issue in a better way. Such a smooth description.” (P77, Korean male)

The quotes reflect the effect of *Authenticity* on trust. Users found little signals for distrust. However, there are no mentions of ethnicity or gender affecting trust. These observations indicate that ethnicity or gender do not significantly affect users' trust in personas.

4.3.3. Realism

Our results show that there was no significant relationship between (a) ethnic similarity and perceived persona realism ($b = 0.037$ (0.232)), (b) gender similarity and perceived persona realism ($b = -0.511$ (0.269)), and (c) ethnic and gender similarity and perceived persona realism ($b = -0.233$ (0.287)). However, even though there were no significant differences between ethnicity and/or gender and persona realism, we found specific themes from the open-ended answers affecting perceived persona realism: (1) *Authenticity* and (2) *Body language and subtle bodily cues*. For *Authenticity*:

- “She represented what seemed like a real, convincing person based on her accent and appearance and the content of what she said.” (P05, Caucasian female)
- “The level of authenticity and realism portrayed in the persona was remarkable, creating a captivating and engaging experience.” (P52, Indian male)
- “The persona was perceived as realistic because it was crafted in a manner that accurately reflected the characteristics, behaviors, and challenges of a specific user.” (P47, Indian female)

The quotes reflect the effect of *Authenticity* on perceived persona realism. All participant quotes reflect that an authentic persona seems realistic. However, there are no mentions of ethnicity or gender affecting perceived persona realism. These observations indicate that ethnicity or gender do not significantly affect perceived persona realism. For *Body language and subtle bodily cues*:

- “Voice did not match the video. Seemed not as realistic as the first video.” (P17, Caucasian male)
- “His face, eyes, and mouth were moving in a somewhat unnatural way.” (P69, Korean female)
- “As someone who uses Korean, it felt like he was reading it too robotically. Although the persona had rich expressions, seeing the face made it feel out of sync, and it created a sense of discordance no matter what. I'm curious if people in English-speaking countries felt the same way when they heard it in English earlier.” (P73, Korean female)

The quotes reflect the effect of *Body language and subtle bodily cues* on perceived persona realism. P73 mentioned the dissonance between spoken language and the persona's body language where P73 and the

persona were Korean. However, the mention by P73 was the only mention reflecting any potential effect of ethnicity and gender between *Body language and subtle bodily cues* and perceived persona realism indicating that ethnicity and gender do not significantly affect perceived persona realism.

4.3.4. Ethnic accuracy

Our results show that there was no significant relationship between (a) ethnic similarity and perceived ethnic accuracy ($b = 0.147$ (0.125)), (b) gender similarity and perceived ethnic accuracy ($b = -0.012$ (0.142)), and (c) ethnic and gender similarity and perceived ethnic accuracy ($b = -0.026$ (0.139)). However, even though there were no significant differences between ethnicity and/or gender and perceived ethnic accuracy, we recognized a specific theme from the qualitative analysis of the open-ended survey data: *Authenticity* illustrated in the following quotes.

- “He doesn't look like a Korean and a city guy.” (P64, Korean female)
- “This person looked like an American. They have western features.” (P02, Caucasian male)
- “In terms of race, she appears to be from East Asia, but based on her hairstyle, makeup style, and fashion, she doesn't strike me as Korean.” (P71, Korean female)
- “Yes, the persona looked like a typical person of his/her nationality. She looked like an Indian and she also told that she is from India.” (P45, Indian female)
- “He had a typical Korean appearance.” (P80, Korean male)

The quotes reflect the effect of *Authenticity* on perceived ethnic accuracy. P02, P45, and P80 shared the ethnicity and gender of the persona they observed for their quotes, giving the remark that the persona did look like a typical member of their ethnic group. In contrast, P64 and P71 shared ethnicity and gender with the persona they observed and deemed that the persona did not look like a typical member of their ethnic group. These observations indicate that sharing the same ethnicity and gender with the persona influences the perceived ethnic accuracy of the personas.

4.3.5. Usefulness

Our results show that there was no significant relationship between (a) ethnic similarity and perceived usefulness ($b = 0.120$ (0.173)), (b) gender similarity and perceived usefulness ($b = 0.136$ (0.184)), and (c) ethnic and gender similarity and perceived usefulness ($b = 0.284$ (0.223)). However, even though there were no significant differences between ethnicity and/or gender and perceived usefulness, we recognized specific themes from the qualitative analysis of the open-ended survey data: (1) *Authenticity* and (2) *Language*. For *Authenticity*:

- “It helped to relate more than just read a case.” (P21, Hispanic female)
- “I'm also facing the same situation.” (P43, Indian female)
- “She looked like a fellow Indian. But the charm and the dressing of an Indian didn't go that well.” (P60, Indian female)

The quotes reflect the effect of *Authenticity* on the perceived usefulness of the persona. Interacting with a persona rather than text was seen as important (P21), and the lack of authentic dressing of the persona was seen to lower the usefulness of the persona (P60). However, there were no signals on the effect of ethnicity or gender on the authenticity, indicating that *Authenticity* does not significantly affect the perceived usefulness of the personas. For *Language*:

- “It was good to hear Korean.” (P64, Korean female)
- “Because of the different language, it was a little hard to understand fully.” (P80, Korean male)

The quotes reflect the effect of *Language* on perceived usefulness. P64 and P80 were both Korean and they mentioned the effect of *Language*. P64 embraces her native language being used, and P80 notes that not hearing his native language making it difficult to understand the persona. P80 is not fully comprehended due to the non-native language used, and not being fully able to comprehend the persona would affect the perceived usefulness of the persona. Observations indicate that sharing the same ethnicity with the persona, through *Language*, influences the perceived usefulness of the persona, although not sharing a fully comprehensible language with the persona might affect the perceived usefulness of the persona.

4.3.6. Attractiveness

Our results show that there was no significant relationship between (a) ethnic similarity and perceived attractiveness ($b = -0.132$ (0.121)), (b) gender similarity and perceived attractiveness ($b = -0.038$ (0.121)), and (c) ethnic and gender similarity and perceived attractiveness ($b = -0.130$ (0.155)). However, even though there were no significant differences between ethnicity and/or gender and perceived attractiveness, we recognized specific themes from the qualitative analysis of the open-ended survey data: (1) *Sexual attractiveness* and (2) *Authenticity*. For *Sexual attractiveness*:

- “I am attracted to women. I did not find the persona ugly or attractive. I did get thrown off a bit by the AI face.” (P02, Caucasian male)
- “The physical attraction is there, and I think she would have to wear clothes that have some exposure.” (P79, Korean male)
- “She has beautiful features and a way of dressing. She is a person who physically attracts me.” (P38, Hispanic male)

The quotes reflect the effect of *Sexual attractiveness* on perceived attractiveness. For P02, revealing his heterosexuality in the quote, he sees the female persona as sexually neutral while seeing the male persona as more attractive than an average male. P79 (Korean male) and P38 (Hispanic male) were both attracted by the female persona, not by their own ethnic group. These observations indicate that not sharing the gender with the persona influences persona attractiveness. For *Authenticity*:

- “His face seems like a Korean but his voice not.” (P62, Korean female)
- “It’s hard for me to find her attractive without fully knowing her.” (P35, Hispanic female)
- “This is an AI and there is no attraction to the persona.” (P10, Caucasian female)

The quotes reflect the effect of *Authenticity* on perceived attractiveness. P35 raises an interesting notion that knowing the persona is the key to attractiveness, and P10 notes that it is difficult to be attracted to an AI persona, yet not specifically mentioning the possible authenticity issues in the AI-generated persona. Quotes from P35 and P10 underline the importance of *Authenticity* for perceived attractiveness. So, there are weak signals of the effect of ethnicity or gender on *Authenticity*, indicating that authenticity could have a minor effect on perceived attractiveness.

4.3.7. Compassion

Our results show that there was no significant relationship between (a) ethnic similarity and perceived compassion ($b = 0.054$ (0.102)), (b) gender similarity and perceived compassion ($b = 0.106$ (0.142)), and (c) ethnic and gender similarity and perceived compassion ($b = 0.214$ (0.143)). However, even though there were no significant differences between ethnicity and/or gender and perceived compassion, we recognized a specific theme from the qualitative analysis of the open-ended survey data: *Empathetic life situations* illustrated in the following quotes.

- “Happens to me and many other people I know.” (P25, Hispanic male)
- “I know how it feels to waste money for products that I don’t want.” (P40, Hispanic male)
- “I don’t feel pity for her situation because there are other situations which really are worse than hers.” (P37, Hispanic male)
- “Genuinely, I’m facing this problem.” (P43, Indian female)
- “I also have struggled with impulsive buying.” (P07, Caucasian female)
- “Problems were realistic and relatable.” (P05, Caucasian female)

The quotes reflect the effect of *Empathetic life situations* on perceived compassion. P05, P07, P25, P40, and P43 felt empathy for having similar life situations and experiences as the persona. P37 felt no empathy towards the persona since P37 saw that the problems the persona was facing were not serious. However, there are no signals on the effect of ethnicity or gender on *Empathetic life situations* indicating that empathetic life situations do not significantly affect the designer’s perceived compassion for the persona.

4.3.8. Age

Our results show no significant relationship between (a) ethnic similarity and participant age ($b = -0.028$ (0.022)), (b) gender similarity and participant age ($b = 0.003$ (0.050)), and (c) ethnic and gender similarity and participant age ($b = 0.030$ (0.055)). No specific themes were revealed from the qualitative analysis of the open-ended survey data regarding ethnic and/or gender similarity and participant age.

5. Discussion

5.1. Theoretical implications

Our study contributes to the body of work testing and exploring the *boundaries of personas for design*, which a stream of studies has investigated (Edwards et al., 2020; Friess, 2012; Matthews et al., 2012; Salminen et al., 2018; Wilson et al., 2018). By ‘boundaries’, we mean finding out the limits of AI-generated persona applications – if such a limit exists. One possible constraint of personas might be in their cross-cultural applicability. This was the premise we set out to test, and we expected to encounter more issues, involving biased thinking. However, our premise – our own bias! – was not supported. Our findings imply that personas are *ethnically universal*: designers from different cultures perceive and use them in highly similar ways. This is a testimony of personas as a design technique that has gained international status as an acknowledged design instrument with the HCI community.

Quantitative differences were not statistically significant, and few signals were found in our qualitative data that could lead us to think that ethnic and/or gender similarity influences the constructs we studied. Indications of such influence emerged, for example, the effect of cultural background and authenticity on relatability and the effect of language on usefulness. In terms of the theory of personas, our quantitative results suggest that (a) *personas are universal in nature, regarding gender and ethnicity* and (b) *designers from different ethnic backgrounds can well empathize with personas from different ethnic backgrounds*. Therefore, personas are applicable in increasing intercultural understanding, as argued in theory (Nielsen, 2019; Nielsen and Storgaard Hansen, 2014). Different cultures, people, and personas have similar properties to which most people can relate. Based on our findings in the qualitative data analysis, such relatable characteristics include physical attractiveness, natural voice, and authentic-looking personal artifacts, such as hair, eyes, and language.

A quote from a participant (P54) reveals the nature of ‘kind people’: “Everyone is unique in their own way”. Ethnocultural empathy (Albiero and Matricardi, 2013) could be seen as a determining factor in this example quote. People, at least the ones in our sample, can truly relate to other people from different cultures. This may be a personality aspect of

UX designers, which would be an exciting area of social research. It also supports prior research showing that even though the potential for bias was present, this bias was not apparent in the actual tasking or design feature (Salminen et al., 2023).

Prior research has seen the over-representation of young females in image generation tools as a problem (Salminen et al., 2020b) that one might, therefore, expect to impact the creation of personas using AI. However, our findings suggest that gender does not have a major effect on AI-generated persona perception. Although there were comments, for example, on attractiveness, these did not appear to significantly affect AI-generated persona perception. In addition to the gender effect in personas, our findings add to the ethnocultural empathy effect described by Albiero and Matricardi (2013). From the AI-generated persona perceptions perspective, the *ethnocultural effect* means that, based on our findings, the ethnic background of the AI-generated persona is not relevant for using the AI-generated persona, or at least it is not the decisive determinant in the formation of AI-generated persona perception among designers.

The three persona usability points raised by Grudin (2006) – namely, personas are humanlike, designers' ability to engage with models of real people transforms to engagement with personas, and designers' models of real people are complex, and personas offer similar models of fictional people – are supported by our results. First, persona usability, how personas are used, seems not to be affected by the persona's ethnicity or gender. Second, perceived empathy towards the persona seems not to be affected by the persona's ethnicity or gender. Third, personas' purpose of aiding decision-makers in the decision process is not affected by the persona's ethnicity or gender. The UX designers in our study could identify the gender and ethnic aspects of the personas, but neither of these significantly affected the designers' perception of the personas. The designers could engage with all personas as real people even though the personas were not real but AI-generated.

5.2. Design implications

Based on our results, ethnicity and gender do not play a significant role in how users perceive personas; ethnicity and gender are not decisive factors in AI-generated persona perception. From the design and managerial perspectives, our results offer a way for managers and designers to approach the concept and use of emerging AI-generated personas in new ways. Many AI-powered persona generation platforms offer a narrow range of default persona ethnicities, mainly young Caucasians, although not always. Based on our results, having a biased selection of persona ethnicities is not a problem for the AI-generated persona perception meaning that little attention could be paid to the ethnicity or gender of the AI-generated persona while still maintaining the persona's effectiveness. However, we would also advocate for more diversity in the default AI-generated persona ethnicities, as there may be design tasks where ethnicity is critically important; ethnically realistic personas add to the design process when developing internationally oriented products. Identification of such use cases is an interesting and valued area of research. A major implication from our work is that, from the perspective of gender and ethnicity, personas are universal; therefore, designers can be confident that their work is applicable (in some respects) cross-ethnically – though much further work would be needed on other aspects of the UX process, such as multicultural scenarios.

5.3. Limitations and future work

For the limitations, first, we used only a limited number of ethnicities in our study. In the future, using multiple ethnicities could offer an even more thorough view of AI-generated persona perception in different ethnic groups. Second, the effect of age on AI-generated persona perception could be measured in more detail in future studies. In our study, our focus was on ethnicity and gender effects. Third, increasing the sample size could offer more explanatory power to the analysis.

Recruiting more participants for the study could strengthen the study. A power analysis was conducted to determine the necessary sample size for detecting a medium effect size ($d = 0.5$) with a significance level (α) of 0.05 and a desired power of 0.80. Using a two-tailed independent samples *t*-test, the analysis indicated that a sample size of approximately 64 participants per group would be required to detect a statistically significant effect. The actual sample size of 64 participants, in total, used in the study aligns with the required sample size for a less than medium effect size (0.60). This means that with the used sample size, large effects could be detected but subtle effects might not be detected.

An increase in sample size would be required to detect a weaker effect. Fourth, we used only UX and software development professionals as study participants, but they were not the only group using personas. Expanding the range of AI-generated persona users to other AI-generated persona user groups, such as marketers, would bring variety to the study participants, possibly offering new insights into the effects of ethnicity and gender on AI-generated persona perception. Fifth, some aspects of AI-generated personas' inherent properties, such as distortions in the videos, were not considered widely in our work. Such effects would be important to study in future research, such as the effects of voice distortions in the AI-generated personas affecting perceived empathy or the effects of potential lip-syncing problems in the AI-generated personas. Sixth, stereotyping towards the personas could influence the design choices based on the persona's ethnicity or gender. Seventh, studying the effect of AI-generated personas' speech on the ethnic representation of the AI-generated persona is a future research direction. We did not address the effects of speech, or how the AI-generated persona talks, on AI-generated persona's ethnic representation. Ethnic representation of the AI-generated persona can be affected, for example, by the intonation of speech or how the AI-persona pronounces words in general or what are the dialectal properties of the AI-generated persona's speech. Finally, the WTS outcomes and the designs could be further analyzed to study the effects of persona perceptions on task performance. We leave this investigation for another study.

6. Conclusion

The research gap we addressed was that no extensive studies have been conducted on the effects of persona ethnicity and gender on AI-generated persona perception. Prior literature has shown that the ethnicity and gender of personas can affect the information-carrying capacity of personas – our study shows the opposite. For now, commercial AI persona generation platforms offer possibilities to create personas in various ethnic groups and genders, though the platforms still have a bias towards the young Caucasian demographic. Based on our results, ethnicity and gender are not significantly important for AI-generated persona perception. So, according to our study, the demographics of AI personas do not play a significant role in AI persona identification, and further research is needed to expand this view we presented. This implies that personas are universal regarding gender and ethnicity. Yet, since we performed our study with UX designers only, the *designers themselves* might be “universal” in the sense that they similarly view personas regardless of their ethnic background and gender.

CRedit authorship contribution statement

Kaate Ilkka: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Salminen Joni:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Data curation, Conceptualization. **Jung Soon-Gyo:** Software. **Santos João:** Writing – original draft, Formal analysis. **Aldous Kholoud:** Data curation. **Häyhänen Essi:** Data curation. **Azem Jinan:** Visualization. **Bernard J. Jansen:** Writing – review & editing, Writing – original draft, Validation, Supervision.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Ilkka Kaate reports financial support was provided by Foundation for Economic Education. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1. Work task scenario

“Here is your fictional scenario. You work as a designer for a software company. Shortly, you will be presented with two different kinds of personas, and your task is to develop an idea for a digital tool that would help the persona reduce impulsive buying. This tool can be anything that can be used in a digital environment, such as a mobile app, game, or system. You do not have to code anything, but the idea of a digital tool is important. The digital tool should support the persona’s desire to reduce impulsive buying. Keep this goal in mind when you observe the persona’s information. The persona’s thoughts were created using a generative artificial intelligence model called ChatGPT. The persona’s visual presence was created with a video creation software called Synthesia.”

Appendix 2. Prompts used for GPT-3 persona narrative creation, GPT-3 persona narrative outputs, and persona narratives used in persona generation based on GPT-3 outputs

app

GPT-3 Prompt	GPT-3 output	Persona narrative
Describe a female persona in his mid-thirties that would like to decrease her impulsive shopping behavior but is struggling to do so.	Meredith is a 34-year old woman who loves to shop. Unfortunately, she has found herself in a situation where she is spending far too much on things that she doesn’t need or even particularly want. She knows she needs to reign in her spending habits, but doesn’t know how to break her impulsive shopping habit. Meredith works in a big corporate office and is usually overworked and exhausted. She finds comfort in browsing online and in stores, and has difficulty resisting the temptation of buying new things. Often, when she does buy something, she later feels guilty about her decision. She is starting to realize that the satisfaction she gets from shopping is temporary, but she finds it hard to practice self-control and stop her impulse buying. Despite her struggles, Meredith is determined to make a change. This motivates her to make a budget and stick to it. She is also trying to recognize triggers that make her want to shop – like boredom and stress – and finds different ways to manage those feelings instead of turning to shopping. She is slowly learning that good financial decisions and financial freedom can make her feel just as good as buying something new.	I am Meredith. I am a 34-year old woman, and I love to shop. Unfortunately, I have found myself in a situation where I am spending far too much on things that I don’t need or even particularly want. I know I need to reign in my spending habits, but I don’t know how to break my impulsive shopping habit. I work in a big corporate office, and I am usually overworked and exhausted. I find comfort in browsing online and in stores, and I have difficulty resisting the temptation of buying new things. Often, when I don’t buy something, I later feel guilty about my decision. I am starting to realize that the satisfaction I get from shopping is temporary, but I find it hard to practice self-control and stop my impulse buying. Despite my struggles, I am determined to make a change. This motivates me to make a budget and stick to it. I am also trying to recognize triggers that make me want to shop – like boredom and stress – and I find different ways to manage those feelings instead of turning to shopping. I am slowly learning that good financial decisions and financial freedom can make me feel just as good as buying something new.
Describe a male persona in his mid-thirties that would like to decrease his impulsive shopping behavior but is struggling to do so.	This male persona is in his mid-thirties and works as a software engineer. He lives in an urban area and loves the hustling and bustling of the streets, but also craves the peace and quiet of nature. He desperately wants to reduce his impulsive shopping habits, especially when it comes to retail clothing. He’s had an issue with spending beyond his means for years now, and it’s taken a toll on his budget. He’s frugal by nature and hates seeing his hard-earned money go to waste. However, he’s prone to giving in to the thrill of instantly acquiring something new, regardless of whether he needs it or not, especially if it’s a brand he likes. He’s tried to apply his sharp engineering skills to finding ways to resist impulses, such as meticulously planning out monthly shopping budgets and only buying basics. But the urge to splurge is just too strong at times. On the rare occasion when he does give in, he feels a huge sense of guilt and regret that often sticks with him beyond the purchase itself. He’s determined to put a stop to his excessive spending, but he is struggling to stick to his well-meaning plans.	I am John. I am a 34-year old man and I work as a software engineer. I live in an urban area and I love the life and happenings of the streets, but I also crave the peace and quiet of nature. I desperately want to reduce my impulsive shopping habits, especially when it comes to retail clothing. I have had an issue with spending beyond my means for years now, and it’s taken a toll on my budget. I am frugal by nature and I don’t like seeing my hard-earned money go to waste. However, I am prone to giving in to the pleasure of instantly acquiring something new, regardless of whether I need it or not, especially if it’s a brand I like. I have tried to apply my sharp engineering skills to finding ways to resist impulses, such as meticulously planning out monthly shopping budgets and only buying basics. But the will to splurge is just too strong at times. On the rare occasion when I give in, I feel a huge sense of guilt and regret that often sticks with me beyond the purchase itself. I am determined to put a stop to my excessive spending, but I am struggling to stick to my well-meaning plans.

Appendix 3. OpenAI code for replicating persona generation

```
app
import os
import openai
openai.api_key = os.getenv("OPENAI_API_KEY")
response = openai.Completion.create(
model="text-davinci-003",
prompt="Describe a male persona that would like to decrease her impulsive shopping behavior but is struggling to do
```

so. \n\nThis male persona is in his mid-thirties and works as a software engineer. He lives in an urban area and loves the hustling and bustling of the streets, but also craves the peace and quiet of nature. He desperately wants to reduce his impulsive shopping habits, especially when it comes to retail clothing. He's had an issue with spending beyond his means for years now, and it's taken a toll on his budget. He's frugal by nature and hates seeing his hard-earned money go to waste. \n\nHowever, he's prone to giving in to the thrill of instantly acquiring something new, regardless of whether he needs it or not, especially if it's a brand he likes. He's tried to apply his sharp engineering skills to finding ways to resist impulses, such as meticulously planning out monthly shopping budgets and only buying basics. But the urge to splurge is just too strong at times. On the rare occasion when he does give in, he feels a huge sense of guilt and regret that often sticks with him beyond the purchase itself. He's determined to put a stop to his excessive spending, but he is struggling to stick to his well-meaning plans. ",

```
temperature=1,
max_tokens=256,
top_p = 1,
frequency_penalty=0,
presence_penalty=0
)
```

Appendix 4. Study variables for persona identification. Items were measured on a 7-point Likert scale (1 = Strongly disagree...7 = Strongly agree)

app

Research Question	Construct	Item	Source
RQ1: How do an AI-generated persona's demographic traits, including (a) ethnicity and (b) gender, affect designers' perceptions of the persona?	Relatability	The persona was relatable (=easy to understand and feel connected to).	Collins Dictionary (2023)
	Similarity	The persona was similar to me.	Oxford Dictionary (2023)
RQ2: How does the designer's demographic similarity, including (a) ethnic and (b) gender similarity, with the AI-generated persona correlate with their perceptions of the persona?	Empathy	I felt like I could understand this persona as a person. I could imagine a day in the life of this persona. I felt like I could understand the problems of this persona.	Salminen et al. (2020c)
	Trust	I could trust the information given by the persona.	Latoschik et al. (2017); Rajaobelina et al. (2021)
	Realism	This persona was realistic, i.e., it represented a person in a way that is accurate and true to life. The persona video had errors or artifacts, i.e., something that should not be naturally present. It felt like a real human was talking to me.	Gefen (2002)
	Ethnic Accuracy	I think the persona looked like a typical person of his/her nationality.	Bailenson et al. (2006)
	Usefulness	I found the persona useful for the given task.	Brooke (1995)
	Attractiveness	I found the persona physically attractive.	Marsh et al. (2010)
	Compassion	I felt sympathetic pity and concern for the problems of the persona.	Sinclair et al. (2022)

Appendix 5. Qualitative data analysis themes and codes for the themes. The coding means that whenever ChatGPT, and later the researcher, located sentiment or mention in the respondent's open-ended answers about the theme denominator (ergo, code), such answer was put to the corresponding qualitative data analysis theme

app

RQ	Construct	Qualitative Data Analysis Theme	Codes for the Themes
RQ1: How do an AI-generated persona's demographic traits, including (a) ethnicity and (b) gender, affect designers' perceptions of the persona?	Relatability	Authenticity	Sentiment of authenticity detected. The participant felt the persona was generally real and authentic. Authentic signal could be realistic looks of the persona (ethnically, culturally, age-wise, gender-wise), emotional authenticity, authentic routines, or the voice of the persona sounded authentic, and that vocals matched the facial movement of the persona.
	Similarity	Cultural, national, or behavioral differences or similarities Empathetic life situations	Mentions of cultural, national, or behavioral differences or similarities between the participant and the persona. Mentions of familiar empathy-inducing situations or daily routines to the participant presented by the persona.

(continued on next page)

(continued)

RQ	Construct	Qualitative Data Analysis Theme	Codes for the Themes
RQ2: How does the designer's demographic similarity, including (a) ethnic and (b) gender similarity, with the AI-generated persona correlate with their perceptions of the persona?	Empathy	Individual Uniqueness	Mentions of unique properties by the persona that the participant found identifiable.
		Empathetic life situations	Mentions of familiar empathy-inducing situations or daily routines to the participant presented by the persona.
	Trust	Language	Mentions of participant's own native language used made the participant perceive the persona closer or participant's own native language not used made the participant perceive the persona more distant.
		Authenticity	Sentiment of authenticity detected. The participant felt the persona was generally real and authentic. Authentic signal could be realistic looks of the persona (ethnically, culturally, age-wise, gender-wise), emotional authenticity, authentic routines, or the voice of the persona sounded authentic, and that vocals matched the facial movement of the persona.
	Realism	Authenticity	Sentiment of authenticity detected. The participant felt the persona was generally real and authentic. Authentic signal could be realistic looks of the persona (ethnically, culturally, age-wise, gender-wise), emotional authenticity, authentic routines, or the voice of the persona sounded authentic, and that vocals matched the facial movement of the persona.
		Body language and subtle bodily signal	The participant felt that the body movement of the persona was natural and/or the persona had realistic hair movement or style of makeup.
	Ethnic Accuracy	Authenticity	Sentiment of authenticity detected. The participant felt the persona was generally real and authentic. Authentic signal could be realistic looks of the persona (ethnically, culturally, age-wise, gender-wise), emotional authenticity, authentic routines, or the voice of the persona sounded authentic, and that vocals matched the facial movement of the persona.
		Usefulness	Authenticity
	Attractiveness	Language	Mentions of participant's own native language used made the participant perceive the persona closer or participant's own native language not used made the participant perceive the persona more distant.
		Authenticity	Sentiment of authenticity detected. The participant felt the persona was generally real and authentic. Authentic signal could be realistic looks of the persona (ethnically, culturally, age-wise, gender-wise), emotional authenticity, authentic routines, or the voice of the persona sounded authentic, and that vocals matched the facial movement of the persona.
	Compassion	Sexual attractiveness	The participant mentioned that the persona was sexually attractive.
		Empathetic life situations	Mentions of familiar empathy-inducing situations or daily routines to the participant presented by the persona.

Data availability

Data will be made available on request.

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