Identifying Body Appreciation by Visualising Actual/Ideal Self-Discrepancy: An Avatar Creation Task

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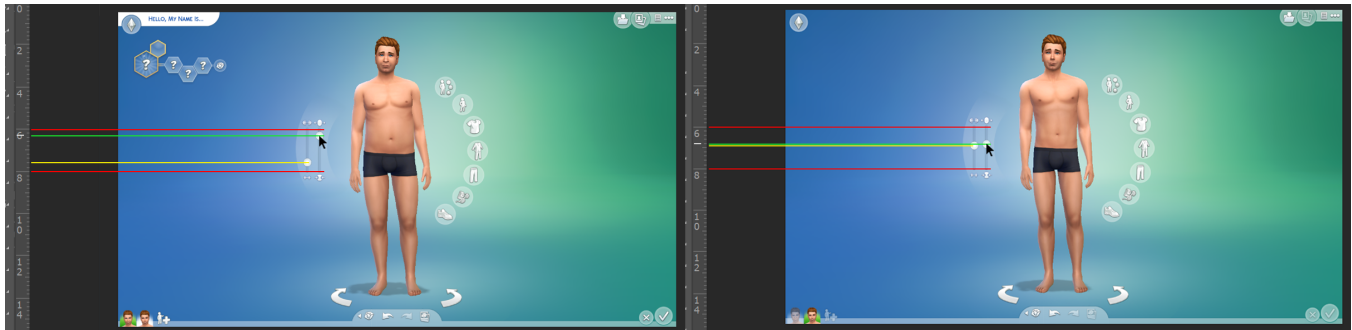Utrecht University
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Figure 1: Avatar creation as a tool for visualising and measuring discrepancy in the actual and ideal self: deriving meaning from the sliders in The Sims 4 (Left: actual self, Right: ideal self)

ABSTRACT

Negative body perception can negatively affect one's health, as it can lead to depression and eating disorders. Body appreciation on the other hand, is about accepting, respecting, loving, and appreciating the body, and has been associated with self-esteem, optimism, life satisfaction, and other factors related to the well-being. The aim of this research project is to investigate whether lower body appreciation can be identified by visualising the discrepancy between someone's actual self and their ideal self (i.e., the distance between these two domains of the self). This discrepancy is visualised through an avatar creation task using *The Sims 4* in which participants have to create an avatar of (1) the way they actually look, and (2) their ideal image. Participants' body appreciation was measured using the BAS-2 body appreciation scale, which contains ten statements about one's feelings towards their body. Actual/ideal self-discrepancy was calculated by measuring the number of changes that were made in order to get from the actual body to the ideal body. Analysis of the results reveals that (a) adjustments to certain avatar traits significantly correlate with body appreciation scores, and (b) some gender differences are notably predictive, e.g., with respect to "muscle", "middle body", and "weight" changes. As such, we may conclude that the developed avatar creation task which measures the discrepancy between the actual and ideal self, can indeed be used as a tool to identify (lower) body appreciation.

CCS CONCEPTS

• **Software and its engineering** → **Interactive games**; • **Applied computing** → **Computer games**; *Consumer health*; • **Human-centered computing** → *User studies*.

KEYWORDS

Avatars, video games, actual/ideal self-discrepancy, positive body image, body appreciation, BAS-2 body appreciation scale

1 INTRODUCTION

In today's society appearance and body image play an important role, as physical appearance is one of the first characteristics that is noticed by others [8]. A lot of people are affected by how they think and feel about their bodies [22] and many are concerned about at least one part of it [29]. In short, body image can be defined as someone's perception, thoughts, and feelings towards their body [15]. Research on body image used to be focused on negative body image (e.g., body dissatisfaction, body shame) rather than trying to identify and promote adaptive attitudes towards the body [2]. Later, research has shifted towards positive body image, in which body appreciation is the main part of focus.

It is likely that someone's ideal body looks somewhat different from their actual body. This can be explained by the *self-discrepancy theory* proposed by Higgins [16]. Higgins argued that one's self can be divided into three different domains: the actual self, the ideal self, and the ought self. The actual self represents the attributes one

believes they actually possess, while the ideal self represents the attributes they would ideally like to possess. Simplified that is: the person you actually are versus the person you would ideally like to be. The third domain of the self, the ought self, is a representation of the attributes someone thinks they should possess in order to conform to the expectations of others. Because this study aims to investigate the discrepancy between the way someone actually looks and the way they would ideally like to look (i.e., their physical attributes), only the first two domains will be focused on in the present study. The discrepancy between the actual and the ideal self can be described as the distance that is between these selves [5], and will in this study be referred to as actual/ideal self-discrepancy.

When someone perceives their own body negatively, this can have a negative impact on their health, such as the development of depression or eating disorders [18]. Body appreciation, on the other hand, is about accepting, respecting, loving, and appreciating the body [2] and has been associated with self-esteem, optimism, life satisfaction, and other factors related to the well-being [2, 17]. Therefore, this study wants to investigate whether lower appreciation of the body can be identified by measuring actual/ideal self-discrepancy. This discrepancy will be assessed through an *avatar creation task* in which participants are asked to recreate themselves as avatars, followed by the task of creating their ideal image.

First, a literature review will establish a better understanding of terminology related to (positive) body image. Moreover, differences in body image and body ideals between men and women will be elaborated upon. Next, the methods used in this research and the experimental design will be explained. This experiment will be conducted to investigate the following question: *Can an avatar creation task measuring discrepancy between the actual and ideal self be used to identify lower body appreciation?* Subsequently, results of the experiment will be presented and analysed, and lastly, conclusions will be drawn and the limitations of the research will be discussed.

2 RELATED WORK

Self-image, self-esteem, and body image all seem quite similar in their meaning. To get a better understanding of the present research context, these terms will be distinguished and explained using literature. Next, we discuss literature on different body ideals for certain genders, followed by a section on positive body image and body appreciation. Lastly, the different domains of the self [16] and the use of avatars will be elaborated upon.

2.1 Self-image, self-esteem, and body image

Self-image can be defined as someone's total subjective perception of themselves [3]; their experiences and ideas about themselves in all aspects of their lives [28]. This includes an image of their body and impressions of their personality and capabilities [3].

Self-esteem is similar to self-image. It can be described as someone's sense of self-acceptance or self-worth, concerning their generalised negative or positive attitude towards themselves [27]. Self-esteem can be used to evaluate self-image [27, 28, 30]. It has been found that poor self-esteem is a primary predictor of body image concerns, dieting and even eating disorders [27].

Body image is an essential part of self-image [28] and encompasses someone's perceptions, thoughts, and feelings about their body [15]. It is a construct that includes multiple aspects, such as body perception, body satisfaction, and body representation [38]. It is a self-perception defined by how someone feels about their own appearance and how they want it to look [18] and it encompasses the assessment of characteristics such as size, aesthetics, and fitness [26]. These subjective evaluations can lead to a perception of the body that is quite different from the objective characteristics of the body [26]. So, how someone views their own body shape determines their dissatisfaction with their body image, regardless of their actual body size [18].

2.2 Body ideals for men and women

A relevant dimension of body image is *body perception*, which reflects how someone's body is perceived [39]. Studies regarding body perception were focused on body size, looking at the discrepancy between the actual body and the ideal body [19, 25]. For the majority of women that partook in the experiments a discrepancy between the perception they have of their actual body and their ideal body was observed. On average, the ideal body of women was found to be thinner than their actual body, regardless of their age or weight [11, 23]. It appears that body image discrepancy is larger for women than it is for men [11], however, research found two different body ideals for men; some men would ideally like to have a leaner body, while others prefer to gain weight and/or muscle mass [23].

Since it is generally agreed upon that there is more social pressure on women to look a certain way than there is for men, a lot of research on body image has focused on women [15]. However, male body image research has developed since the 1980s and nowadays more is known about men's body image during different phases in their life [21]. Research indicated that it is normal for men to feel dissatisfied with their body [14]. This makes sense since the ideal body for men has become leaner and more muscular over the years, which is difficult to actually obtain [21]. According to Thompson [32] the ideal body for men is muscular, lean, physically fit and sexually desirable. This body is characterised by broad shoulders and muscular arms and chest. Moreover, being tall has been associated with body satisfaction [14]. The idea of a muscular ideal male body is being promoted by the media (e.g., social media, television, magazines), which results into more body dissatisfaction [32].

For women media promotion of body ideals is not new either. Promotion of a thin ideal body has been supported by research for years [10]. Current research suggests a shift in this ideal female body. Social media platforms nowadays are filled with female fitness accounts, featuring thin and muscular models [7]. So, the ideal female body now also includes the appearance of physical fitness (e.g., muscularity). Bozsik et al. [7] found that even though women in their particular investigation still thought of the thin body as attractive, they in fact had a preference for a thin and toned female body.

2.3 Positive body image

Body image research used to be focused on describing and predicting negative body image (e.g., body dissatisfaction and body shame) instead of focusing on the identification, prediction and promotion of adaptive attitudes towards the body [2]. Later, studying positive

body image gained more attention. Tylka and Wood-Barcalow [37] argued that promoting positive body image in body image therapy is more effective than simply reducing symptoms of negative body image. Reducing negative body image will only lead to a neutral body image, in which the body is solely tolerated rather than appreciated and loved. Positive body image is extensively defined as follows:

"An overarching love and respect for the body that allows individuals to (a) appreciate the unique beauty of their body and the functions that it performs for them; (b) accept and even admire their body, including those aspects that are inconsistent with idealized images; (c) feel beautiful, comfortable, confident, and happy with their body, which is often reflected as an outer radiance, or a "glow"; (d) emphasize their body's assets rather than dwell on their imperfections; (e) have a mindful connection with their body's needs; and (f) interpret incoming information in a body-protective manner whereby most positive information is internalized and most negative information is rejected or reframed." – Wood-Barcalow et al. [40, p.112].

Having positive body image is not the same as having low levels of negative body image. It cannot be considered as a single scale, on which negative body image is on one endpoint and positive body image is on the opposite one [37]. Positive body image is often expressed through *body appreciation*, which plays an important role in positive body image research [34]. Body appreciation is defined as accepting, respecting, loving, and appreciating the body, holding favourable opinions toward it, while also rejecting appearance ideals promoted by the media [2]. People with body appreciation admire their body for what it is able to do and for its unique features [37]. It is not the same as body dissatisfaction simply being absent [36]. According to research, body appreciation is linked to several positive psychological constructs and also indicates good health [1]. For example, it has been associated with self-esteem, optimism, adaptive coping, life satisfaction, and other factors related to the well-being of women [2, 17].

2.4 Measuring body appreciation

Avalos et al. [2] expressed and measured body appreciation via the 13-item Body Appreciation Scale (BAS), which has been used by researchers to understand features, correlates, and potential outcomes of positive body image. The BAS was originally developed to examine women, however, some researchers also used it for men to research gender differences. In order to investigate whether the BAS operates similarly for men and women, Tylka [35] investigated gender differences in BAS scores. She concluded that the BAS score of men and women can indeed be compared. Moreover, she found that on average men hold more positive body attitudes than women. This could be explained by the fact that male appearance norms are found to be less specific than those for women [35].

Later, the BAS was revised and adjusted by Tylka and Wood-Barcalow [36], which they tested in three different studies. Their new version of the BAS, the BAS-2, was evaluated by samples of U.S. female and male college students and members of online communities. The final scale contains ten items, of which five from Avalos et al.'s [2] original BAS statements and five revised or newly developed items that improved upon the limitations of the original BAS. One of those limitations was the fact that the BAS was not

gender neutral. Therefore, there was a male and female version of the BAS, because the list contained one gender specific statement ("I do not allow unrealistically thin (muscular) images of women (men) presented in the media to affect my attitudes toward my body"). In the BAS-2 this was reformulated ("I feel like I am beautiful even if I am different from media images") so that the same statements could be used for both men and women.

2.5 Different domains of the self

Higgins [16] proposed that one's self can be divided into three different domains: the actual self, the ideal self, and the ought self. The *actual self* represents the attributes someone believes they actually possess, referring to the person they think they are. The *ideal self*, on the other hand, represents the attributes someone would ideally like to possess. It describes the person that they would ideally like to be. The *ought self* is a representation of the attributes someone thinks they should possess in order to conform to the expectations of others (e.g., social norms). The first two selves will be focused on during this research, as participants will be asked to create both their actual self and their ideal self as an avatar in The Sims 4. The distance between the actual self and the ideal self (i.e., the differences between them) is referred to as actual/ideal self-discrepancy [5].

2.6 Avatars and body appreciation

An avatar can be defined as the embodiment of the user [6]. They fulfil communication needs, but they are also a visual representation of the user, an embodiment of their identity [12]. Individuals can choose pre-made avatars or customise their own, making self-representation in virtual environments very flexible [41]. People can dramatically change or subtly alter their avatar in any way they desire, including their gender, age, body shape and proportions, facial features, and hair style and colour [4, 42].

Studies investigating the use of avatars in virtual worlds, typically focus on the means that avatars provide for self-expression and communication. The intersection of avatars and (real-world) body appreciation is a relative niche and novel field of investigation. A proof-of-concept for assessing body appreciation via indirect measurements in a virtual environment has been explored by Thomas and Johansen [31]. Our study is similar to this work, though our study is more comprehensive in not only focusing on body mass and females, but more extensively investigating the relationship between body appreciation and desired body adjustments (i.e., beyond body mass).

A study on preferences for avatar personalisation options is performed by Ducheneaut et al. [12]; the work touches upon body representation, and revealed a tendency for users to embody aspects of their enhanced or ideal self into their avatar. Particularly, scholars observed in the Ducheneaut et al. [12] study "... a bias of avatar creation toward Western ideals, and older players, those with a higher body mass index, and players with lower psychological well-being were more likely to represent themselves in an idealised way, which reduced avatar diversity [20]." Finally, a recent study by Koulouris et al. [20] investigated the effects of avatar customisation and identification in a VR exergame. They found that avatar customisation significantly increased identification, but, interestingly,

that (overly) idealised avatars increased wishful identification while at the same time decreasing exergame performance compared to realistic avatars.

3 METHOD

In order to answer the question *'Can an avatar creation task measuring discrepancy between the actual and ideal self be used to identify lower body appreciation?'* an avatar creation task was purposely designed. First we will discuss the participant sample that has been leveraged for this experiment. Next, an explanation of the avatar creation task will be provided, clarifying all the materials that have been used and describing the procedure of the experiment.

3.1 Participants

The sample size consisted of 40 participants, of which 19 (47.5%) were female and 21 (52.5%) were male. All participants were Bachelor or Master students at Anonymous University, of which most of them studied either Information Science or Computing Science. Participation was strictly voluntary, and recruitment took place via convenience sampling. The age of the participants ranged between 18 and 27 years old, with a mean age of 22. Moreover, 35 participants had created avatars before, of which 6 create avatars on a regular basis. The remaining 5 participants had no experience creating avatars before the start of the experiment. The experiment was conducted over a period of two weeks. Participants were invited to take part in the experiment through an online calendar tool in which each participant was able to pick a time slot of their choice.

3.2 Ethical considerations

Before the commencement of the experiment, participants were informed that all their data would be confidential, would stored in an anonymous manner, and solely the instructor having access to the data. They were reminded that withdrawing from the study would be possible at any moment and that they could omit any questions they did not feel comfortable answering. An information letter and consent form were used to ensure that the participants fully understood what they were taking part in.

3.3 The avatar creation task

3.3.1 Design considerations. In order to design the avatar creation task, three things were required: (1) a tool in which avatars can be created, (2) a way to measure actual/ideal-self discrepancy, and (3) a way to measure body appreciation. First, a tool for creating avatars was selected, which had to meet a number of requirements. The first requirement is that it must be a flexible tool that allows the user to easily adjust a wide range of physical attributes. Moreover, it should be easy to create multiple avatars in a row. Thus, it should not be linked to an online account where the user is only able to create and adjust a single avatar. Furthermore, the tool must be able to run on a laptop, so that additional devices or consoles are not required. The Sims 4 meets all of these requirements and was therefore chosen as the simulation tool for this experiment. This tool and how actual/ideal-self discrepancy (i.e., changes made by participants) were measured will be elaborated upon in the following section. Lastly, the Body Appreciation Scale-2 was chosen to measure body appreciation, as the BAS and BAS-2 have often

been used and evaluated in positive body image research and were found to be effective tools for measuring positive body image [2, 35, 36]. Its content and how to use the scale will be explained in the following section as well.

3.3.2 Materials – Simulation tool. The so-called life simulation video game 'The Sims 4' [13] was used as the simulator participants created their avatars in. The Sims 4, which is an online life simulation game, allows users to create and customise avatars (or 'Sims'), giving them the possibility to change a variety of facial- and physical attributes, such as skin tone, face- and body shape, hair, clothes, and more. Users can choose between several standard body types and adjust these however they please. With sliders users can change the muscle and fat percentages of their avatar and by clicking and dragging certain body parts, users can adjust facial structures (e.g., cheekbone height and eye width) and body shapes (e.g., breast-, waist-, gut- and hip size).

3.3.3 Materials – Measuring change. The changes that participants made to get to their ideal-self avatar were measured in two ways. First, the two sliders from The Sims 4 were used to derive the change in muscle- and fat percentage between the two avatars. A series of screenshots were taken from each avatar (e.g., Figure 3–6). Since the resolution of each image was identical, the distance between two slider points could be read consistently. For this, the ruler tool in Adobe Photoshop was used. In Photoshop the length of each slider was 2 centimetres, as shown in Figure 1. This scale was converted from 8–6 centimetres (which were the Photoshop ruler values in our setup) to 0–10 points, each millimetre being a point on the scale. So, hovering the cursor over the lever made it possible to read its position on the scale. In the example shown in Figure 1, the actual-self avatar has a fat percentage of 8.5, while this is 6 for the ideal-self avatar. So, a -2.5 change in the Fat-slider was observed. In this example, the muscle percentage of the actual-self avatar is 2, while it is 5.5 for the ideal-self avatar, resulting in a +3.5 muscle change. To add both slider results together, a new variable was created that disregards whether the change is positive or negative. In this case the value of that variable would be 6, since that is the number of points on which the ideal-self avatar differs from the actual-self avatar.

The second way change was measured is through a questionnaire. The first section of the questionnaire gathers general information about the participants, such as their age, gender, and experience creating avatars. The second section contained reflective questions on the changes they had made during the experiment. As can be observed from Figure 2, changes beyond muscle- and fat percentage adjustments were made by the participants (e.g., facial features). Since in The Sims 4 these changes these cannot be measured by observing sliders, a list of notable bodily features is included to the questionnaire. This list was derived from items 61–69 of the Multidimensional Body-Self Relation Questionnaire (MBSRQ) [9]. In the MBSQR, participants are asked how satisfied they are with eight bodily features. For the purpose of this research, however, participants were asked to indicate how drastic the changes they had made to these features were. As such, in the questionnaire, the participants had to answer whether they made no changes at all, some minor changes, obvious changes, or drastic changes to the following items: (1) Face, (2) Hair, (3) Lower body (buttocks, thighs,

legs, feet), (4) Midsection (abdomen and stomach), (5) Upper body (chest, shoulders, arms), (6) Muscle tone, (7) Weight, (8) Overall appearance.

A score was assigned to each answer option, from 1 (no changes at all) to 4 (drastic changes). Adding all points together and dividing them by 8 resulted into a new variable that represents the average score of the changes that have been made to the entire body. To summarise, the changes between the actual- and ideal-self avatars have been measured in two ways: (1) a derivation of the sliders resulting into a slider score, and (2) the reflective questions from the questionnaire resulting into a questionnaire score.

3.3.4 Materials – Measuring body appreciation. For measuring the participant's body appreciation, Tylka and Wood-Barcalow's [36] BAS-2 body appreciation scale was used. The BAS-2 contains 10 questions, which have to be answered using a 5 point Likert Scale (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, 5 = Always). The average of the participant's responses to the 10 items results into a score that indicates their level of body appreciation; higher scores representing a more positive body image. In the last section of the questionnaire the following statements had to be answered: (1) I respect my body, (2) I feel good about my body, (3) I feel that my body has at least some good qualities, (4) I take a positive attitude towards my body, (5) I am attentive to my body's needs, (6) I feel love for my body, (7) I appreciate the different and unique characteristics of my body, (8) My behaviour reveals my positive attitude toward my body; for example, I hold my head high and smile, (9) I am comfortable in my body, (10) I feel like I am beautiful even if I am different from media images.

3.3.5 Procedure. Participants were individually invited to partake in the experiment. They were informed of what was expected of them during the experiment and were asked to read the instruction sheet and sign the consent form. Participants were ensured that their data would be anonymised, i.e., data will be stored such that re-identification of the individual is impossible.

To start off the experiment, a randomised avatar of their gender was presented to them in The Sims 4. First, participants were instructed to undress the avatar till it is shown in underwear, and subsequently create an avatar that resembles the way they look as closely as possible: their actual-self avatar. A quick tutorial on The Sims 4 was given to them so that they were familiar with all the features they were able to adjust. They were told that dressing up and accessorising the Sim avatar was not necessary for the experiment.

After finishing the actual-self avatar, an identical twin of this Sim was created using the genetics tool. This saved time compared to having to create a new Sim from scratch, since all the features (e.g., facial structures and body size) were now identical to the first Sim. Next, participants were asked to create an avatar that reflects the way they would ideally like to look: their ideal-self avatar. After finishing the avatars, participants were asked to fill out a questionnaire. The first two questions regarded their age and gender, followed by the reflective questions about the changes that were made. Lastly, participants had to answer the ten BAS-2 items. Participants were instructed to indicate whether the statements are never, seldom, sometimes, often, or always true for them.

Table 1: Descriptives: Average BAS-2 score, Muscle-slider changes, and Fat-slider changes

	Mean	Std. Deviation	N
BAS-2 score	3,575	,5921	40
Slider (muscle)	1,225	1,6367	40
Slider (fat)	-1,212	1,5017	40

When the experiment was concluded, participants were debriefed on the study. The purpose of the experiment and how the gathered data was going to be used was explained to them. On average, the duration of the experiment was 20 minutes per participant. A summary of the procedure is shown in Figure 7.

4 RESULTS

In the experimental setup, the number of changes that a participant makes to their actual image (i.e., towards achieving their ideal image) is measured in two ways:

(1) *An observed score.* These are the scores on two general sliders that were present, one for "Muscle tone" and one for "Fat" (i.e., body fat percentage).

(2) *A self reported score.* By means of a questionnaire subjects reported how many changes were made on a range of 8 categories (face, hair, eyes, etc.). The scores will be averaged. Subject scored on an ordinal scale, hence analyses will be of a non-parametric nature (Spearmans rho).

4.1 Analysis of observed scores; group as a whole

We will first calculate correlations between dependent variables that have been scored. From the slider scores we can see that "Muscle" was a positive number on average, and with "Fat", it was the other way around, it was a negative number (see Table 1). These are the expected directions when talking about "making one's ideal body" (more muscles, less fat).

For the group as a whole there was a positive correlation between the BAS-2 score and the behaviour with the "Fat-slider", rho = 0.429, n=40, p< 0.01, two-tailed; a higher BAS-2 score went together with higher Fat-slider scores. In other words, the better one is feeling about one's own body according to the BAS-2 scale, the less Fat-reduction took place in the subsequent ideal self-image (cf. Figure 8). Inversely, the people scoring *lower* in BAS-2 scale were the ones reducing their fat more. There was no correlation of BAS-2 with the Muscle-slider.

4.2 Analysis of self-reported scores group as a whole

Here we have another way to measure adjustments towards the ideal self-image, this time as estimated by the participants themselves. The scores on the questionnaire correlated negatively with scores on the BAS-2, rho = -0.494, n=40, p=0.01. The better one is feeling about one's own body according to the BAS-2, the less changes participants *reported* to have made in the subsequent ideal self-image (cf. Figure 9).
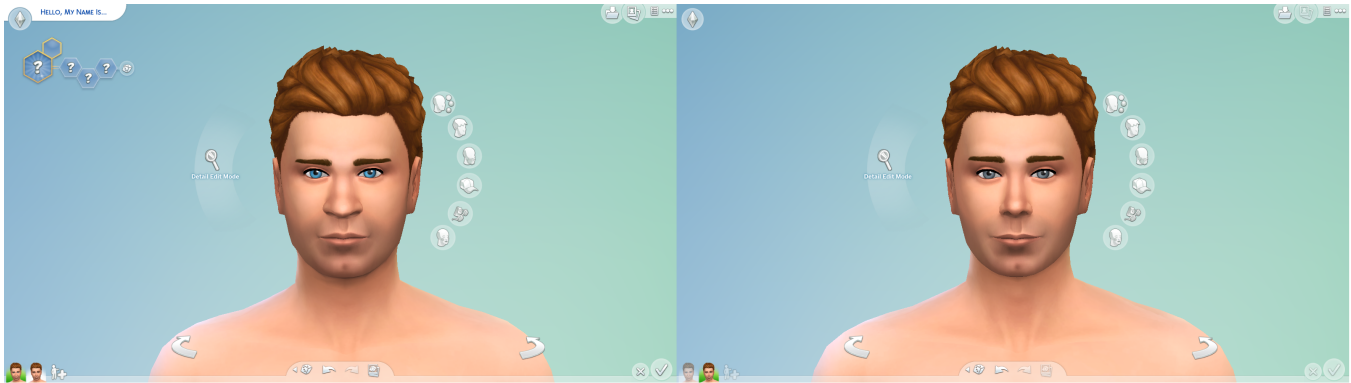
Figure 2: Changes to an avatar's face that were not made via The Sims 4 sliders

Figure 3: Male example of an actual-self (upper) and ideal-self (bottom) avatar

Figure 4: Male example of an actual-self (upper) and ideal-self (bottom) avatar

Since we had observed (moving sliders) scores, *and* self-reported scores (questionnaire) it is interesting to see whether these scores correlated. This was indeed the case: Reported number of Changes via the questionnaire and Fat-slider score were negatively correlated, rho = -0.381, n=40, p<0.01. This means that the higher one's self image is (via BAS-2) the less changes they report to have applied.

4.3 Gender differences

Proceeding with additional analysis, we now explore possible gender differences in the obtained results.

4.3.1 Gender differences & BAS-2 scores. There was no difference in the *average total* BAS-2-scores between males and females (M=3,54, SD=0.68 and M=3.62, SD=.50), $t(38)=-0.41$, p > .05 (cf. Figure 10;

Figure 5: Female example of an actual-self (upper) and ideal-self (bottom) avatar

Figure 6: Female example of an actual-self (upper) and ideal-self (bottom) avatar
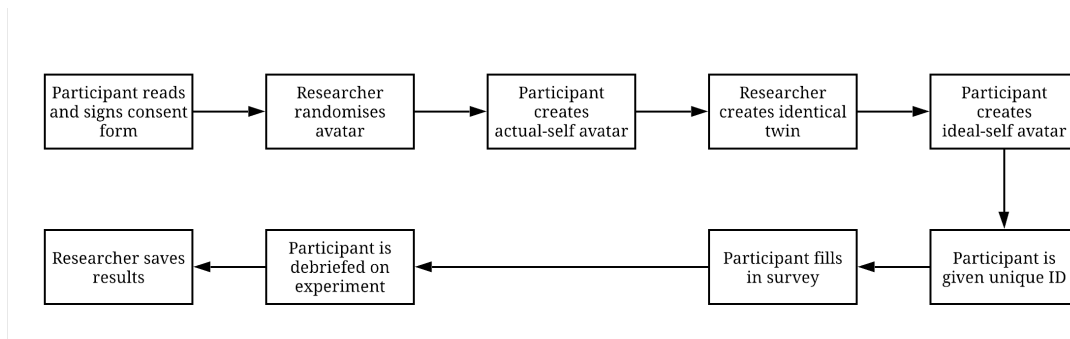

Figure 7: Outline of the experimental procedure

error bars at 95% CI). There were also *no* differences in partial scores on the BAS-2.

4.4 Observed differences: Scores on sliders

The difference in scores on the two sliders (Muscle and Fat) between men and women was also analysed. It showed that the Muscle-slider was used for significantly more changes among men than among women (M=1.74, SD=1.42 and M=0.66, SD=1.71), t(38)=2.18, p < 0.05 (cf. Figure 11 "Muscle-score slider"; error bars at 95% CI). With the Fat-slider there was no difference. This result suggests that the males in the experimental sample found muscle more important than women.

4.5 Self reported differences: Relation BAS-2 scores and questionnaire items

Just as with the BAS-2 scores, there was also no difference in the average questionnaire-score between males and females (M=2.30, SD=0.41 and M=2.24, SD=.45), t(38)=-0.41, p > .05.

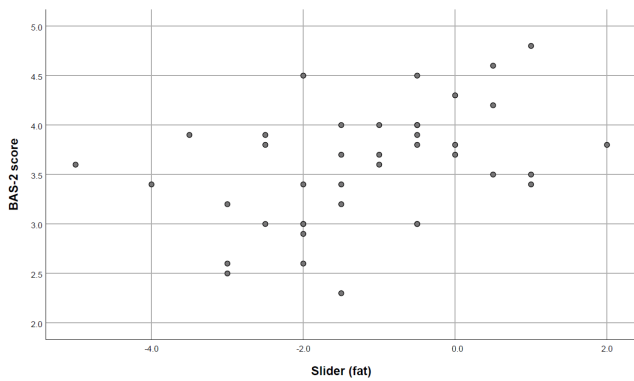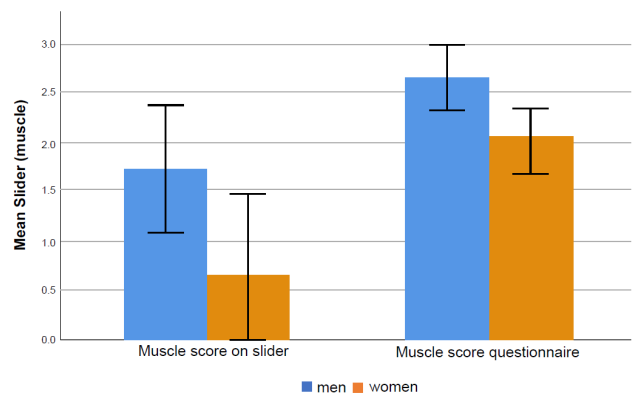**Figure 8: Scatterplot of BAS-2 scores and Fat-slider adjustments**

Figure 9: Scatterplot of BAS-2 scores and number of Changes reported the questionnaire

Figure 10: BAS-2 scores grouped per investigated gender

However, also here the one questionnaire item related to *"muscle"* was scored differently by men; males scored this question significantly higher (cf. Figure 11; "Muscle score questionnaire"). Here males scored systematically reported to have more changes than the women did (M=2.76, SD=0.73 resp. M=2.11, SD=0.74), t(38)=2.42, p < 0.05.

Figure 11: Gender differences in two Muscle related number of changes (via slider and via questionnaire).

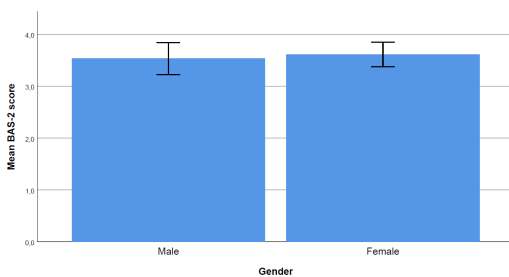**Figure 12: Scatterplot of BAS-2 scores and Middle Body adjustments (females)**

4.6 BAS-2 score of males and females and relation with the questionnaire

Lastly we analyse the correlation of BAS-2 scores between males and females with the individual items from the questionnaire. With the females the BAS-2 scores correlated negatively with the questionnaire items "Middle body" (Figure 12) and "Weight" (Figure 13). The higher the general BAS-2 scores, the less they reported having changed "Middle body" features, rho = -0.748, n=19, p < 0.01. Also, and interestingly, the higher the BAS-2 scores, the less they reported having changed "Weight" features, rho = -0.728, n=19, p < 0.01.

With the males there only was one negative correlation, it showed that the higher the BAS-2 scores, the less they reported having changed "Weight" features, rho = -0.576, n=21, p < 0.01.

5 DISCUSSION

Here, we will provide a general discussion of the obtained results (5.1), discuss outlier findings (5.2), reflect on the relationship between age and body appreciation (5.3), and discuss minimising participant bias (5.4) and limitations of the study (5.5).
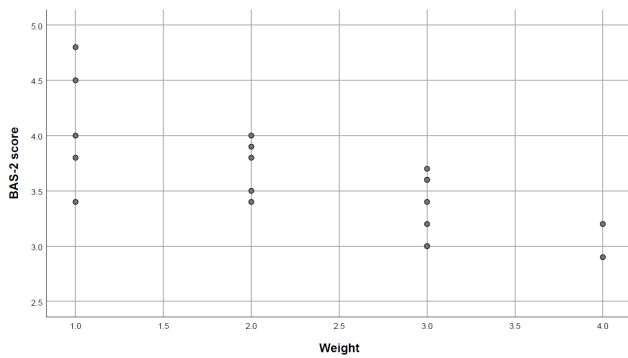
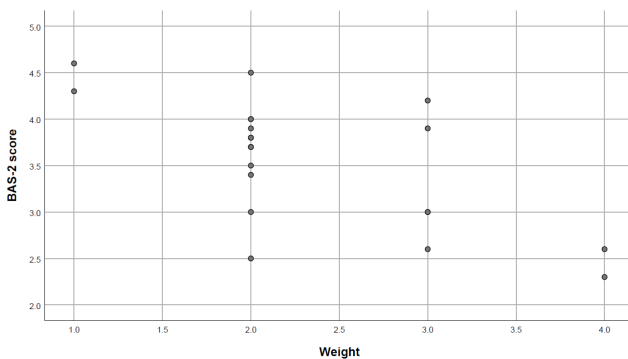**Figure 13: Scatterplot of BAS-2 scores and Weight adjustments (females)**

Figure 14: Scatterplot BAS-2 scores and Weight adjustments (males)

5.1 General discussion of the results

Resuming the results for the group as a whole, a higher BAS-2 score went together with higher Body Fat scores with the slider (i.e., more fat is accepted by the participant). In other words, the better one is feeling about one's own body according to the BAS-2 scale, the less Fat-reduction was desired for the ideal self-image. There was no correlation of BAS-2 score with the Muscle-slider scores. However, the BAS-2 scores correlated with the self-reported number of changes (reported via the questionnaire); the higher one's BAS-2 scores, the less changes participants reported to have made. The average Fat slider score and the number of Changes (questionnaire) score were negatively correlated, meaning that the more fat one allows in the ideal self-image by the slider, the less changes they report to have applied.

Regarding gender differences, what stood out were idealised "muscle" changes for participants identifying as male. Males use the muscle slider for bigger changes (as observed in The Sims 4 avatar creator) and also employ Muscle changes (self reported) more often than women. Lastly, the BAS-2 scores among females correlated negatively with the single questionnaire items "Middle body" and "Weight"; the higher the BAS-2 score, the less changes were self-reported. Interestingly, for the males only "Weight" correlated, also negatively.

5.2 Outliers

There are, however, some examples of outlier results. Figure 15 shows the results of someone with a high BAS-2 score, yet they also made relatively many changes. Even though such results are quite exceptional, they can be explained. Tylka and Wood-Barcalow [37] argued that positive body image is not the same as being highly satisfied with every aspect of the appearance. So, someone can still appreciate their body and have a positive body image while also wanting to change or improve certain physical attributes. As such, the avatar creation task is generally able to give an indication of someone's body appreciation but it may not be entirely accurate in all cases.

5.3 Age and body appreciation

As in the majority of body image research, the present study only focuses on students (i.e., average age 22, with only four participants being 25 or older), rather than focusing on older adults. So, it might be interesting to investigate the effectiveness of the avatar creation task for older participants as well. As people age, they drift further away from the youthful thin or muscular body ideal. People usually gain weight, change shape, develop wrinkles, and their hair gets thinner or turns grey as they get older [33]. Tiggemann [33] investigated body image across the life span for women. She concluded that body dissatisfaction remains quite stable during a woman's life, but that the importance of appearance decreases as women age. In other words, their body dissatisfaction remains the same, but it matters less to them. The developed avatar creation task could indeed be used to compare the actual/ideal-self discrepancy of older adults to that of young adults to investigate if there are differences in body appreciation between these age groups.

Interestingly, a study by Ducheneaut et al. [12] revealed that while younger participants create avatars of a similar age, older users apparently prefer creating an avatar that appears quite different in age. More precisely, the study revealed that older users generally create avatars looking younger than they are in real life; sometimes by a large margin. For instance, several participants with avatars in the virtual world *Second Life* aged 40 and above, had avatars looking like teenagers or young adults [12].

5.4 Minimising participant bias

Withholding the aim of the study. To the end of minimising participant bias it was decided that participants were not told the aim of the experiment beforehand. This is a typical approach when assessing body appreciation (e.g., cf. [31]). Of course, participant bias cannot be completely prevented. While the aim of the experiment is not immediately clear while partaking in the avatar creation task, one might be able to make a connection between the BAS-2 statements and the task they just completed, once they reach the last part of the questionnaire. The questionnaire does not mention that these statements are used to measure body appreciation, however one could guess that it has to be related to the actual- and ideal-self avatar they were asked to make. Thus, this could result into participants giving more favourable answers. An alternative would be to measure body appreciation first, subsequently perform the avatar creation task, and finally evaluate the changes that were made. This, however, would likely make the aim of the experiment

Figure 15: Outlier result; a participant with high BAS-2 body appreciation score nevertheless making significant avatar changes

more obvious from the start. Therefore, it was decided to have the questionnaire completed after the avatar creation task.

Hawthorne effect. It is theoretically possible that participants modified an aspect of their behaviour in response to the presence of the instructor (i.e., the Hawthorne effect [24]). We took care to minimise the occurrence of this effect. I.e., while the instructor was present in the room, she could not observe the in-game behaviour of the participant. She also took care to never comment on participant's actions or possible results; she was merely present to provide instructions and answer questions, e.g., in case the participant experienced difficulties with the computer controls. In addition, the effect is minimised via emphasising that data will be stored such that re-identification of the individual is impossible (i.e., the experiment is strictly anonymous).

Building upon the actual-self avatar. When creating a representation of one's ideal self, the participants are provided with their actual-self avatar as a reference. An alternative would have been to instead start with a randomly generated avatar. However, literature suggests that this would result in substantial noise in the experimental data, with participants predictably creating more 'free form' avatars [31]; as opposed to reflecting on precisely which adaptations they would prefer for specific body elements. Presumed accuracy aside, building upon the constructed actual-self avatar allows for a more time-efficient assessment of body appreciation.

5.5 Limitations

The Sims 4 limitations. Though care has been taken to select an avatar creation tool (1) with a wide expressive range, (2) with an intuitive user interface, and (3) enabling accessible and repeated experimenter interaction, the present study is inherently affected by the use of the adopted avatar creation tool; The Sims 4. That is, some customisation options regarding (a) length, (b) skin imperfections, and (c) hair-style and hair-colour are missing. Our intuition is that for the present study on body appreciation these customisation options are only a small moderating factor, but still we would like

to list their absence as a possible limitation imposed upon a user's expression and experience.

Sample size. Indeed, a limitation of the present research is the sample size that was used. A sample size of 40 participants is sufficient for finding general correlations, but since this research also investigates gender differences, these individual groups were too small (men = 19, women = 21) to properly analyse. A larger sample size (e.g., 30 participants per group) should be considered for more reliable results, but that was not feasible for the present research.

6 CONCLUSION & FUTURE WORK

In conclusion – and while acknowledging the limitations of the present study and the sample size of 40 participants – based on the experimental results it nevertheless is clear that the developed avatar creation task which measures the discrepancy between the actual and ideal self, can indeed be used to identify (lower) body appreciation.

For future work, we will investigate practical applications of the avatar creation task, with a particular focus not on students, but on older adults. The rationale here is that when people age, they may drift further away from a mediated, perhaps youthful body ideal. Inspired by Tiggemann [33], who found that when people age their body dissatisfaction remains relatively stable – but that the dissatisfaction matters less to ageing adults – we wish to further understand this phenomenon.

REFERENCES

[1] Rachel Andrew, Marika Tiggemann, and Levina Clark. 2016. Predicting body appreciation in young women: An integrated model of positive body image. *Body image* 18 (2016), 34–42.

[2] Laura Avalos, Tracy L Tylka, and Nichole Wood-Barcalow. 2005. The body appreciation scale: Development and psychometric evaluation. *Body image* 2, 3 (2005), 285–297.

[3] Joseph A Bailey 2nd. 2003. Self-image, self-concept, and self-identity revisited. *Journal of the National Medical Association* 95, 5 (2003), 383.

[4] Suzanne C Baker, Ryan K Wentz, and Madison M Woods. 2009. Using virtual worlds in education: Second Life® as an educational tool. *Teaching of Psychology* 36, 1 (2009), 59–64.

[5] Michael D Barnett, Jenna M Moore, and Aleesa R Harp. 2017. Who we are and how we feel: Self-discrepancy theory and specific affective states. *Personality and Individual Differences* 111 (2017), 232–237.

[6] Marion Boberg, Petri Piippo, and Elina Ollila. 2008. Designing avatars. In *Proceedings of the 3rd international conference on Digital Interactive Media in Entertainment and Arts*. 232–239.

[7] Frances Bozsik, Brooke L Whisenhunt, Danae L Hudson, Brooke Bennett, and Jennifer D Lundgren. 2018. Thin is in? Think again: The rising importance of muscularity in the thin ideal female body. *Sex Roles* 79, 9 (2018), 609–615.

[8] Pop Cristiana. 2016. Self-esteem and body image perception in a sample of university students. *Eurasian Journal of Educational Research* 16, 64 (2016).

[9] Claudia Cruzat-Mandich, Fernanda Díaz-Castrillón, Cristhian E Pérez-Villalobos, Paula Lizana, Catalina Moore, Susan Simpson, and Camila Oda-Montecinos. 2019. Factor structure and reliability of the Multidimensional Body–Self Relations Questionnaire in Chilean youth. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity* 24, 2 (2019), 339–350.

[10] Dale L Cusumano and J Kevin Thompson. 1997. Body image and body shape ideals in magazines: Exposure, awareness, and internalization. *Sex roles* 37, 9 (1997), 701–721.

[11] Jack Demarest and Rita Allen. 2000. Body image: Gender, ethnic, and age differences. *The Journal of social psychology* 140, 4 (2000), 465–472.

[12] Nicolas Ducheneaut, Ming-Hui Wen, Nicholas Yee, and Greg Wadley. 2009. Body and mind: a study of avatar personalization in three virtual worlds. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 1151–1160.

[13] Kevin Gibson, Grant Parent, Ryan Michael Vaughan, Eric Holmberg-Weidler, Matt Yang, Magnus Hollmo, Samantha Miceli, Steven Ross, Danielle von Mayrhauser, and Ilan Eshkeri et al. 2014. The Sims 4. *Electronic Arts (Maxis)* (2014).

[14] Scott Griffiths, Stuart B Murray, Aimee Medeiros, and Aaron J Blashill. 2017. The tall and the short of it: An investigation of height ideals, height preferences, height dissatisfaction, heightism, and height-related quality of life impairment among sexual minority men. *Body image* 23 (2017), 146–154.

[15] Sarah Grogan and Helen Richards. 2002. Body image: Focus groups with boys and men. *Men and masculinities* 4, 3 (2002), 219–232.

[16] E Tory Higgins. 1987. Self-discrepancy: a theory relating self and affect. *Psychological review* 94, 3 (1987), 319.

[17] Amy C Iannantuono and Tracy L Tylka. 2012. Interpersonal and intrapersonal links to body appreciation in college women: An exploratory model. *Body image* 9, 2 (2012), 227–235.

[18] Youjeong Kim and S Shyam Sundar. 2012. Visualizing ideal self vs. actual self through avatars: Impact on preventive health outcomes. *Computers in Human Behavior* 28, 4 (2012), 1356–1364.

[19] Marion Kostanski, Adrian Fisher, and Eleonora Gullone. 2004. Current conceptualisation of body image dissatisfaction: have we got it wrong? *Journal of child Psychology and Psychiatry* 45, 7 (2004), 1317–1325.

[20] Jordan Koulouris, Zoe Jeffery, James Best, Eamonn O'neill, and Christof Lutteroth. 2020. Me vs. Super (wo) man: Effects of Customization and Identification in a VR Exergame. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–17.

[21] Mohammed Malik, Sarah Grogan, Jennifer Cole, and Brendan Gough. 2021. Men's reflections on their body image at different life stages: A thematic analysis of interview accounts from middle-aged men. *Journal of health psychology* 26, 8 (2021), 1222–1232.

[22] Mohammed Saqalain Malik. 2018. *Male body image across the life course: a mixed methods study*. Ph. D. Dissertation. Manchester Metropolitan University.

[23] Marita P McCabe and Lina A Ricciardelli. 2004. Body image dissatisfaction among males across the lifespan: A review of past literature. *Journal of psychosomatic research* 56, 6 (2004), 675–685.

[24] Rob McCarney, James Warner, Steve Iliffe, Robbert Van Haselen, Mark Griffin, and Peter Fisher. 2007. The Hawthorne Effect: a randomised, controlled trial. *BMC medical research methodology* 7, 1 (2007), 1–8.

[25] Todd G Morrison, Rudolf Kalin, and Melanie A Morrison. 2004. Body-image evaluation and body-image among adolescents: A test of sociocultural and social comparison theories. *Adolescence* 39, 155 (2004).

[26] Kristen M Murray, Don G Byrne, and Elizabeth Rieger. 2011. Investigating adolescent stress and body image. *Journal of adolescence* 34, 2 (2011), 269–278.

[27] Jennifer A O'dea. 2004. Evidence for a self-esteem approach in the prevention of body image and eating problems among children and adolescents. *Eating disorders* 12, 3 (2004), 225–239.

[28] Anne C Petersen, John E Schulenberg, Robert H Abramowitz, Daniel Offer, and Harold D Jarcho. 1984. A self-image questionnaire for young adolescents (SIQYA): Reliability and validity studies. *Journal of youth and adolescence* 13, 2 (1984), 93–111.

[29] Hannah L Quittkat, Andrea S Hartmann, Rainer Düsing, Ulrike Buhlmann, and Silja Vocks. 2019. Body dissatisfaction, importance of appearance, and body appreciation in men and women over the lifespan. *Frontiers in psychiatry* 10 (2019), 864.

[30] Roberta G Simmons, Florence Rosenberg, and Morris Rosenberg. 1973. Disturbance in the self-image at adolescence. *The Life Cycle* (1973), 199.

[31] Andrew G Thomas and Mark K Johansen. 2012. Inside out: Avatars as an indirect measure of ideal body self-presentation in females. *Cyberpsychology* 6, 3 (2012).

[32] Jodie Thompson. 2018. Exploring body image dissatisfaction and body idealisations amongst young adult men: A thematic analysis. (2018).

[33] Marika Tiggemann. 2004. Body image across the adult life span: Stability and change. *Body image* 1, 1 (2004), 29–41.

[34] Tracy L Tylka. 2011. Positive psychology perspectives on body image. (2011).

[35] Tracy L Tylka. 2013. Evidence for the Body Appreciation Scale's measurement equivalence/invariance between US college women and men. *Body Image* 10, 3 (2013), 415–418.

[36] Tracy L Tylka and Nichole L Wood-Barcalow. 2015. The Body Appreciation Scale-2: item refinement and psychometric evaluation. *Body image* 12 (2015), 53–67.

[37] Tracy L Tylka and Nichole L Wood-Barcalow. 2015. What is and what is not positive body image? Conceptual foundations and construct definition. *Body image* 14 (2015), 118–129.

[38] Daniela Villani, Elena Gatti, Emanuela Confalonieri, and Giuseppe Riva. 2012. Am I my avatar? A tool to investigate virtual body image representation in adolescence. *Cyberpsychology, Behavior, and Social Networking* 15, 8 (2012), 435–440.

[39] Liesbeth Woertman and Femke van den Brink. 2008. Tevreden met het uiterlijk, maar de perfectie lokt. *Psychologie en gezondheid* 36, 5 (2008), 262–271.

[40] Nichole L Wood-Barcalow, Tracy L Tylka, and Casey L Augustus-Horvath. 2010. "But I like my body": Positive body image characteristics and a holistic model for young-adult women. *Body image* 7, 2 (2010), 106–116.

[41] Nick Yee and Jeremy Bailenson. 2007. The Proteus effect: The effect of transformed self-representation on behavior. *Human communication research* 33, 3 (2007), 271–290.

[42] Nick Yee, Jeremy N Bailenson, and Nicolas Ducheneaut. 2009. The Proteus effect: Implications of transformed digital self-representation on online and offline behavior. *Communication Research* 36, 2 (2009), 285–312.