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# EDITOR’S NOTE

I am delighted to introduce the sixth issue of *Koç University Undergraduate Psychology Journal*. I am especially excited as this issue marks my first as editor-in-chief of KUUPJ. From day one, we wanted to create a platform that would inspire undergraduate students to engage with academic research as well as to reward and reinforce those who take their time to write papers. I believe that at every step, we showed our determination and persistence to reach that goal and I hope this to be an indication of further accomplishments of KUUPJ. I hereby would like to thank each and every one of our founding team members for their devotion to our cause and wish them a rewarding and successful graduate life. It was a pleasure to have worked with them. Besides, I am excited to see their further contributions to KUUPJ as they are still a part of our team as graduate editors.

I am very excited for this issue also because it marks the expansion of KUUPJ and gives us hope to reach a bigger audience of students. We are introducing experimental, review and scale-development articles from three different universities- Koç University, Middle East Technical University, and Yeditepe University. I would like to thank all the authors whose works inspire us and our readers, and encourage future researchers and authors.

At every step, I remind myself how much of KUUPJ’s success we owe to our mentors Dr. Fuat Balcı and Dr. Tilbe Göksun. Here, I would like to thank both of them again for their support and guidance throughout this journey. It is also with the incredible support from the whole Psychology Department of Koç University that we were able to even come this far. I would like to thank our whole faculty and our Dean Prof Aylin Küntay.

Of course, this issue would not have been possible without our wonderful editors whom I was very lucky to have worked with this Fall. I am already excited for our next steps as we hope to make our platform greater with every work.

The team hopes that you will find this issue enjoyable and inspiring to read. And we would like to thank you for keeping doing Science and more importantly reaching to others by writing about it. Keep writing!

*Editor-in-chief*
Y. Kağan Porsuk

# Every Like You Have; Has Something to Say: A Study of Relationship Between Instagram Usage and Emphasize on Appearance

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**This study investigated the relationship between Instagram use and the three different domains of self-esteem which are Appearance-, Social- and Performance-based. We hypothesized that (I) Instagram users place more importance on appearance in terms of self-esteem than non-users and (II) between Instagram users, people who have more number of likes place more importance on their appearance in terms of self-esteem. Reinforcement theory provided a framework for the reason why we divided users into two categories according to their number of likes. In order to test the research hypotheses, we tested 99 participants using the Rosenberg Self Esteem Scale, Adult Sources of Self Esteem Inventory (ASSEI), and the Revised State Self Esteem Scale (R-SSES). As predicted, the results revealed Instagram users to have significantly higher scores on the appearance subdivision of R-SSES than non-Instagram users ($p = 0.01$), and the average total scores on appearance questions within Instagram users were significantly higher for people who had a greater number of likes compared to people who had lower number of likes ($p = 0.05$). To conclude, although there is insufficient information to support the validity of R-SSES, this scale can be developed for future research.**

***Keywords:*** self-esteem, social media, Instagram, State Self-Esteem Scale, appearance, social, performance

Internet has changed dimensions and maintained its occupancy in several fields, after entering our lives as a communication instrument (Bilgin & Taş, 2018). As it became easier for people to have access, Internet has started to answer people’s not only communication needs, but also other needs such as entertainment, self-approval or socialization, which may lead to different forms of gratification (Kırcaburun & Griffiths, 2018). Additionally, many Internet sites or platforms such as Instagram, Twitter or Facebook have greatly diversified. Especially, according to the statistics, the number of monthly active Instagram users was 600 million in December 2016. In September 2017, the number of monthly active users increased to 800 million (Statista, 2017).

There are several theories suggesting that the social media use (Hawi & Samaha, 2016) and self-esteem, which is defined as “an individual's positive or negative evaluation of himself or herself”, are correlated (Smith, Mackie, & Claypool, 2014). Self-esteem may be influenced by people’s qualities such as physical appearance, hobbies or abilities. Since people may want to share some of these qualities in their social media posts, many researchers agreed that social media can affect people’s self-esteem. As a result, there have been many studies about the link between social media and self-esteem (Gonzales & Hancock, 2011; Kramer and Winter, 2008; Kim & Chock, 2015). According to a study conducted by Gonzales and Hancock (2011), Facebook use amplifies students' level of self-esteem. They expounded in their study that when people post something on their profile, they have the opportunity to filter the negative information that they would not relish to be exposed, and to publicize only the information that they consider positive. By doing this, people can build an ideal image of themselves online, which consequently improves their self-esteem (Gonzales and Hancock, 2011).

Another important aspect about social media usage and self-esteem is that checking other people's profiles, liking, sharing or commenting on social media posts can result in a frequent engagement in social comparison (Appel, Crusius, & Alexander, 2015). Moreover, social comparison does not occur only in the context of physical appearance but also occurs in a social context, because of the phenomena called "social grooming" which can be defined as “the process of maintaining relationships and seeking social information" by Dunbar (1996) and Tufekci (2008) as cited in Kim and Chock (2015).

A unique part of this study is to investigate to which aspects of the self-esteem one gives importance in the context of social media. The aspects of self-esteem were divided into three components as appearance self-esteem, performance self-esteem and social self-esteem by State Self-Esteem Scale (Heatherton & Polivy, 1991). Considering these three aspects of self-esteem, we hypothesize that Instagram users will place more importance on appearance in terms of self-esteem than non-users. Additionally, according to Thorndike (1911), law of effect is a fundamental process closely related with reinforcement in learning paradigm. Reinforcement happens when a stimulus follows a behaviour which increases the probability of the behaviour. Therefore, favourable results make responses more likely to be seen again in similar situations. Reinforcing stimuli, events, and situations may increase the likelihood of the behaviour which comes after (Wong, 2008). Therefore, we also hypothesize that between Instagram users, people who have a greater number of likes will place more importance on their appearance in terms of self-esteem. We specifically focus on Instagram which is one of the highly used social media platforms because it offers individuals the ability to augment their own images and a high probability that other users will see those images. Also, it contains only visual posts which is a unique feature compared to the other social media platforms.

## Method

*Participants*

Participants were 99 (46 males, 52 females and 1 other) people from various majors and jobs except for psychologists, psychological counselling and guidance, and psychology students. The age of the subjects ranged between 18- 32 (M=21,7041 SD= 2,52904), and the participants were recruited with the convenience sampling technique.

*Questionnaire Measures*

Participants completed a set of questionnaires including three different self-report measures which were in the format of a Likert scale. Additionally, qualitative data were collected from an open- ended questionnaire which we developed.

Rosenberg Self Esteem Scale (RSES)

Rosenberg Self Esteem Scale (RSES) was included in the research instruments to measure participants' global self– esteem (Rosenberg, 1965). It consists of 10 questions which are answered on a 4-point scale ranging from "strongly agree" to "strongly disagree." The items 3, 5, 8, 9, and 10 were reverse-coded. In the RSES, higher scores indicate "higher levels of self-esteem" which means expressing the feelings that one is good enough and low scores indicate "lower levels of self-esteem" implying the individual's lack of respect for the self they observe (Rosenberg, 1965). We translated RSES to Turkish and used this translation for the study.

Adult Sources of Self Esteem Scale (ASSEI)

To measure the salience and importance of various aspects of the self-esteem, the Adult Sources of Self Esteem Scale (ASSEI) was used in our research (Elevson & Fleming, 1989). The scale was translated to Turkish to use for this study. The ASSEI is a 10- point Likert scale based on self-report, and it consists of 20 items which can be rated from 0 as "of no important" to 10 as "extremely important" according to the importance level of the item content. The items can be grouped into 7 categories as "Outward Self: Appearance and Popularity", "Intellect and Abilities", "Personal Achievement and Recognition", "Personal Control", "Ethics and Integrity", "Relations with Others" and "Religion/Spirituality". Getting higher scores in a category indicates putting more importance into that category in terms of self-esteem.

Revised State Self-Esteem Scale (R-SSES)

The original State Self- Esteem Scale was developed by Heatherton, and Polivy (1991) to measure one's self-esteem at a given point in time. It consists of 20 items which are subdivided into 3 components of self-esteem as performance self-esteem, social self-esteem and appearance self-esteem. There are 7 items belonging to performance self- esteem component, 7 items belonging to social self-esteem component and 6 items for the appearance self-esteem component. The scale is in the format of a 5- point Likert scale (1=not at all, 2=a little bit, 3=somewhat, 4= very much and 5=extremely). The original scale had items about satisfaction. For that reason, it had to be evaluated by the research students since the aim of our study is to measure the “importance (salience)” not the “satisfaction” in terms of self-esteem. The content of items was changed from satisfaction to importance. For example, in the Original SSES, item 1 is “I feel confident about my abilities” however in the R-SSES it turns into "To be confident about my abilities is important for me”. The Turkish translation and its evaluation were made by the research students. Unlike the original SSES, the R-SSES consists of 19 items. This was because in the process of the revising, the item 11 which is “I feel good about myself.” and the item 19 which is “I feel like I’m not doing well.” turn out to have almost the same meaning in Turkish which is “Feeling good about myself is important for me”. For that reason, we decided to eliminate item 19 and the items were renumbered. Thus, in the R-SSES there are 6 items (item 1, 4, 5, 9, 14, and 18) belonging to performance self-esteem subcomponent, 7 items (item 2, 8, 10, 13, 15, 17, and 19) belonging to social self-esteem subcomponent and 6 items (item 3, 6, 7, 11, 12, and 16) belonging to appearance self-esteem subcomponent. There were also 13 reverse-coded items in the original SSES; however, after turning the content into “importance”, the items lost their characteristic of being reversed. The scoring of R-SSES was done according to its subcomponents. Higher scores that a participant gets in a subcomponent refer to placing more importance on that component in terms of their self- esteem.

Open Ended Importance Questionnaire

We created an open-ended questionnaire which consists of 13 sentences to be completed by the participant. For example, the item 1 is “I like myself because…” and the item 9 is “I compare myself with others especially about…”. The goal of the questionnaire is to see one’s personal answers without any limitation, so the items were developed as neutral sentences in the sense that participants can answer them with features that can represent any domain of their self-esteem, i.e. either social-based, performance-based or appearance-based. To standardise the scores of the participants in the questionnaire, the answers were categorized into these three categories. An answer can be categorized as one of them, both of them or all of them. The negative and positive answers such as “I do not compare myself with others” or “I just like myself” were categorized as all of the components since the answers may cover all of the three components. Everybody had a separate score for each of the three categories. Having higher scores in a category implies that participant placed more importance into that category than the other categories in terms of their self-esteem.

*Procedure*

Participants firstly signed the informed consent and then filled the demographic form. In the demographic form, they were asked to answer questions about their age, gender, education level, socio- economic status (SES), whether they use any social media, if so which one of them, the purpose of their social media usage, if they use Instagram, their username and an estimate of the time that they spent online in a day. The participants were informed that, if they use Instagram, they will be followed by an account during the experiment, which was created only for the purpose of this study. Then the following questionnaires were filled out by participants in the following order: RSES, ASSEI, R-SSES and Open-Ended Importance Questionnaire.

Assessment of Instagram

An Instagram account which did not have any posts was created in order to calculate the participant’s total likes, number of photos, and number of followers, since the aim of the study was to correlate these numbers and the participant’s test scores on each test.

*Statistical Analysis*

The participants’ total number of likes were divided into three groups as High Like, Intermediate Like and Low Like. High Like group indicates the participants having the top 33% of the likes while Low Like group indicates the bottom 33%. We categorized SES (monthly family income) into 5 groups as very low (0-1500 TL), low (1501-2500 TL), intermediate (2501-4000 TL), high (4001-8000 TL) and very high group as over 8001 TL in order to see the differences between those groups. We used non–parametric statistics throughout the whole analysis. In order to report medians and interquartile ranges, descriptive statistics were used. Spearman Correlation Analysis was conducted to check correlations between questionnaires after the assessment of internal consistency for each scale through Cronbach's Alpha. We also used Mann-Whitney-U analysis to examine the differences between the groups.

## Results

### Reliability Analysis

The internal consistency was high for Rosenberg Self Esteem Scale with a Cronbach's alpha of .807.

The Cronbach's alpha analysis for Adult Sources of Self Esteem Inventory (ASSEI) questionnaire indicated a high level of internal consistency with a = .818. Since internal consistency was satisfactory and each item was important for detecting the differences among sub-dimensions of ASSEI, we did not exclude any items.

Reliability analysis for Revised State Self-Esteem Scale (R- SSES) indicated a high internal consistency with a = .819. No item has been excluded from the test due to their significance for comparison of sub-dimensions.

### Relationship Between Subcomponents of R- SSES and ASSEI

In order to validate the R- SSES, we looked for correlations of "Performance Self- Esteem", "Appearance Self-Esteem" and "Social Self-Esteem" subcomponents of R- SSES with sub-dimensions of ASSEI (Outward Self: Appearance and Popularity, Intellect and Abilities, Personal Achievement and Recognition, Personal Control, Ethics and Integrity, Relations with Others, Religion/Spirituality).

"Outward Self: Appearance and Popularity" sub-dimension of ASSEI was positively and significantly correlated with "Social Self Esteem" ($p= .003$, $r=.30$, $n=97$), "Performance Self Esteem" ($p= .009$, $r= .26$, $n= 98$) and "Appearance Self Esteem" ($p< .001$, $r=.35$, $n=98$) components of R- SSES.

"Intellect and Abilities" sub-dimension of ASSEI was significantly and positively correlated with "Social Self Esteem" ($p= .048$, $r= .20$, $n= 97$), "Performance Self Esteem" ($p< .001$, $r= .41$, $n= 98$), "Appearance Self Esteem" ($p= .002$, $r= .31$, $n= 98$) components of R- SSES.

"Personal Achievement and Recognition" sub-dimension of ASSEI was significantly positively correlated with "Social Self Esteem" ($p= .002$, $r= .31$, $n= 97$), "Performance Self Esteem" ($p= .001$, $r= .33$, $n= 98$), "Appearance Self Esteem" ($p= .006$, $r= .27$, $n=98$) components of R- SSES.

"Personal Control" sub-dimension of ASSEI was significantly positively correlated with "Social Self Esteem" ($p= .011$, $r= .26$, $n= 97$), "Performance Self Esteem" ($p=.031$, $r= .22$, $n= 98$) components of R- SSES.

"Ethics and Integrity" sub-dimension of ASSEI tended to positively correlate with "Performance Self Esteem" ($p= .086$, r=. 17, $n= 98$) component of R- SSES.

"Relations with Others" sub-dimension of ASSEI did not correlate any of the subcomponents of R- SSES which are "Social Self Esteem ($r=.04$, $p=.720$, $n=96$), "Performance Self Esteem" ($r=.14$, $p=.160$, $n=97$) and "Appearance Self Esteem ($r=.05$, $p=.619$, $n=97$).

"Religion/Spirituality" did not correlate any of the subcomponents of R- SSES which are "Social Self Esteem ($r=.04$ $p=.709$, $n=97$), "Performance Self Esteem" ($r=.09$, p=357, $n=98$) and Appearance Self Esteem ($r=.04$, $p=.709$ $n=98$).

### Validation of Open Ended Questions

In order to check the validity of our open-ended questionnaire, we looked for correlations between ASSEI sub-dimensions and the number of answers given in the appearance, performance and social categories of self-esteem in open-ended questionnaire. However, no significant correlation was found ($p > 0.05$).

Comparison of Instagram Users and Non-Instagram Users

We found that Instagram users significantly had higher scores on appearance sub-dimension of R-SSES (p= .001) as seen in Figure 1. Furthermore, Instagram users also had significantly higher scores for performance (p=.017) and social (p= .014) sub-dimensions of R- SSES.

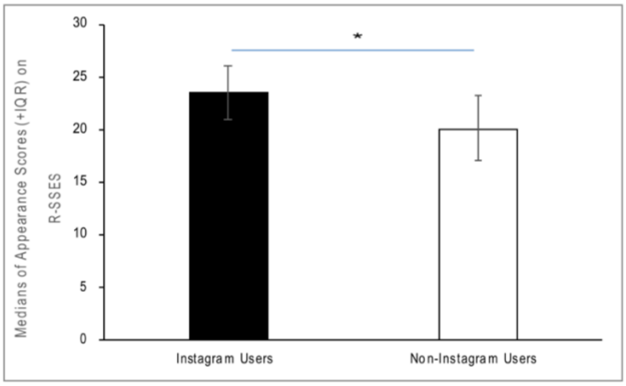


*Figure 1* - People who use Instagram have significantly higher scores on Appearance subcomponent of R- SSES compared to non-users. (p= .001, n= 99)

Comparison of High Like Group and Low Like Group

We considered the number of followers and the number of photos and we computed a constant ((number of likes: photographs): number of followers). Moreover, we looked for correlations for those variables. However, no significant correlations were found for the constant and no significant correlations were found for the number of followers or the number of photographs. Therefore, we used the number of likes as our measure. We found that people who received higher numbers of like significantly had higher scores for the items about appearance in R-SSES (p= .05) as seen in Figure 2.

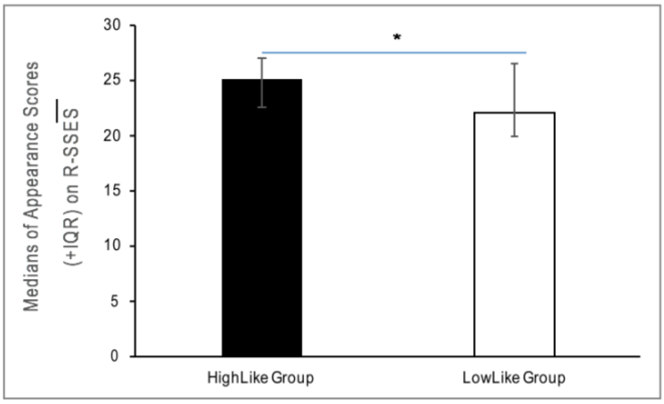


*Figure 2* - People who received higher number of likes on Instagram have significantly higher scores on Appearance subcomponent of R-SSES when compared to non-users (p= .05, n= 50).

Moreover, people with higher numbers of likes also significantly have higher scores on "Intellect and Abilities" sub-dimension of ASSEI (p= .025) and they tend to have higher scores on "Ethics and Integrity" sub-dimension of ASSEI (p= 064). However, for the open-ended questions, they give significantly lower numbers of answers about appearance (p= .006) and they tend to give less answers about performance (p= .055).

A Comparison in Terms of Gender

In order to see gender differences, we compared genders in terms of several dependent variables (All sub-dimensions of ASSEI and R-SSES, number of answers given to appearance, performance or social self-esteem open-ended questions, Rosenberg scores) and we found that female participants scored significantly higher on "Ethics and Integrity" (p< .001) and "Relation with Others" (p= .001) sub-dimensions of ASSEI. They also gave significantly higher numbers of answers about social self-esteem compared to other two categories in open-ended questions (p= .020) and they scored higher on the items about the performance in R-SSES (p= .075). On the other hand, male participants gave more answers about appearance for open ended questions (p= .058) and they had higher scores on "Outward Self: Appearance and Popularity" sub-dimension of ASSEI (p= .067).

A Comparison in Terms of Time Spent Online

To see whether there is a difference between people who spend more time online and people who spend less time online, we compared these two groups in terms of several dependent variables (All sub-dimensions of ASSEI and R-SSES, number of answers given about appearance, performance or social self-esteem for open ended questions, Rosenberg scores). We found that people who spend more time on social media to have significantly higher scores on Rosenberg Self Esteem Scale (p= .032) and they gave significantly more answers about appearance compared to other two categories in open ended questions (p= .034).

A Comparison in Terms of Socio-Economic Status

We wanted to see the differences in terms of people's socio-economic statuses; therefore, we compared income groups in terms of several dependent variables (All sub-dimensions of ASSEI and R-SSES, number of answers given about appearance, performance or social self-esteem for open ended questions, Rosenberg scores).

People with very low income gave significantly higher numbers of answers about social self-esteem (p= .028) and higher numbers of answers about appearance (p= .028) for open ended questions when compared to people with low income.

People with very low income gave significantly more answers about social self-esteem for open ended questions when compared to people with high income (p= .019). On the other hand, people with high income scored significantly higher on Rosenberg Self Esteem Scale (p= .030).

People with very low income gave significantly more answers about social self-esteem for open ended questions (p= .008).

People with low income scored significantly higher on "Relations with Others" (p=.049) and "Religion/Spirituality" (p= .024) sub-dimensions of ASSEI when compared to people with high income. On the other hand, people with high income scored significantly higher on the items about appearance on R-SSES (p= .038).

People with high income scored significantly higher on Rosenberg Self Esteem Scale
(p= .024) when compared to people with intermediate income.

People with very high income scored significantly higher on Rosenberg Self Esteem Scale (p= .049) when compared to people with intermediate income.

Correlations Between Several Other Variables

To see the correlations between several variables, we conducted a Spearman Correlation Analysis and we found that the time spend online is significantly positively correlated with "Ethics and Integrity" (p= .017, r= .24) and "Relation with Others" (p=.047, r= .20) sub-dimensions of ASSEI. Moreover, number of likes was significantly and positively correlated with "Intellect and Ability" sub-dimension of ASSEI (p= .049, r= .23) and positively correlated with appearance subcomponent of R-SSES (p= .092, r= .20). On the other hand, number of likes had a significant negative correlation with the number of answers about appearance (p=.018, r= -.27) and performance (p= .009, r= -.30) in the open- ended questionnaire.

Since "Outward Self: Appearance and Popularity" sub-dimension of ASSEI was significantly and positively correlated with "Appearance Self-Esteem" subcomponent of R-SSES (p< .001, r= .35, n= 98), we considered "Appearance Self-Esteem" subcomponent of R-SSES as a valid measure for assessing the importance given to appearance by participants. Moreover, "Intellect and Abilities" sub-dimension of ASSEI was significantly and positively correlated with "Performance Self Esteem" subcomponent of R- SSES (p< .001, r= .41, n= 98). Therefore, we considered this subcomponent as a valid measure for assessment of the importance given to performance by participants. However, "Relations with Others" sub-dimension of ASSEI did not correlate with "Social Self Esteem" (p= .720, n= 96).

## Discussion

We hypothesized that Instagram users attach more importance to their physical appearance in terms of their self-esteem than non-users. In addition to this, we did not focus only on Instagram users and non-users, but we also divided Instagram users into two categories according to the numbers of likes they had. Our second hypothesis was that Instagram users whose posts are liked more, placed more importance on their self-esteem compared to people who had fewer likes.

The goal of our research was to uncover the relationship between social media usage, specifically Instagram users and their numbers of like, and different domains of self-esteem such as physical appearance, ability/performance and social. In accordance with our hypothesis, Instagram users had significantly higher scores on the appearance subdivision of Revised State Self Esteem (R-SSES) than non-Instagram users. As Lee et. al. (2015) mentioned in their article, the feature that separates Instagram from all of the social media applications is that Instagram is photograph based. While Twitter, Facebook and rest of the social media applications include option of sharing texts without pictures, Instagram stresses users to post pictures.

People share their selfies, pictures of travels, food, pets they are interested in more than they post their thoughts or ideas. They may also edit, recreate and add filter to their pictures and when they post it to the online world, their pictures are seen by numbers of people. The picture based approach is a unique part of Instagram, and it also creates a visually oriented culture (Lee, Lee, Moon, & Sung, 2015). As a consequence, most people display the ideal images of their appearance to impress and positively affect other people and receive approval from the others (Ahadzadeh et.al., 2016). As a result of this visually oriented culture, individuals started to draw most of the attention to their appearance.

According to the findings, Instagram users had also higher scores on both performance and social subdivisions of R-SSES than non-users. Positive feedbacks such as liking, positive comments and good interpersonal relationships are important for people to develop their social self-esteem (Valkenburg, Peter, & Schouten, 2006). Even if the finding about high social scores is not surprising due to nature of social media, we did not expect to find such a simultaneous interplay between three components of self-esteem. These findings made us think about two possible explanations. First of all, after Fleming and Elovson developed their scale (ASSEI), they discovered that the subgroups of the scale were mostly overlapping with each other due to inseparable characteristics of the concept of self-esteem (1989). On this basis, this overlap made us think that when it comes to self-esteem, it may not be possible to divide it into concrete subcomponents due to its non-stable nature. Another possible explanation may be related with the characteristics of our scale. Due to lack of evidence about the validation study of R-SSES, we do not have sufficient supporting evidences for making comments about the plusses or minuses of our scale.

Our findings showed that the total scores of appearance questions of Instagram users were significantly higher than the scores of people who had less likes. The reason that we categorized Instagram users into two groups according to their number of likes takes its base from learning theories. If we try to interpret our findings with basic principles of operant learning, we would see that it is an example of how people get conditioned to maintain their behaviour when they receive reinforcement.

This interpretation stems from the theory of reinforcement in which the terms like reinforcer and law of effect (Thorndike, 1911) can be used to explain social media behaviours. With respect to this learning theory, if a situation is followed by events that provide pleasurable things for subjects, the responses are more likely to occur (Wong, 2008). In these kind of situations, events that increase a response's probability of reoccurring were referred to as reinforcers by Thorndike (1911, p. 244). We evaluated the results of our study in the light of the operant learning theory of Thorndike. When a person shares a photo, which is liked by other Instagram users, they may understand that they engage with a condition that is approved and/or liked by most of the individuals. In this context, being liked by other people or being socially approved is a reinforcer. As people are reinforced by social approval through Instagram likes, they engage more with their precedent behaviour and consequently attach more importance to their appearance. Moreover, Instagram provides an environment where people are exposed to different users' ideal posts which may feed their negative thoughts and feelings towards their own body. According to another study conducted by Ahadzadeh and his colleagues (2016), the idealized posts or images may cause young adults to feel negative about their physical appearance and might drive constant comparing of their body to others as a way to define themselves. This supports our findings on physical self-esteem and social media usage, with respect to Instagram as a platform. In addition, we counted the numbers of likes that every Instagram user had, and we found that the total number of likes were positively correlated with the total scores on the appearance questions of R-SSES.

We also looked for gender differences in order to understand whether there is a relationship between gender and habits and style of using Instagram. We did not find any difference in the time spent on Instagram between male and female users. Women and men do not differ with respect to the time they spend in different categories such as chatting with partners (Sidelinger, Ayash, & Tibbles ,2008), playing online games (Williams, Consaho, Caplan, & Yaein 2009). Beyond these findings, we looked for differences in the scores of two gender groups on Adult Sources of Self-Esteem Scale (ASSEI) and R-SSES, and we discovered that women's scores on the subdivision of ASSEI, relation with others, were significantly higher than men. In this manner, our results were also parallel with many other studies on gender differences which found that women use social media with the aims of chatting (Giles & Price, 2008) and maintaining relationships (Bonds-Raacke & Raacke, 2008).

Although, Stake (1979) found that male students had significantly higher scores on Performance Self Esteem Scale compared to female students and that women had a tendency to make lower assessments about their abilities and performances, we ascertained that total scores of females on performance component of R-SSES were likely to be higher than men. The last finding about gender is that men tend to have higher scores on the performance component of ASSEI. Lastly, male participants tend to give more answers about appearance for open ended questions and they tend to have higher scores on appearance dimension of ASSEI than women. Based on Leit, Pope and Gray's study (2001) stating that culturally constructed norms related with the ideal image of male body have changed in time (especially more muscular form during the 1990s), we can deduce that not only women but also men can be influenced by social norms. The statistics about male participants' numbers of appearance answers and scores made us think about that male body is under the influence of social norms and men also give importance to their appearance and physique.

Additionally, we found that appearance scores in R-SSES of people with high income are higher than people with low income. According to Mobius and Rosenblat (2006), the salaries of employees who are physically attractive are 10% more than other employees who are considered below average in terms of attractiveness This might imply a possible relationship between physical traits and amount of income. Also, parallel to our findings, Twenge and Campbell (2002) found that SES and self-esteem has a statistically significant and positive relationship across a sample consisting of 446 participants.

## Limitations and Further Research

First limitation of the current study is that participants were selected with the technique of convenience sampling. In addition to this, most of the participants were recruited from the same private university in the Western part of Turkey. Participants being mostly undergraduate students might have an influence on their income. Also, since we were not interested in the characteristics or content of the photos, we only focused on the number of likes and the number of photos during data collection. The content of photographs that people share could have been either directly or indirectly related with the number of likes. Besides the Revised State Self Esteem Scale, we used open ended questions to gather information in order not to overlook the qualitative aspects. However, the use of open ended questions was problematic because of several unexpected answers. We were faced with misunderstandings and answers which we could not categorize. Also, in some cases, people were noncommittal in answering the questions. Finally, we should indicate that terms like self–esteem, self-perception, and social approval are notions that we can only conceptualize. It creates the problem that there is no universal definition for these abstract concepts. They can vary from culture to culture or from context to context.

Although there were several limitations, our research is inspirational about the effects of different social networking sites on people, specifically on their self-esteem. Despite the fact that social media applications have become brutally popular, there is an apparent lack of studies in the literature. We hope that this research will lead the way for further research about social media use, its interplay with other variables, and their cumulative effect on people.

To conclude, we tested the two hypotheses that (I) people who use Instagram attach more importance to appearance in terms of self-esteem than non-users, and (II) between Instagram users, people who have more likes have higher scores in the appearance dimension of self-esteem. With the purpose of testing the hypotheses, we evaluated R-SSES and created open ended questions but we did not used open ended question when we interpret our findings. We found relatively consistent results with our expectations; however, there were considerable limitations, especially resulting from convenience sampling, relating to the participants' similar level of education, income, and age. Also, we did not collect data about the content of the photos but when the subject is social media, the content of photographs may have an impact on the numbers of likes. Last limitation is that the notions of the self and self-esteem can be influenced by social and cultural norms.

Beside some insufficient information to support validation of R-SSES, current research has the characteristic of focusing different subdivisions of global self-esteem. On the contrary of the traditional self-esteem scales, we developed an innovative scale that could detect how much importance people place on three different subdomains of self-esteem. R- SSES gives the opportunity to examine the importance people place on different dimensions of self-esteem.

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# Does Self-Esteem Predict the Authenticity of Self-Presentation on Instagram?

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**In this day and age, the opportunities to present oneself on social media are endless via the broadcasting of photos, videos, and even ideas. Social media users have enhanced control over the self-presentation behaviors that they engage in compared to face-to-face interactions. Online self-presentation can be meticulously constructed; highlighting desirable and positive aspects of oneself and concealing perceived flaws. Previous research suggests that low self-esteem increases the likelihood of false-self presentations; meaning the portrayal of inauthentic aspects that doesn't match one's real self. The present study examined the link between self-esteem and self-presentation behavior on Instagram. Self-reports were collected from 182 young-adults (ages between 18-25) on their self-esteem levels and online self-presentation behaviors on Instagram. A series of regression analyses suggest that young-adults with higher self-esteem levels displayed more authentic self-presentations on Instagram.**

***Keywords:*** self-esteem, self-presentation, Instagram, social media

Self-presentation is any behavior that individuals engage in while trying to transmit information about themselves in order to create an image of self for others (Baumeister & Hutton, 1987) In this day and age, the opportunities to present oneself on social media are endless via the broadcasting of photos, videos and even ideas. The social media platforms allow ordinary individuals to reach a potential crowd. The presented image of self, through a profile with personal information and photos, enables virtual relationships via messages, posts, and ever-growing number of followers. Social media users have enhanced control over the self-presentation behaviors that they engage in compared to face-to-face interactions (Kramer and Winter, 2008). Online self-presentation can be meticulously constructed; highlighting desirable and positive aspects of oneself and concealing perceived flaws. Users may strive to present an attractive description of themselves in order to form and maintain online relationships (Kramer and Winter, 2008). The strategic nature of online self-presentation is fueled by the desire to put out the best image of oneself (Ellison, Heino & Gibbs, 2006).

The study conducted by Michikyan, Dennis and Subrahmanyam (2014) suggested that people present different aspects of their selves online as individual factors were related to the portrayal of real, ideal or false selves. Real self-presentation concerns the portrayal of aspects that are authentic whereas ideal self-presentation is the presentation of who one desires to be; false self-presentation conveys inauthentic aspects that do not match with the real self. Their results revealed that the experience of emotional fluctuations and self-doubt predicted increased online presentation of a false self.

Marcus, Machilek and Schütz (2006) suggested that behavior in online contexts are particularly prone to the influence of predispositions, as they are “weak situations” (Mischel, 1977). Weak situations are defined by Mischel (1977) as those contain comparatively small pressure concerning an appropriate behavior. The lack of pressure and constraints create variations across the behavior of different individuals according to their individual traits. Users with vulnerable personalities may tend to portray online presentations that are perceived to be more rewarding and appealing than their true identities. Individual predispositions that increase the likelihood of false self-presentation, regardless of being online or offline contexts, are low self-esteem and unawareness of the true self (Harter, Marold, Whitesell & Cobbs, 1996).

Self-esteem is a concept concerning an individual's general self-evaluation on his/her self-worth (Weiten, 2001). Schlenker (1980) discussed that self-esteem is a universal need for human beings. According to "Sociometer Theory" proposed by Baumeister and Leary (2000), self-esteem works as a monitor for individual's social acceptance; evolved to function in order to keep one off from social rejection. Moreover, it evolved due to early humans' need of belonging to social groups in order to increase their chances of survival and reproduction (Baumeister & Leary, 1995). Signals of rejection and social devaluation can cause a decrease in individual's self-esteem which may lead to a variety of psychological problems such as depression and substance abuse (Leary, 1999). Thus, preserving and uplifting self-esteem is essential for the individual (Kramer & Winter, 2008).

As users will endeavor for favorable self-presentations that will promote their self-esteem, they will invest time and effort in constructing their profiles (Kramer & Winter, 2008). The greater control endowed in the online context concerning one's self presentation can be in the form of ability to self-select what to post and what to conceal, as well as manipulation or enhancement of images. These lead to greater likelihood of such behaviors promoting one's self-esteem. This promoting may come in the form of leaving out one's perceived flaws and shortcomings, as well as exaggerating or faking desirable characteristics. Accordingly, it is plausible that individuals with low self-esteem would be more drawn to those types of behavior. In conformity, Gil-Or, Levi-Belz, and Turel (2015) suggested that low self-esteem individuals are more inclined to construct online self-presentations that have greater social appeal compared to their authentic selves as an attempt to escape from offline social-life shortcomings and dissatisfactions about their true selves. Such modifications in the self-presentation may provide the individual with positive social feedback and support lacking in face-to-face interactions. The study also showed that low levels of self-esteem are associated with higher frequency of self-image enhancement, resulting in an increased discrepancy between real-self and online self-presentation.

Present study builds on these findings and aims to assess the relationship between self-esteem and self-presentation on the social media platform Instagram in order to uncover whether users' self-esteem levels influence the type of self they present on this specific site. Research on social media is a popular trend in academic environment; however, there is very limited research on Instagram. Given the vast amount of opportunity Instagram provides for the manipulation of one's shared image; as users are offered many means of image-enhancement through built-in photo adjustment features as well as secondary applications like Photoshop and FaceTune; it is expected that the authenticity of the self-presented on Instagram is influenced by user's level of self-esteem. We expect high level self-esteem to be less associated with engagement in self-image manipulation, hypothesizing that higher levels of self-esteem will predict a more authentic self-presentation on Instagram.

## Method

*Participants*

Young adults aged between 18-25 [$w$ = 182, (56 males, 126 females); $M_{age}$ = 20.85, $SD_{age}$ = 1.35] were recruited online via sharing the survey link on social media platforms which include Facebook, Twitter and Instagram as well as sending it to groups and individuals on Whatsapp. The survey link was shared mostly in student groups on social media; hence, most of the individuals reached are predicted to be university students.

*Materials*

Demographic questionnaire.

Consisting of 2 questions, the questionnaire obtained information on participants' birth dates and gender. Birthdays were obtained in order to control for our targeted age range, 18-25. Gender information was not initially taken as an independent variable but was used in post-hoc analysis to check for possible effects of gender differences.

Coopersmith Self-Esteem Inventory

The CSEI contained 57 items that assess one's self-esteem based on answers to statements provided about oneself, given as "Yes" or "No" (Coopersmith, 1967). The version that was administered was translated into Turkish by Piskin (2003). Scale assessed the total self-esteem on three dimensions; general, social, and academic self-esteem. Sample items included: "Things usually don't bother me" and "I'm proud of my academic achievements". Total score was calculated by multiplying the total number of positive self-esteem items chosen by the participant by 2 (Cronbach's alpha = .85). Scores were out of 100 and higher scores indicated higher levels of self-esteem.

Instagram Self-Presentation Inventory

This inventory comprised of 54 self-report questions that assess the authenticity of the self-presentation on Instagram on a 5-point Likert Scale (1 = strongly agree to 5 = strongly disagree). Sample items included: "I strive for a perfect image on my Instagram profile" and "I use photo adjustment apps before uploading my photos (concealing pimples, slimming down body parts, etc.)". After the first computation of internal reliability; 3 of the questions were removed, leaving 51 for the analysis (Cronbach's alpha = .94). Higher scores indicated greater level of authenticity in participants' self-presentation on Instagram.

*Procedure*

A 113-question online survey was completed by the subjects. Survey consisted of three parts. It started with the demographic inventory following the informed consent form and participant's admission. After participants answered questions on their birthdate and gender in the demographic inventory, they moved on to answering the Coopersmith Self-Esteem Scale (1967) which involved 57 statements to be answered as "Yes" or "No". For the last part of the survey, they were expected to answer the Instagram Self-Presentation Inventory that we constructed for this research; consisting of 54 questions, assessing their self-presentation behaviors on Instagram.

We intended to reach a large sample in a relatively short amount of time. A larger sample would allow both more variance in our independent variable and higher external validity; yielding generalizable results. We also took into account that people may be hesitant to give honest answers on their false self-presentation behavior due to the fear of being seen as not-consistent with their true selves. Thus, it was very important to ensure the anonymity of the participants in the design. Using an online survey allowed the anonymity of the subjects of our research and helped tackling the potential problem of social desirability bias. Conducting the survey online granted fast and easy transmission and the subjects were able to participate anywhere, anytime, using any device that had internet connection.

## Results

On average, the participants scored *M* = .62 on total self-esteem with a *SD* = .14. The average of the dimensions of self-esteem scores were as follows: Social self-esteem *M* = .83, *SD* = .2; academic self-esteem *M* = .52, SD = .25 and general self-esteem *M* = .66, *SD* = .19. Average authenticity score of the self-presentation on Instagram was *M* = 3.57, with the *SD* = .54.

Table 1.1

*Descriptive Statistics*

| | *N* | *Mean* | *Std. Deviation* |
|---|---|---|---|
| Total Self-esteem | 182 | 0.6185 | 0.13845 |
| Social Self-esteem | 182 | 0.8356 | 0.19855 |
| General Self-esteem | 182 | 0.6628 | 0.18780 |
| Academic Self-esteem | 182 | 0.5258 | 0.24830 |
| Authenticity of Self-presentation | 182 | 3.5700 | 0.53609 |

Regression analyses were conducted to evaluate the association between self-esteem, dimensions of self-esteem, and authenticity of the self-presentation on Instagram. First, a linear regression analysis was used to determine the association between self-esteem and authenticity of the self-presentation on Instagram. The analysis predicting authenticity of the self-presentation on Instagram based on self-esteem was significant [$F$ (1,180) = 28.47, $p$ = .00, Adjusted $R^2$ = .13], suggesting self-esteem was a positive significant predictor of authenticity of the self-presentation on Instagram. Authenticity of the self-presentation increased .37 SDs for each SD increase of self-esteem. Young adults, high in self-esteem, scored higher in authenticity of the self-presentation.

Table 1.2
*Summary of linear regression for total self-esteem predicting self-presentation on Instagram (N = 182)*

| | Unstandardized Coefficients | | Standardized Coefficient | |
|---|---|---|---|---|
| Variable | *B* | *Std. Error* | *Beta* | *Sig. (p)* |
| Total Self-esteem | 1.431 | .268 | .370 | .000 |

*Notes.*
$R^2 = .13$

The multivariate regression analysis predicted authenticity of the self-presentation using general self-esteem, social self-esteem and academic self-esteem scores. In this model, general self-esteem was a positive predictor of authentic self-presentation on Instagram [$F$ (3,178) = 11.79, $p$ = .00, Adjusted $R^2$ = .15]. Authenticity of the self-presentation increased 0.39 SDs for per unit of general self-esteem. Specifically, young adults with higher levels of general self-esteem displayed higher levels of authenticity in their self-presentation on Instagram. Neither academic self-esteem ($p$ = 0.76), nor social self-esteem ($p$ = .99) significantly predicted authenticity of the self-presentation on Instagram.

Figure 1.
Regression Graph for general self-esteem predicting authenticity of self-presentation on Instagram

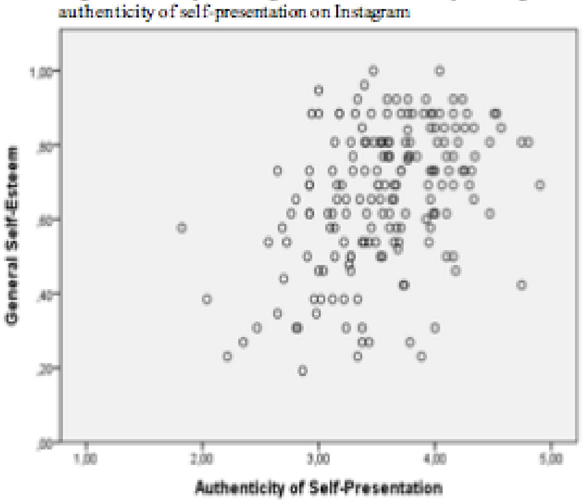


Table 1.3
*Summary of multiple regression for general, academic, social self-esteem predicting self-presentation on Instagram (N = 182)*

| | Unstandardized Coefficients | | Standardized Coefficients | |
|---|---|---|---|---|
| Variable | *B* | *Std. Error* | *Beta* | *Sig. (p)* |
| General Self-esteem | 1.124 | .242 | .394 | .000 |
| Academic Self-esteem | .052 | .171 | .024 | .760 |
| Social Self-esteem | .003 | .203 | .001 | .987 |

*Notes.*
$R^2 = .15$

As post-hoc analyses, an independent t-test showed males ($M$ = .73, $SD$ = .02) had significantly higher general self-esteem scores compared to females ($M$ = .63, $SD$ = .17, $p$ = .002). Self-esteem scores did not show any significant difference on the other dimensions or on the total self-esteem scores. Then 2 two-way ANOVAs were conducted. First was conducted on gender and social self-esteem to calculate the interaction effect between the two on participants' authenticity of their self-presentations on Instagram. There was no significant effect of the interaction; groups did not differ on the basis of their self-presentation behavior ($p$ > .05). Secondly, the main effects of gender and general self-esteem and the interaction effect between gender and general self-esteem were compared on the authenticity of the self-presentation on Instagram. Again, there were no statistically significant effects of the interaction; groups did not significantly differ on the authenticity of self-presentation ($p$ > .05).

## Discussion

Evidence showed that higher self-esteem levels predict higher authenticity of self-presentation on Instagram. Consistent with our theoretical framework, individuals with low self-esteem engage in inauthentic self-presentations more often than those with higher levels of self-esteem. It may be drawn that people's online behavior and type of self-presentation are a function of their self-esteem levels. This finding could imply that the influence of self-esteem on self-presentation behaviors also applies to online contexts, specifically, to Instagram as evident in our results.

Interestingly, we didn't encounter any gender differences in the association of self-esteem and self-presentation on Instagram even though post-hoc independent t-test showed that males had significantly higher scores of general self-esteems. Also, a general opinion would be that females engage in false self-presentations more often due to the universal self-esteem gender gap (Bleidorn et al., 2016). This indifference may be implying that social pressure, striving for acceptance and admiration, is not less of a burden on males. Further research with a focus on gender differences may yield more information on the issue. Also, we expected to find that social self-esteem dimension had a stronger impact compared to the other two dimensions; however, only the general self-esteem had a significant impact. Could it be the case that individuals may not be seeing the act of sharing photos on Instagram as engaging in a conventional social interaction, since photos are generally broadcasted to a wide audience and feedback is inferential rather than direct, in the form of "likes"? Further research may reveal the underlying reasons.

*Limitations*

There were several limitations to our research, since the data collected relied solely on self-reports and contained personal information that participants might be unwilling to mention, the participants may have been reluctant to report behaviors that reflect false self-presentations. It may also be the case that the numerous opportunities for enhancing an image that widely-used applications provide as well as the photo adjustment options built-in Instagram made these behaviors so common that users do not consider these as inauthentic. Further research with various data sources may provide a valuable insight.

*Further Studies*

For future research, other individual characteristics and predispositions such as personality traits may be studied in relation to self-presentation behaviors on Instagram in order to find out how various individual differences have an influence on the behaviors of self-presentation on social media.

In conclusion, the current study demonstrated a link between self-esteem and the authenticity of self-presentation on Instagram. Findings provide empirical evidence that may shed light on the role of self-esteem in different type of self-presentation behaviors on Instagram.

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# The Development and Validation of Morpheus System Justification Scale

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**The aim of the current study is to develop and validate a scale to measure system justifying beliefs among university students. The participants were 60 students ranging between 18-31 years old and studying at different departments. We administered the Morpheus scale developed by the researchers of this study, the general system justification scale (Kay & Jost, 2003) and the religious fundamentalism scale (Altemeyer & Hunsberger, 2009) to our sample. We hypothesized that there will be high correlation between the Morpheus and the general system justification scale and there will be a small or moderate correlation between general system justification and religious fundamentalism. Also, we expected some behavioral outcomes of system justification. We measured convergent, discriminant and criterion validity in addition to reliability. Results showed that the internal reliability of the scale is high. Moreover, correlational analysis confirmed the convergent, discriminant and criterion validity of the scale. Implications for the measurement of system justification and inferences for future research are discussed.**

***Keywords:*** system justification, religious fundamentalism, Morpheus scale, scale validation

In this study, our aim is to develop and validate a scale to measure system justifying tendencies within Turkish cultural context. In the literature, system justification is defined as a general ideological motive to maintain the perceived fairness and legitimacy of the existing social, economic and political order (Jost & van der Toorn, 2012). Also, a research indicates that this legitimization continues to exist even though it may be disadvantageous for personal or group interest (Jost & Banaji, 1994). In this regard, motivated psychological processes such as stereotypes or rationalizations provide legitimate interpretations which are used for supporting and defending the existing social systems composed of certain norms, rules and practices (Kay et al., 2009). Therefore, they can be seen as elements of psychological tendency which serve the maintenance of status quo and normalization of existing habits. These processes which vary in strength are based on situational and dispositional factors (Jost, Kay & Thorisdottir, 2009; Kay & Friesen, 2011). In terms of dispositional factors, individuals differ in terms of epistemic (to attain certainty, predictability, and control), existential (to manage anxiety, fear, and threat), and relational (to affiliate with others and maintain solidarity) needs that enhance system justification motivation (Jost & Hunyady, 2005). Regarding situational factors, ideological motive tends to be activated or enhanced when people think that legitimacy or stability of the system is being threatened or when they feel especially dependent on the system for their outcomes (Laurin, Shepherd, & Kay, 2010). In addition, system justifying motivational processes tend to be activated when it is very difficult for people to leave the system or when people feel that they have low personal control on their lives (Kay & Friesen, 2011).

Concerning how ideological motive functions, a quote would be illuminating: “The existing social order is presented as a stable, harmoniously coordinated system, and the great mass of people hesitate and lose heart when they think of what a radical change might bring… They can only imagine the present being torn to pieces and fail to perceive the new order which is possible, and which would be better organized, more vital than the old one” (Gramsci, 1972; p.106-107). In line with what Gramsci argued, previous studies indicate that the ideological motive functions at an implicit or nonconscious level, which means that people are mostly unaware that there is an ideology, such as capitalism or nationalism, capturing them while thinking or acting (Ashburn-Nardo, Knowles, & Monteith, 2003). Some of the ways it shows itself are stereotyping (Kay & Jost, 2003), the denial or rationalization of inequality (Napier & Jost, 2008), and the endorsement of political and religious belief systems (Jost, Nosek, & Gosling, 2008). There are some research indicating that religiosity and system justification share same kinds of epistemic, existential and relational needs (Hennes, Nam, Stern, & Jost, 2012; Jost, Ledgerwood & Hardin, 2008). Furthermore, it has been found that religiosity is associated with system justifying belief systems such as opposition to equality, belief in a just world, Protestant work ethic, fair market ideology, right-wing authoritarianism and political conservatism (Jost, Hawkins, Nosek, Hennes, Stern, Gosling, & Graham, 2013).

In the literature, religious fundamentalism is depicted as a commitment to a set of religious doctrines that are believed to hold certain and final truth about both worldly and ethereal existence. (Altemeyer & Hunsberger, 1992). Also, it has been shown that religious fundamentalism is associated with right-wing authoritarianism and fundamentalists show prejudice and discrimination towards outgroup people not conforming their values (Brandt & Reyna, 2014; Pal & Sinha, 2016). Moreover, Osborne and Sibley (2014) observed that the relationship between church attendance and right-wing authoritarianism is increased by the enhancement of system justification, which shows that religiosity and legitimizing motive are conceptually related.

There are various tests developed to measure different types of system justifying belief systems. The original system justification scale (Kay & Jost, 2003) is developed to measure the justification or legitimization of social arrangements by means of stereotypes. To measure more specific aspects of the construct, Jost and Kay (2005) developed the Gender-Specific System Justification Scale (GSJ) to examine the effect of gender stereotypes and sexism on the justification of the system. In addition, Jost and Thompson (2000) developed the Economic System Justification Scale (EJS) to investigate the relationship between legitimization of economic system and ethnocentrism, social policy attitudes, opposition to equality and political conservatism. The literature shows that convergent and discriminant validity exist for Gender-Specific System Justification and Economic System Justification (EJS) scales (Luca, 2008; Verniers & Martinot, 2015).

The main aim of our study is to develop and validate a scale to measure system justifying beliefs among university students living in a Turkish cultural context. Since ideological motivation for system justification is based on the existing social, political and economic order as fair and legitimate (Jost & van der Toorn, 2012), we think general system justification needs to be adapted for using at different social contexts which may affect how system justifying tendencies function. In this regard, in the light of Life Satisfaction Research conducted by Turkish Statistical Institute (TÜİK), we decided to include items which can capture various system justifying belief systems prominent in Turkish culture. Different from the previous test which was designed to measure general system justification by Kay and Jost (2003), our scale includes various items reflecting different system justifying belief systems such as right-wing authoritarianism, belief in a just world, fair market ideology, opposition to equality and political conservatism. In that sense, it focuses on specific domains of system justification to better reflect the content domain of the construct. Moreover, in the literature, general system justification is measured by a system justification scale which found to be reliable ($\alpha = .88$) and which exhibits construct validity (Kay & Jost, 2003). According to their findings, the scores on the measure of system justification predicts the scores on the belief in a just world, $r(117) = .67$, $p < .001$ and more weakly, the scores on the need for balance and complementarity, $r(117) = .37$, $p < .001$.

Also, the general system justification scale which measures the construct we intended to measure has not sufficient items to cover various domains of the system justification such as right-wing authoritarianism or political conservatism. So, the content validity of the test may be improved by composing items that include dominant justifying tendencies among our population without decreasing reliability or external validity.

We hypothesize that there is a strong positive correlation between Morpheus and GSJ since they both measure the legitimization of the status quo in a general sense even though Morpheus scale is more focused on specific belief systems. Also, we expect that there will be a small or moderate correlation between Morpheus scale and religious fundamentalism scale depending on the literature stating that religiosity and system justification are correlated with rs ranging from .16 to .35. (Jost et al., 2013). Lastly, it is expected that some behavioral or attitudinal outcomes of system justifying beliefs will correlate with Morpheus scale. Moreover, we will investigate the inter-item reliability of the scale.

## Method

*Participants*

Our sample consists of 60 students from Middle East Technical University, including 36 females, 23 males and 1 other. Their age ranged from 18 to 31. We used convenience sampling to gather our data. The demographic information is collected from participants although we did not consider the gender, age, department and grade of the participants to interpret our results.

*Development of the Scale*

While preparing the items for Morpheus Scale, theoretical background is provided by the literature about system justification. However, since our scale is measuring system justification within Turkish culture, culture specific situations are considered as well. We analyzed Life Satisfaction Research conducted by Turkish Statistical Institute (TÜİK) to create a framework for items (2014). While theoretical information is obtained from literature, real-life applications of the theoretical information in Turkish culture are extracted from Life Satisfaction Research.

It is stated in the literature that system justification is the tendency of maintaining status-quo, even though it is in disfavor of certain people and groups (Jost & van der Toorn, 2012; Jost et al., 2009; Kay & Friesen, 2011). Regarding this definition, some of the items were based on disadvantaged minority groups such as homosexual people. In addition to these items, an item about whether a woman should go out at night is also included since we think that it implies a commonly held approach which justifies unequal status of women in public. Furthermore, people who have an inclination of system justification tend to need predictability, stability and solidarity within society and experience fear and anxiety when status-quo is challenged (Jost & Hunyady, 2005). In order to measure this inclination, questions asking participants' opinions about general social, political and economic conditions are formed. For example, an item measuring satisfaction with the education, health and transportation services offered by state are included in the scale. Finally, as it is proposed in the literature that some ways of justifying system are stereotyping (Kay & Jost, 2003), the denial or rationalization of inequality (Napier & Jost, 2008); justifying methods are assessed by statements that propose an idea with one of the ways of system justification. For example, the item “people do not experience social pressure because of their faith or faithlessness” indicates the denial of inequality that some minorities experience because of their beliefs, while “governments can keep secrets from citizens in order to protect them” points to a rationalization process. While forming criterion validity questions, a situation is proposed and after deciding the range of possible responses, a choice for each degree of response is created. Therefore, not all criterion validity questions have same number of choices.

Although we have not established subcategories, distribution of questions about right-wing authoritarianism, economic and political conditions and belief in a just world are regarded while forming the scale. To detect participants who answer without reading, two questions which ask them to choose a certain response are included. First, an item pool consisting of 43 questions is created. Then, the items that are most relevant to the construct we aimed to measure are chosen so that a construct was not measured twice, and all items were addressed to general tendencies rather than specific cases. Also, items that address hot topics such as “terrorism” are excluded as we did not wanted judgments of our participants to be affected by changeable political agenda. As a result, final list consisted of 29 items . We decided that 7-point Likert Scale is ideal for scoring. Four questions are created for criterion validity scale and all of them are included. Criterion related questions are decided to be multiple choice in order to make analysis easier. Lastly, we named our scale after a character on a movie called Matrix (Silver, Wachowski, & Wachowski, 1999) because of its reference to defeating the existing system of a constructed reality, under the leadership of Morpheus.

*Measures*

Our Morpheus Scale consists of 29 Likert-type questions ranging from 1 (strongly disagree) to 7 (strongly agree) and has 3 reverse items that are numbered as 11, 26, 27. An example item is stated as the following one: "I don't think that people are subjected to social pressure because of their faith or faithlessness." Moreover, Morpheus contains 4 multiple choice criterion-related validation questions. In order to test the convergent validity of our scale, we correlated our scale with GSJ (Kay & Jost, 2003). Secondly, to test the discriminant validity, we correlated our scale with Religious Fundamentalism Scale (Altemeyer & Hunsberger, 2004). Finally, to examine the criterion related validity, some behavioral or attitudinal outcomes of system justifying beliefs are correlated with Morpheus scale.

To assess the religious fundamentalism level of our sample, we used Revised 12-Item Religious Fundamentalism Scale which is developed by Altemeyer and Hunsberger (2009). The scale has a reliability value of .92 and inter-item correlation of .37. Although in the original scale the items are measured on values ranging from -4 to +4, we used it as a 7-point Likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree) to make it more practical to analyze. The scale has 6 reverse items which are numbered 2, 4, 7, 9, 10, 12. An example item is stated as: "To lead the best and most meaningful life, one must belong to the one, fundamentally true religion."

To measure the system justification, General System Justification Scale (Jost & Kay, 2003) which consists of 8 items is used. The scale has a reliability value of .87. (Kay & Jost, 2003). 7-point likert scale from 1 (strongly disagree) to 7 (strongly agree) is used. System Justification Scale has 2 reverse items that are numbered as 3 and 7. An example item is the following: "In general, I find society to be fair."

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*Procedure*

The ethical approval for the study is obtained from METU psychology department. After translating testing measurements to Turkish, the survey package which contains informed consent, demographic information form, debriefing form, General System Justification Scale (Jost & Kay, 2003), Revised 12-Item Religious Fundamentalism Scale (Altemeyer & Hunsberger, 2009) and Morpheus Scale is formed. The research is conducted via online survey. After reading the informed consent and deciding to participate in study, participants had access to the scales. Following the completion of the scales, they were given a debriefing form. The study was announced through social media channels.

## Results

The descriptive analysis was done for General System Justification Scale (Jost & Kay, 2003), Revised 12-Item Religious Fundamentalism Scale (Altemeyer & Hunsberger, 2009) and Morpheus scale. Since we prohibited passing questions without answering, there was not any missing value. We used reverse item coding for reverse items. That is, if the respondent gave a 1, it is made a 7 and so on. The mean score for SJS is calculated as 1.79 (SD = .75). Also, the mean score for RFS is 2.77 (SD = 1.61). Finally, the mean score for Morpheus which is developed by the researchers is 2.61 (SD = .77). Mean scores of Morpheus and SJS imply that our sample has low justification tendencies compared to other samples (Kay & Jost, 2003; Jost & Kay, 2005). Also, mean score of Morpheus turned out to be higher than SJS which could mean that our scale is able to measure additional aspects of system justification. Moreover, four multiple choice criterion validity questions were also analyzed. For criterion validity questions, each choice was turned to a value. Those indicating high system justification were given higher points and those indicating low system justification were given lower points. If the question had 5 multiple choices, the highest point for this question was 5 and lowest was 1. The mean score for this scale is 2.04 (SD = .64) (see Table 1).

Table 1
Descriptive statistics for gender, age, Revised 12-Item Religious Fundamentalism Scale (RFS), General System Justification Scale (GSJS), Morpheus Scale and criterion Questions

| | **Mean** | ***SD*** | **Minimum** | **Maximum** |
|---|---|---|---|---|
| Gender | 1.42 | .53 | 1 | 3 |
| Age | 21.62 | 2.81 | 18 | 31 |
| RFS | 2.77 | 1.61 | 1 | 6.75 |
| SJS | 1.79 | .75 | 1 | 4.50 |
| Morpheus | 2.61 | .77 | 1.43 | 5.11 |
| Criterion | 2.04 | .64 | 1.25 | 3.75 |

*Reliability*

Cronbach's Alpha was used to measure internal reliability. The value of Cronbach's Alpha is
.73 for GSJS, .93 for RFS, .885 for Morpheus which is higher than the GSJS and .50 for criterion validity questions. Analysis has shown that if some items to be deleted, internal reliability increases for Morpheus and criterion validity questions. If item 3 which is "Very wealthy people are usually unhappy" deleted on Morpheus, Cronbach's Alpha would increase to .94. If item 26 which is "I think that non-governmental organizations should take a bigger role in the fight against poverty" deleted, it would increase to .91. If question 4 which asks participants what to do in a civil war situation on criterion validity questions is excluded, the reliability increases to .56. (see table 2). Despite the promise of increase in reliability, those items are kept in the scale. We will elaborate on why we did not drop those items in the discussion section.

Table 2 Reliability statistics for Revised 12-Item Religious Fundamentalism Scale (RFS), General System Justification Scale (GSJS), Morpheus Scale and criterion questions

| | **Cronbach's Alpha** | **Standardized Items** | **N of Items** |
|---|---|---|---|
| RFS | .930 | .931 | 12 |
| SJS | .730 | .775 | 8 |
| Morpheus | .885 | .888 | 28 |
| Criterion | .502 | .502 | 4 |

*Validity*

Convergent and discriminant validity is analyzed in order to confirm construct validity. For convergent validity, we ran correlation analysis between Morpheus and General System Justification Scale. As hypothesized before, there is a positive strong correlation (r = .836, $p$ < .01). For discriminant validity, we ran correlation analysis between Morpheus and Revised 12- item Religious Fundamentalism Scale. The correlation was positive and moderate which is in line with what we expected (r = .614, $p$ < .01). Finally, the correlation between Morpheus and four multiple choice criterion validity questions is calculated in order to verify criterion validity. The correlation came out positive and high enough as expected (r = .564, $p$ < .01). To conclude, all of the hypotheses which had been stated in the study are supported (see table 3).

Table 3 Bivariate Correlations

| | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| **1. Morpheus** | 1 | | | |
| **2. Criterion** | .662** | 1 | | |
| **3. SJS** | .836** | .621** | 1 | |
| **4. RFS** | .614** | .496** | .571** | 1 |
| *Note:* * p < .05; ** < .01 | | | | |

## Discussion

The current study is aimed at generating a new measure for system justification.

Reliability of the scale is ensured by revealing that it has .88 internal consistency reliability. Convergent validity score (.84) indicates that Morpheus Scale is indeed able to measure system justifying tendencies. Discriminant validity score (.61) shows moderate correlation with religious fundamentalism that is quite higher than the range found by previous studies (from .16 to .35) (Jost et al., 2013) but still in conformity with the hypothesis. Although all hypotheses are supported, we will especially reflect on the last one due to its unique significance to the context of the study preceded by a short criticism of the literature.

Academicians tend to write in the forms they think will increase the number of citations they take under the influence of the bureaucratic processes accompanied by an ever- increasing prevalence of academic inflation (Becker, 2016). Even a quick look at the related literature is sufficient to indicate that system justification is no exception to this trend: There are plenty of studies written today regarding system justification composing excellent examples for the trend of producing such derivative work. For instance, many issues ranging from the denial of global warming to the degree of support for redistributive social policies, which at the time were not considered within the domain of social psychology, have started to be examined through the lens of system justification theory (Feygina, Jost & Goldsmith, 2010; Wakslak, Jost, Tyler & Chen, 2007). In the process of developing the study while analyzing those articles, we have ended up with choosing religious fundamentalism to check discriminant validity in the hopes that it will turn out to have moderate correlation. Instead of another construct such as self-efficacy or openness to experience that would be regarded essentially as uninformative of system justification, religious fundamentalism is chosen since the literature provides assurance for its relevance to the construct. That is revealed by the fact that gradual escalation in system-justifying beliefs made people increasingly more susceptible to religious indoctrination (Osborne & Sibley, 2008). The reason why it is more strongly correlated (.61) with system justification than in the literature (.16 to .35) (Jost et al, 2013) might be due to the fact that some of items of Morpheus scale are associated with right wing authoritarianism which is profoundly relevant to Turkey since religion is inextricably intertwined with the national identity of majority of citizens and justification of government's actions is facilitated by a position of religious authority (Ozcan & Gunduz, 2015; Somer, 2016).

System justification functions as a mechanism to abstain from facing up to uncertainty. Not doing so could otherwise have been ascribed to the failure of the extant state of affairs (Owuamalam, Rubin & Spears, 2018). This low tolerance for uncertainty to hold strong system-justifying attitudes is supported by Morpheus' 4., 6., 12., 14., items that, respectively, lay a particular emphasis on the perceived deservedness of the event one goes through, the need for order, the desire for a consistent government and the belief that justice will prevail sooner or later.

Concerning why we did not drop some items despite the promise of increase in reliability, firstly, they measure the construct we want to measure, and the reliabilities are still high enough with them. Moreover, we wanted to cover all the findings revealed by Life Satisfaction Research (TÜİK, 2014) to keep the content validity of our scale. In addition, we think that the item 3 which is "Very wealthy people are usually unhappy" is important since "poor but happy" and "rich but miserable" stereotypes contribute to activation of system justification tendencies (Kay & Jost, 2003). Also, we think that the item 26 which is "I think that non-governmental organizations should take a bigger role in the fight against poverty" is important as NGOs imply capacity of citizens to change the status quo, which refers to the correlation between feeling of low control on one's life and system justification (Kay & Friesen, 2011).

The fact that reliability of the developed scale (.88) turned out to be higher than the GSJS (.73) can shed light on the distinguishing features of Morpheus Scale. Items with regard to political transparency and public disclosure, anti-poverty programs undertaken by non- governmental organizations and the perceived normality of censoring media organs increased its reliability owing to them being oriented to take concrete steps to measure system justification.

It can be inferred from the correlation of the criterion validity questions that they arguably bear some ambiguity proven by the outcome that excluding one of them increases reliability. For instance, the question about what to do in a civil war situation is open to both interpretations. The answer 'I'd stay and join it' may be given by the motivation of acknowledging the authority of the state to eliminate all threats to its existence as the ultimate power-holder or of bowing to the inevitable in which case it is counted to the credit of system justification. However, if one considers that leaving the country in order to ensure self- preservation is unacceptable underlying the belief that only legitimate war is being against war regardless of the circumstances or rightfulness of any party, it must be taken in the opposite way. That's why this ambiguity may need to be removed by either specifying the items or excluding them altogether.

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# What Neural Mechanisms Take Part in the Process of Aesthetic Pleasure and How Do They Affect Perception of Dance?

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**This paper will deal with the question of "What neural mechanisms take part in the process of aesthetic pleasure and how do they affect perception of dance?". In order to tackle this question, we will start with explaining the concepts of neuroaesthetics and aesthetic experience. The three main schools of neuroaesthetic theories (objectivist, subjectivist and interactionist) will be introduced. Various accounts of aesthetic experience, such as processing fluency and embodied simulation theories- that are derived from these three perspectives- will be discussed. By interpreting the results of experiments that were built on the premises of these theories, we will explore the underlying neural mechanisms and their cognitive and behavioural correlates that form the aesthetic experience. The focus of this paper will be the neuroaesthetics of dance: a less researched area compared to the neuroaesthetics of visual arts. Specifically, this review will explore the neural mechanisms and the cognitive processes that they facilitate, which are peculiar to the perception of dance in aesthetic experience. This will be achieved via looking at the similarities and differences in results yielded by research on neuroaesthetics of visual arts and that of dance.**

***Keywords:*** neuroaesthetics, aesthetic experience, dance, perception

Various research results in neuroaesthetics of visual arts demonstrated the involvement of the visual cortex (Di Dio & Gallese, 2009) specifically the core emotional centres (such as insula and amygdala) (Di Dio, Macaluso & Rizzolatti, 2007), reward related centres (such as caudate nucleus) (Vartanian & Goel, 2004), sensorimotor areas (such as premotor cortex) (Jacobsen, Schubots, Hofel & Cramon, 2006) and mirror network (such as IPL and PPL) (Freedberg & Gallese, 2007)- in aesthetic experience (Figure A and Figure B). These findings implied that aesthetic experience is a complex phenomenon in which the aesthetic stimuli are processed at multiple levels that include various cognitive processes. Such processes are the visual perception of the object and how its objective features are processed; embodied mechanisms and somatomotor resonance which is further modulated via the subjective experience and characteristics of the viewer. When we turn to the dance studies; the findings emphasize the sensorimotor regions and mirror network, and consequently the influence of embodied simulation, on the aesthetic evaluation of dance (Cross, Kirsch, Ticini, & Schütz-Bosbach, 2011; Orgs, Hagura & Haggard, 2013; Kirsch, Drommelschmidt & Cross, 2013; Christensen & Calvo-Merino, 2013). Results from neuroaesthetics studies focusing on dance, also implied the involvement of visual cortex and processing of visual features of the stimuli, such as symmetry, in aesthetic evaluation (Christensen & Calvo-Merino, 2013; Orgs et al., 2013). Findings indicated that the greater activation of the mirror system, which indicated embodied simulation in the beholder, correlated with reports of increased liking (Cross et al., 2011). Consistent with findings from the visual arts studies, dance studies yielded results that were convenient with multiple accounts indicating complex underlying cognitive processes that may be affected by the fluency of processing of the stimuli, symmetry judgement, viewer's dancing experience and motor resonance induced by the moves (Cross et al., 2011; Cross & Ticini, 2012; Christensen & Calvo-Merino, 2013; Orgs et al., 2013; Kirsch et al., 2013).

## Three Main Schools of Neuroaesthetics

Neuroaesthetics is a branch of cognitive neuroscience that investigates the neural underpinnings of the aesthetic experience by the application of imaging and neurophysiological techniques, namely fMRI, MEG and EEG (Di Dio & Gallese, 2009). The term was initially coined by Zeki (1999) as he claimed that art functions as an extension of the functioning of the human brain, specifically the visual brain. Both the brain and art operate to seek knowledge; searching for constancies in objects, surfaces or situations to make sense of the world. He argued for the biological foundations of art, based on the processing of objective features and properties of artworks that induce aesthetic pleasure when viewing. He gave the example of a group of cells discovered by Hubel and Wiesel in 1959 that only respond to lines that have a specific orientation; their response decreased as the orientation of the lines diverged from the "preferred" orientation. Zeki (1999) emphasized that "Aesthetics, like all other human activities, must obey the rules of the brain of whose activity it is a product".

Neuroaesthetic research consists of three main schools of theories on what drives aesthetic pleasure (Reber, Schwarz & Winkielman, 2004). First of these are the objectivists who looked into the objective stimulus features to identify the properties that produce aesthetic experience in any perceiver (Tatarkiewicz, 1970). Proportion, symmetry and contrast were a few of the properties that were uncovered by research (Reber et al., 2004). Zeki's (1999) conceptualization is an example of this approach.

Subjectivists, however, saw aesthetic experience as a function of idiosyncratic attributes of the beholder and argued that there were no laws for beauty (Tatarkiewicz, 1970). Finally, interactionists sought to understand aesthetic experience by looking at the patterns in the way people and objects relate (Merleau-Ponty, 1964). The field's initial objectivist focus was on visual perception; particularly how objective features of artworks are visually processed. With consideration of the sensorimotor and emotional processes that characterize the embodied motor responses and affective reactions, further research prompted a shift toward interactionism. Hence, a conceptualization of aesthetic experience, where prior processes of visual analyses are followed by embodied mechanisms and further modulated by subjective determinants (like the beholder's past experiences of the stimuli), became prevalent (Di Dio & Gallese, 2009). Reber et al. (2004) defined aesthetic experience as a "pleasurable subjective experience directed toward an object and not mediated by intervening reasoning" (p. 365). Seeking to identify these interaction patterns, they proposed that aesthetic pleasure stems from the processing experiences of the beholder which are subjected to the features of the stimuli.

Affective and cognitive processes take part in the aesthetic experience yielding an interaction of both the objective features of the stimuli and the viewer's past experiences with it. They argued that aesthetic pleasure is derived from the fluency of the processing of stimulus. Smoother the process, the more positive the aesthetic response to the object is (Reber et al., 2004). Also stemming from the interactionist approach; Di Dio and Gallese (2009) proposed that the aesthetic stimuli are processed at multiple levels starting from the visual analysis of the art object. These processes render aesthetic experience through visceromotor and somatomotor resonance in the viewer (Di Dio & Gallese, 2009).

## Neural Underpinnings of Aesthetic Experience

Looking at the neural underpinnings of this phenomenon; the activations of sensorimotor areas, core emotional centers and reward related centers are evident in the overall findings of the research in the neuroaesthetics field (Di Dio & Gallese, 2009). In an fMRI study investigating the neural correlates of beauty perception, participants were asked to judge different categories of paintings as beautiful, neutral or ugly. Results showed a decrease in activation in medial orbitofrontal cortex (OFC) (Fig. A) compared to the baseline; with highest activation for the judged-beautiful stimuli and lowest for the judged-ugly ones (Kawabata & Zeki, 2004). In another fMRI study, Vartanian and Goel (2004) discovered varying levels of activation in caudate nucleus (Fig. A); as decreased preference for observed art work yielded decreased activation. In addition, activity in left anterior cingulate sulcus

(Fig. A) increased as the preference for the presented artwork increased (Delgado, Locke, Stenger & Fiez, 2000). Such results imply a connection between the processing of aesthetic stimuli and the activation of brain areas that respond to reward (Di Dio & Gallese, 2009).

Various research has also shown the activation of parietal regions for aesthetic stimuli which supported the notion that mental imagery and spatial processing are involved in the aesthetic experience (Cela-Conde et al., 2009; Cupchik, Vartanian, Crawley & Mikulis, 2009; Di Dio & Gallese, 2009). In an attempt to uncover the processes that are different in perception of objects (yielding object identification) and perception geared towards aesthetic experience; Cupchik et al. (2009) asked whether aesthetic experience is brought about by the perceptual features of the stimuli or if it necessitated an intentional orienting of perception toward "distilling the properties of artworks" (p. 85). They argued that it required cognitive control to adopt the aesthetic viewing orientation prior to aesthetic experience. Their experiment consisted of two conditions; in the pragmatic viewing orientation, participants were instructed to approach the images in an objective and detached manner to obtain information about the content (Cupchik et al., 2009). The aesthetic condition required participants to view paintings in a subjective and engaged manner; they were asked to focus on the colours, composition, shape and were invited to experience the feelings it evoked. They found increased activation in the left lateral prefrontal cortex in the aesthetic condition and interpreted this as the top-down control in directing perception toward aesthetic orientation (Cupchik et al., 2009). This was supported by the findings on the role of lateral PFC (Fig. B) in top-down control of cognition (Ridderinkhof, Ullsperger, Crone & Niewenhuis, 2004). Results Cupchik et al. (2009) obtained, supported their predictions about the required cognitive control to adopt the aesthetic viewing orientation prior to the aesthetic experience.

In order to investigate the bottom-up modulation of the perceptual orientation concerning the features of the stimuli, they manipulated the edges of the forms in the paintings yielding soft-edged, ill-defined forms compared to hard-edged ones (Cupchik et al., 2009). Soft-edge paintings were expected to facilitate aesthetic perception through active image construction mediated by the parietal lobe (Fig. B). This assumption was based on the former studies which highlighted the role of parietal lobe in the active image construction, spatial cognition (Fairhall & Ishai, 2008) and generation of abstract mental imagery (Cavanna & Trimble, 2006).

Specifically, Fairhall and Ishai (2008) observed increased activation in the postero-medial portion of the parietal lobe, linked with the generation of mental imagery as participants viewed paintings that lacked recognizable content, compared to paintings that were rich with suggestive objects. In their study; participants attempted to identify the ill-defined forms in order to construct a coherent image in the aesthetic condition, yielding activation in parietal lobes, specifically the left superior parietal lobe (Fairhall & Ishai, 2008). In addition to these, their results highlighted the role of bilateral insula in aesthetic perception which implied the component of subjective experience when evaluating artworks.

They also presented the role of right fusiform gyrus in pragmatic perception, indicating identification of meaningful objects in the hard-edged condition. The results of this study suggested that the aesthetic experience was a product of the interaction between the top-down orientation of cognitive control and the bottom-up perceptual input from the stimuli. In another fMRI study by Jacobsen, Schubots, Hofel and Cramon (2006) participants were asked to evaluate stimuli on aesthetic dimension (beautiful or not) and on symmetry dimension (symmetric or not). Their study indicated that increased activations in parietal and premotor areas, imply the role of spatial processing in participants' judgements. The overall findings of the study confirmed the influence of symmetry on aesthetic judgement (Jacobsen et al., 2006).

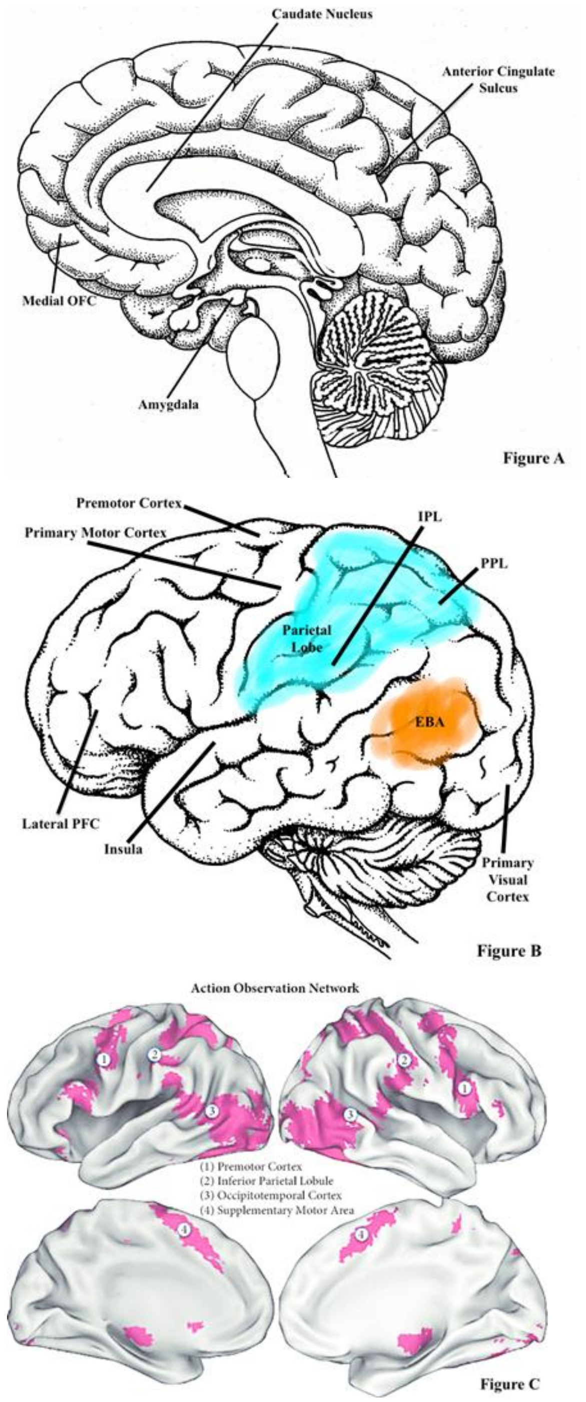


*Figure* 1. Schematic of the Action Observation Network. Reprinted from "The impact of aesthetic evaluation and physical ability in dance perception", by E. S. Cross, 2011, *Frontiers in Human Neuroscience*, *5*, 102.

The activation of parietal regions also rendered another important implication. Research showed that mirror system in humans, which is the system that matches action observation and execution, involves the posterior parietal lobe (Buccino et al., 2001). The implication of the mirror system in humans was facilitated the findings of studies with macaque monkeys in which they discovered mirror neurons, neurons that fire both as a response to the observed action and the execution of this action (Rizzolatti & Craighero, 2004). The mirror system in humans is thought to be the neural mechanism that enables the embodied simulation (Gallese, 2009). It has been proposed that embodied simulation underlie the viewers' responses to art through the embodied simulation-driven empathic feelings and representational content concerning actions and intentions implied; which challenged the previous accounts that focused on the processing of stimulus features in explaining the aesthetic experience (Freedberg & Gallese, 2007; Di Dio & Gallese, 2009). Di Dio et al. (2007) found supporting evidence for this hypothesis in their fMRI study where results displayed ventral premotor and posterior parietal cortex activation when participants were shown Classical and Renaissance sculptures, indicating motor resonance matching to the implied movement of the sculptures.

Core emotional centres are also shown to be mediating aesthetic preferences, namely amygdala and insula, which underlined the neural link concerning emotions and aesthetics (Di Dio & Gallese, 2009). Di Dio et al. (2007) found particularly strong activation of insula in their fMRI study when participants were asked to observe sculptures as if they were in a museum with no explicit reporting of judgement required, compared to other conditions where they were asked to evaluate the sculptures based on proportion and aesthetics. With this study, they investigated the objective features of the sculptures that induce aesthetic pleasure when they compared the conditions of non-manipulated sculptures and proportion-modified ones. They also explored the contribution of subjective aspects (e.g. observer's own emotional experience) when comparing brain responses to previously judged (liked or disliked) stimuli and found selective activation of the right amygdala when observing the liked ones compared to those disliked. They have shown that the aesthetic experience derived from physical properties of the stimulus through the processing of sensorimotor input is mediated by the activation in insula and amygdala; challenging the notion that the aesthetic experience is solely based on the objective properties of the stimuli.

Neuroaesthetics of Dance

Even though dance is less studied in the field of neuroaesthetics compared to visual arts, it offers much to explore about the embodied simulation theories concerning the aesthetic experience and is also fed by the literature on action-perception relationship. Perception of dance and aesthetic experience related to it is connected to the perception and representation of the bodies and movement of the performer and affected by the emotion they convey. The region of the human brain that allow the extraction of information about the observed movements and bodies is the region in the extra striate cortex known as the extra striate body area (EBA) (Fig. B). Brain regions that take part in the processing of movement, namely complex visual areas and the motor regions, also respond to the static body postures; indicating that the sense of movement can be extracted even in static images (Christensen & Calvo-Merino, 2013). The process in which observed dance movements are transformed into an aesthetic experience in the beholder is connected to the embodied simulation via the activation of premotor and parietal cortices of the human brain which are suggested to be working in a similar manner with the mirror neurons; both active in the execution and the observation of the movement. Subsequent research supported that the mirror neuron mechanisms combine information of the observed action with the internal motor resonance (Christensen & Calvo-Merino, 2013).

In pursuit of studying the factors affecting the activation of mirror neuron mechanisms and embodied simulation when watching dance, Cross et al. (2011) assessed the relationship between the participants' physical ability and aesthetic response in an fMRI study; investigating the activation of sensorimotor brain regions as participants watched dance performances. Behavioral data collected through self-reports indicated that participants reported liking movements that were perceived as difficult to physically execute. The higher ratings of liking concerning moves that were difficult to replicate may be explained by two accounts. First, the performance of physically skilled dancers may lead to an acknowledgement in the beholder as what he/she is observing is beyond his/her abilities resulting in increased liking of actions. A second account may be connected to the perceptual fluency of Reber et al. (2004); when participants observe the execution of difficult movements as smooth and easy by the professional performers, increased liking emerges. Hayes et al. (2008) demonstrated that people tend to like objects more when they observe others interacting with them smoothly and easily; which supports the link between perceived action fluency and liking. The relationship between physical ability and liking was represented within occipitotemporal and parietal regions, parts of the sensorimotor areas of the brain, within the action observation network (AON) (Fig. C). Strong contrast was found in the interaction between liking and perceived capability of execution; brain regions that showed stronger response when increased liking and reduced perceived reproducibility were shown in analysis. These regions were bilateral occipitotemporal cortices and the right inferior parietal lobule (IPL) (Fig. B). IPL was consistently showed to be connected to embodied simulation by various studies and this connection was further supported by the recent studies indicating that neurons within IPL code action and execution in a similar manner as the mirror-neurons identified in the homologous cortical region of macaque monkeys (Chong et al., 2008). The stronger activation of IPL in the results may be indicating the persevering attempt to embody the visually pleasing but physically difficult movement by the observer's motor system. In the reverse direction, increased activation of IPL may also be the reason for increased liking of the movement. Even though without further experimentation it's impossible to clarify the causal role of IPL in embodied simulation and aesthetic judgement; findings support Freedberg and Gallese's (2007) hypothesis of the embodied simulation as a basis of aesthetic experience. Calvo-Merion et al. (2008) also investigated the neural mechanisms underpinning the aesthetic experience when watching dance. Collecting fMRI data during participant's passive observing of the dance stimuli (without any instructions on aesthetic evaluation) and comparing these to later reports of aesthetic evaluation of the stimuli; they found significant neural correlates of liking-disliking of a stimulus in aesthetic experience in their analysis. According to their results, brain activity in right premotor cortex and bilateral early visual cortices during the observation of movements which had higher liking group-average ratings was increased. The group average ratings of liking in the behavioural questionnaire corresponded to the increased activation of visual and premotor cortex in the fMRI data. This indicated the involvement of sensorimotor and visual cortices during aesthetic experience of dance. Premotor cortex activation correlated with subjective liking. The premotor cortex is a part of the mirror system for perceiving and executing actions; when we watch an action, we simulate the movement using the same brain network that we use to execute it (Decety & Grezes, 1999). This way, the aesthetic content involving motor performance may induce a form of motor resonance in premotor areas and other structures of the mirror system (Calvo-Merino et al., 2006). A correlation between the degree of liking, the degree of movement in a stimulus (since they found higher activation and liking for jumps and full body displacements compared to movements with single limb displacement) and the activity induced in the premotor cortex was suggested. These findings are consistent with the embodied simulation account of aesthetic experience. Concerning the relevance of the activation in the visual cortices; their results suggested that greater activity was evoked by movements that were rated higher in liking by the observers. This difference correlated with the specific visual attributes of the movement; namely the amount of visual motion. These results are consistent with Zeki's (1999) claim that visual art must follow the rules of the visual brain. Importantly, unlike similar neuroaesthetic experiments this experiment looked at brain activity during passive viewing; explicit aesthetic judgements weren't obtained in the process. Hence, they argued that the aesthetically relevant brain activity they've found was completely implicit. On contrary to Cupchik et al.'s (2009) hypothesis that aesthetic experience necessitates prior intentional orientation of aesthetic perception, this indicated that even when we're not interested in the aesthetic evaluation or the beauty of the stimuli; we may perceive and enjoy the aesthetic value or engage in aesthetic experience. Orgs et al. (2013) introduced a model of aesthetic perception of dance which distinguished three levels characterized by differing processes when perceiving body postures, movements and choreographic structure. They found that the aesthetic perceptions of body postures were related to spatial geometry and involved both visual and sensorimotor processing. The participants consistently preferred body postures that maximized static symmetry. Former studies also verified the importance of symmetry in the positive aesthetic judgement in visual artworks (Jacobsen et al., 2006). Good continuation of movement proved to be an important predictor of aesthetic preference of participants and simpler movements over more complex ones were preferred (Orgs et al., 2013) which may be implying the effect of processing fluency. The preference of simple movements may also indicate a form of embodiment considering the participants were novice observers.

Exemplified results and discussed theories make it clear that aesthetic experience is a complex phenomenon in which aesthetic stimuli are processed at multiple levels including visual perception of the object and its features, motor resonance induced by observed or implied movements or intentions and influence of the subjective experience and characteristics of the beholder. These implications were shared by studies on neurasthenics of visual arts and those of dance. Similarly, neural mechanisms that underlay the aesthetic pleasure were common for visual arts and dance and research showed major similarities in the cognitive processes they facilitated and the behavioural outputs (the reports of aesthetic evaluation) they produced. Specifically, the involvement of visual cortex, sensorimotor regions and mirror neuron network were implied in both line of research. Likewise, visual processing of objective features of the stimuli, namely symmetry and contrast in a painting and symmetry and spatial geometry in a dance choreography, found to be similar in both forms of art. These shared implications yielded support for the Processing Fluency account for aesthetic experience. Embodied simulation is another example of common cognitive processes in neuroaesthetics of visual arts and of dance, which promoted the Embodied Simulation account. For example, Christensen and Calvo-Merino's (2013) finding that the sense of movement can be extracted even in static images is consistent with the account of Embodied Simulation and enlarges the scope of Freedberg and Gallese (2007)'s account by showing its validity in neuroaesthetics of dance. This shows that even though the two lines of research seem to be prospering separately, they offer important insights for one another. Future research should look further into how cognitive processes and underlying neural mechanisms differ in the perception of dance and everyday perception of sequences of mundane movements. Such direction may yield answers on the significant question; what makes an object a work of art?

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# Effectiveness of CBT on PTSD

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**Post-traumatic stress disorder (PTSD) is characterized as the psychological and emotional outcomes of experiencing a traumatic life event (Iribarren, Prolo, Neagos & Chiappelli, 2005). Potentially traumatic life events such as childhood traumas, sexual assaults, and political violence are very common and thus, post-traumatic stress disorder (PTSD) affects a large population. One of the most effective therapy techniques to treat PTSD symptoms is Cognitive Behavioral Therapy (CBT). CBT has different techniques for specific trauma types, and some examples for these techniques can be in vivo and imaginary exposure, psychoeducation, homework, and relaxation trainings. In this review, the effectiveness of CBT and its different methods on PTSD symptoms caused by different kinds of traumatic events, as well as the effectiveness of CBT across different populations were assessed. Overall, CBT is found to be a very effective technique for PTSD; however, it could be applied to a larger population who has developed PTSD.**

***Keywords:*** PTSD, CBT, sexual abuse, childhood traumas, political violence.

Post-traumatic stress disorder (PTSD) can be characterized as the psychological and emotional outcomes of experiencing a traumatic life event (Iribarren, Prolo, Neagos & Chiappelli, 2005). Traumatic life events can range from rape, sexual abuse, violence, accidents, natural disasters, death of a loved one, and terrorist acts to war. According to National Center for PTSD, post-traumatic stress disorder affects 7-8% of the population during a given year and women are affected two times more than men; while women suffer more from sexual assault, men suffer more from accidents and injury (2007). Individuals with a PTSD diagnosis who have been exposed to traumatic events might have difficulty in overcoming the event and may experience depression and anxiety. Moreover, the event may recur as flashbacks, interfere with a person's daily life and may cause problems related to sleeping, eating, socialization, memory, mood stability and addiction (American Psychiatric Association, 2013). In order to treat PTSD symptoms, many treatment methods and therapy techniques are introduced. A research which was conducted by Kar (2011) shows that cognitive-behavioral therapy (CBT) for PTSD yields both long-term and short-term benefits and it is considered as an effective treatment.

CBT has numerous techniques for different disorders and for different symptomatology (as cited in Dossa & Hatem, 2012). As it can be seen in the following sections, there are different CBT techniques that are preferred for specific trauma types. In this review, it is aimed to examine the effectiveness of CBT techniques on different kinds of PTSD symptoms.

One of the most effective CBT technique for PTSD is the exposure therapy (Kar, 2011). According to the Kar's research, after war trauma, soldiers suffering from PTSD symptoms regarding social functioning showed significant improvement by undergoing exposure therapy and cognitive processing. The same study suggests that by applying prolonged exposure as the cognitive behavioral therapy technique, symptoms resulting from sexual assault and sexual abuse can also be reduced. In prolonged exposure, patients with PTSD symptoms gradually encounter their traumatic memories, negative feelings and trigger situations that they avoid in daily life. Another sample that CBT is effective for is children with PTSD. Similar to the adults, exposure therapy is applied to children in some cases such as sexual abuse, physical abuse, disasters, accidents, fear and loss of a loved one. Although there has been some question marks about children's adherence to the CBT structure, it was supported that CBT is effective for children, too (Scheeringa, Salloum, Arnberger, Weems, Amaya-Jackson & Cohen, 2007). Cognitive Behavioral

Intervention for Trauma in Schools (CBITS) is also reported to have significant effect on reducing PTSD symptoms in children and decreasing psychosocial problems in their parents (Dorsey, Briggs & Woods, 2011).

## Literature Review

### CBT for Children Diagnosed with PTSD

Traumatic events and violence target not only adults, but also children. Unfortunately, the rate of children and adolescents who are exposed to potentially traumatic events in the USA is 60.4% (Finkelhor, Turner, Omrod & Hamby, 2009). A considerable part of them develop PTSD and other common trauma related disorders. Even non-clinical PTSD symptoms make them vulnerable to other psychological disorders (American Academy of Child and Adolescent Psychiatry, 2010). Hence, it is important to treat their PTSD symptoms (American Academy of Child and Adolescent Psychiatry, 2010). In a meta-analytic review which was conducted by Wetherington and his colleagues, it has been seen that CBT is the most efficient approach for treating child and adolescent PTSD compared to play therapy, art therapy, psychodynamic therapy and pharmacological therapy (2008).

In one study that examines the feasibility and effectiveness of CBT in traumatized preschool children, three major points were investigated: whether preschool children can adhere significantly in structured, trauma-related exposure exercises, whether they can apply relaxation techniques well enough, and whether their parents who are also traumatized and have high levels of anxiety constrain the children’s progress (Scheeringa et al., 2007). They found that even though young children’s ability of self-expression is still developing, they could successfully join in the structured-therapy, collaborate with exposure techniques and homework, and at the end of the 12 sessions, their PTSD symptoms declined dramatically. Also, their parents’ anxiety levels did not interfere with the development of the therapy.

An inspiring study was conducted by Feather and Ronan (2009) where they presented the application of CBT methods to maltreated children who were diagnosed with PTSD following physical abuse, sexual abuse, neglect, emotional abuse, and witnessing domestic violence. The Trauma-focused CBT (TF-CBT) was applied by the same researchers in previous studies with the aim of clarifying various hypotheses. For instance, in a study conducted in New Zealand with maltreated children of European descent, Feather and Ronan (2006) completed the first phase of the TF-CBT and reported an overall reduction in PTSD symptoms and an increase in coping behaviors related to specific abuse and trauma-related concerns (as cited in Feather & Ronan, 2009). The same researchers together with Murupaenga, Berking, and Crellin replicated the study with Maori and Samoan children and received positive results showing that the treatment was also cross-culturally valid (as cited in Feather & Ronan, 2009). In the latest phase of the study, the fully developed TF-CBT method was applied by different therapists and also included their parents and/or caregivers (Feather & Ronan, 2009).

According to the above-mentioned study, the TF-CBT program includes several aspects of the therapy methods used in CBT. Although CBT methods have been applied for only a few decades, CBT approaches which are applied to PTSD highlight the importance of a collaborative therapeutic relationship, as well as use of creative applications of the model, particularly when working with children is concerned (Kendall, 1993). Based on the “Coping Cat” program which is a comprehensive CBT based treatment program for children with anxiety disorders and aims children to recognize and cope with anxiety and master difficult tasks (Kendall, Kane, Howard & Siqueland, 2017) , the TF-CBT program compromised various methods including; a) using creative media to create a coherent trauma narrative with the objective of desensitizing trauma in a safe therapeutic environment, b) sand-play therapy which has been found clinically useful for children in treating abuse and violence trauma in children, c) the STAR plan for anxiety disordered children, which is a form of CBT technique developed by Kendall et al. (1990)

for anxious children and aims to improve children's coping skills, d) a gradual exposure procedure for processing and resolving trauma, derived from behavioral, cognitive and expressive therapy models adapted for children and finally e) a transition to life beyond therapy program (as cited in Feather & Ronan, 2009).

The study findings supported the positive results of the previous studies which showed that the levels of PTSD symptoms were reduced, and children's coping mechanisms strengthened across baseline and treatment, and also showing that TF-CBT was superior to other treatments in improving PTSD and related symptoms (Feather & Ronan, 2009).

CBT for Sexually Assaulted Women Diagnosed with PTSD

Although all crimes might have a psychological impact on the victims, rape and sexual assault are the most horrifying experiences for women, and they often result in critical psychological problems (Breslau, Davis, Andreski & Peterson, 1991; Wirtz & Harrell, 1987). Averagely, over 500.000 women reported rape and sexual assaults per year, and this statistic may not even reflect the truth since most women are hesitant to report sexual assaults (Bachman & Salzman, 1995). Due to the fact that women are more likely to develop PTSD after a traumatic event (as cited in Tolin & Foa, 2006), sexually victimized women are particularly vulnerable to chronic symptoms of PTSD (Jaycox, Zoellner & Foa, 2002). These kind of PTSD symptoms therefore may be severe, difficult to manage, and may last for years without treatment (as cited in Billette, Guay & Marchand, 2008).

For the most cases of PTSD in rape survivors, CBT has been used in the context of an empathic and supportive therapeutic relationship in which supportive counseling techniques have been used (Foa & Meadows, 1997). In spite of the fact that CBT is the most widely used psychotherapy for PTSD and that there is considerable empirical support for its effectiveness (Foa, 2000; Foa & Meadows, 1997; Solomon, 1997), specific and adapted Greene CBT techniques are needed considering the success rate is only from 46 % to 54 % (Bradley, Russ, Dutra & Westen, 2005).

Why do some sexual assault survivors recover and others develop severe psychological disorders? The following study suggests an answer for that question as well as a detailed therapy program for those women. According to Foa and her colleagues (as cited in Jaycox, Zoellner & Foa, 2002) the reason lies in the Emotional Process Theory. This theory indicates that in order to recover from a traumatic event, individuals need to process the event with special effort, and those who fail to do so may end up with chronic disturbances. Accordingly, Jaycox, Zeollner and Foa (2002) created a CBT program including four important components: breathing retraining, education about PTSD symptoms, imaginal exposure to the trauma itself and confrontation of feared situations, and cognitive restructuring. In the study, investigators explained all components in detail; each step to follow, and session by session structure of the therapy, and they have demonstrated this program with a single case report: Janice. At the end of the therapy, they found that Janice's PTSD symptoms reduced dramatically as well as her depression and anxiety scores according to her weekly self-report questionnaires (Jaycox, Zoellner & Foa, 2002).

In another study which investigated the impact of spousal involvement in CBT for sexual assault survivors, therapy sessions for women who have PTSD and their spouses were tailored (Billette, Guay & Marchand, 2008). The treatment included the psychoeducation about PTSD and sexual assault, anxiety management techniques, cognitive restructuring, emotional regulation, in vivo and imaginal exposure, and relapse prevention. Women's spouses were included in the sessions and they showed their support for their partners. Before every session, women reported their PTSD symptoms on self-report questionnaires. The results demonstrated that all subjects responded positively to the treatment, and their PTSD symptoms decreased every week. In addition, they were all satisfied with the support from their spouses and as therapy continued, their satisfaction levels increased as can be seen in their self-reports. This research suggests that although CBT is effective in PTSD cases, in the context of sexual assault, social support of spouses can be very helpful for treatment of symptoms, and important for couples' relationship.

In sexual assault trauma cases, stigmatization and the feeling of loneliness is a common problem, and group therapies are a really good way eliminating these problems since the survivors feel like they are being understood by others who have faced similar traumas, (Prendergast, 1994) also a perfect environment for sharing traumatic experiences in a safe place is provided (De Luca, Boyers, Furer, Grayston & Hiebert-Murphy, 1991). This self-expressive environment could also provide the enrichment of interpersonal functioning and facilitates change during the therapy (Avinger & Jones, 2007; Hazzard, King & Webb, 1986; Johnson & Young, 2007). Accordingly, Misurell, Springer and Tryon (2017) conducted a study which investigated the effects of game-based CBT group program for sexually abused children. With the help of the therapy they have aimed to improve internalizing symptoms, externalizing behaviors, sexually inappropriate behaviors, lack of social skills, self-esteem problems and knowledge of healthy sexuality and self-protection skills. After GB-CBT group program, they have discovered that the program was effective for most of the variables except for social skills and self-perception. Even though the results were not statistically significant for social skills and self-esteem, they have found a positive direction for those.

CBT for Political Violence Survivors Diagnosed with PTSD

Political violence is a concept which includes terrorism, coups or coup attempts, and both civil and intrastate wars (Sandler, 2016). Although intrastate wars were not common in recent years, deaths related to battles have been increasing dramatically since 2010 (Sandler, 2016). According to the list published on Wikipedia (2018), the numbers of individuals who have been killed in terrorist attacks are increasing every year. The fact that there is a civil war in Syria, and the number of individuals who are killed by terrorist groups are increasing, put an emphasis on the importance and severity of political violence. CBT has been applied to many kinds of political violence survivors such as refugees, war veterans, individuals who are tortured, bombing survivors, and sexually abused women due to war-related violence (Dossa & Hatem, 2012). In this section, war related PTSD symptoms will be focused on and the efficacy of CBT techniques on survivors with war related PTSD will be evaluated.

Research about war survivors diagnosed with PTSD have shown that CBT has minor to large curing effects on them. Wilson, d'Ardenne, Scott, Fine and Priebe (2012) claim that the TF-CBT method had large efficacy on the survivors of the London bombings which occurred on 7 July 2005. While before the start of the treatment traumatized individuals were emphasizing four themes which were shock and disorientation, reorientation and reconnecting with the outside of the world, horror and getting out; as the treatments progressed, they started to mention recovery and resilience.

On the other hand, Morina, Rushiti, Salihu and Ford (2010) found no change in PTSD symptoms in their study conducted with 81 civilian war survivors of the war in Kosovo. They also discovered that CBT treatment has a limited effect on their sense of overall well-being and significantly improved symptoms of depression and symptoms of general distress as well as their quality of life. In this study, war survivors received a CBT treatment almost nine years after the war. During the therapy, prolonged exposure and cognitive techniques were used to treat post-traumatic symptoms. Psychoeducation, imaginal and in vivo exposure to reduce avoidance of memories of the traumatic experiences and associated distress, and reappraisal of trauma related cognitions were included in the therapy. In clients with depressive symptoms or other relevant symptoms, additional CBT techniques such as behavioral activation, reappraisal of depressive cognitions techniques were used (Morina et. al., 2010). As mentioned above, the results of the overall therapy had no to limited and significant effects in post-traumatic symptoms. Cook, Schnurr, and Foa state that CBT techniques are not sufficient in meeting the needs of more severely distressed war survivors and that additional approaches may be needed for war survivors with more severe long-term symptoms (as cited in Morina et al., 2010). However, the study shows that CBT techniques are able to enhance the quality of life for individuals with less severe symptoms in terms of war related PTSD (Morina et al., 2010). Usefulness of CBT for war survivors suffering from PTSD is a slightly controversial topic in the literature. Some researchers propose to consider the quality of life as a separate goal and an outcome for civilian war survivors (Besser & Neria, 2009). On the other hand, another group of researchers argue to introduce either more intensive therapies to resolve PTSD, or alternate methods to specifically enhance social support or personal efficacy in order to improve the quality of life (as cited in Morino et al., 2010).

In conclusion, several CBT techniques such as both in vivo and imaginary exposure, psychoeducation, homework, and relaxation trainings are used to treat PTSD symptoms and it was found that they are mostly effective.

The studies which are mentioned in this review have some limitations. First of all, almost all studies have small numbers of participants, which may create a problem about generalizability. Therefore, conducting studies with much larger samples would be good in terms of representability of results. The second limitation is that in the literature, there are a lot of studies which investigated the effectiveness of CBT on children and adults separately; however, there are not enough empirical studies which compare the differences in techniques and effectiveness rates among children and adults. In further studies, it would be favorable to investigate these differences, to compare these different samples and if necessary, to create new and more effective techniques for children according to the results.

Another limitation concerns sexual assault survivors. It is a known fact that not every woman, especially in countries with conservative cultures, can share all details of their traumatic stories, and probably all of the symptoms that they have, which might create a bias in the results. Moreover, spouse-involvement may be a good idea and supportive in the US; however, it may create serious problems for women in conservative cultures. Women may not want to share their stories since they may be afraid of their partners' reactions. Thus, while adapting CBT techniques and application styles to another country or population, it is important to consider the culture that the individuals live in. Another limitation is that most of trauma literature about political violence belong to Western countries such as Canada and the US (Dossa & Hatem, 2012; Sloan, Unger & Beck, 2016; Garcia, Kelley, Rentz & Lee, 2011; Rauch et al., 2009). However, it is also known that political violence is more common in Eastern countries, especially in the Middle East. That means, countries, in which political violence are more common, do not have many researches about PTSD, and therapy methods to treat PTSD. This is probably because these countries do not have sufficient sources to conduct research; and it may create a gap between the trauma literature and its reflections on reality. If suitable techniques for specific type of traumas are investigated further in these countries, it could be a valuable contribution for the trauma literature.

By looking at these studies and their results, several implications can be suggested. First of all, to be able to reach individuals who need help but do not seek help due to the fear of being exposed, psychotherapists should provide a setting in which individuals can be anonymous. Providing therapy via internet and conducting therapy sessions in an intermediary association which individuals can trust may be alternatives to provide anonymity. Since some individuals who have been traumatized cannot afford the costs of therapies or cannot see a psychotherapist because they have to work whole day, more feasible CBT methods should be created. Therapy by walking around can be an option for feasibility since it is a recent and untraditional way of conveying therapy. In this technique, small groups of mental health workers go out of the therapy room and directly go into work fields to see potentially traumatized individuals. They can either give psychoeducation or teach brief techniques (Orman, et al., 2002). Informative brochures and qualified mobile applications giving psychoeducation can also be used. Finally, the techniques whose effectiveness are highly supported by empirical studies should be delivered to a larger population diagnosed with PTSD. In order to do this, CBT based group therapies may be used.

Moreover, some CBT based therapeutic programs may be prepared to be applied in schools, work places, or neighborhoods. Online sources may again be a good idea to convey CBT techniques to individuals who need it. As mentioned above, more feasible and anonymous settings can be designed or created. Adapting to technology, following e-health trends and improving or slightly leaving the most traditional ways of CBT can be useful in this era.

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# Neuronal Mechanisms Underlying Dissociative Identity Disorder, and Memory Dissociation between Alternate Personality States

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**Dissociative identity disorder is one of the severe and interesting psychiatric abnormalities. DID patients possess at least two dissociative identity states categorized as *neutral identity state* and *trauma-related identity state*. These alternate identity states have different mental mechanisms including self-awareness, memory, cognition and perception. Accessibility of autobiographical memories is also different during alternate identity states. Additionally, it was revealed that different identity states express various physiological patterns, such as activation of different brain regions. The main cause of DID is still open to debate, but many believe that it results from as a severe childhood experience such as trauma or child abuse. There are continuing researches on this topic to figure out how these different identity states and mental mechanisms can be accommodated in a single body. This article will focus on the neuronal mechanism of patients suffering from dissociative identity disorder, and the memory dissociation among alternate personality states. In the article, different identity states of DID patients (neutral and traumatic identity states), their brain imaging and emotion regulation patterns will be explained. Further, implicit and explicit memory states, and state-dependent memory of DID patients will be explored. Finally, the relationship between the neural mechanism and memory impairments of DID patients will be discussed.**

***Keywords:*** Neutral identity state, trauma-related identity state, dissociation, interpersonality amnesia

Dissociative identity disorder (DID), formerly known as multiple personality disorder, is one of the most chronic and severe psychopathologies (Eich, Macaulay, Loewenstein & Dihle, 1997; Huntijens, 2003). According to Diagnostic and Statistical Manual of Mental Disorders (4th ed.), the characteristic property of the dissociative identity disorder is that a patient possesses two or more distinct and complex identities or personality states having specific body images, state-dependent memories, cognition and perception modes (Huntijens, 2003.; Putnam, 1988). Transitions between these states are discontinuous and abrupt in contrast to normal conscious state transitions (Putnam, 1988). Patient's behavior is controlled by the dominant state, and interpersonality amnesia or state-dependent memories occur due to alternate personality states (Nissen, Willingham, Mackenzie & Schacter, 1988). It was recorded in more than half of the cases that these personalities could have the opposite gender of the patient, and they could be at different ages (Nissen et al., 1988). In addition, 98% of the cases claim that they have no direct awareness of the existence of other personalities, and they do not remember consciously the experiences of their other personalities (Nissen et al., 1988).

Dissociative identity disorder is considered a *state-change disorder*, meaning that there is a disorganization during transition (switch) from one state to another (Putnam, 1988). Putnam defines state as the basic unit of organization of consciousness and exists from birth (1988). Transition between states is unstable and abrupt during infancy, but it becomes more self-regulated and smoother with development and maturation of motor organization (Putnam, 1988). In normal individuals, there are overlaps among states, and their interpretation of events does not change sharply (Nissen et al., 1988). In contrast, alternate states seen in dissociative identity disorder differ from each other by many aspects including memory, consciousness, identity and behavior (Nissen et al., 1988).

Dissociative identity disorder is claimed to be the result of self-protecting processes during childhood abuse, and severe trauma occurred during childhood (Putnam, Guroff, Silberman, Barban & Post, 1986). Most of the patients reported that they had experienced sexual, physical or psychological abuse during their childhood (Huntijens, 2003). According to Putnam (1988), at least two mechanisms might contribute to personality dissociation. In one of the mechanisms, trauma occurs in early development or before puberty, so it may interrupt the normal development of state transitions, and may cause abrupt state transition which is generally seen in small children (Putnam, 1988). The second process is that the dissociation of consciousness, memory and behavior into discrete states protects the child from the impacts of traumatized memories (Putnam, 1988). As this process is repeated over time, these dissociative states construct alter personalities having specific behaviors and a complex sense of self (Putnam, 1988). The extent of identity fragmentation and memory compartmentalization is related to the intensity and severity of trauma in terms of the child's age, and the amount of support given to the child (Huntijens, 2003).

Theory of Structural Dissociation of the Personality explains the term *dissociation* as a personality fragmentation in which each identity has its own perspective, a view of who they are, and its relation with the world (Nijenhuis & Van der Hart, 2011). According to this theory, DID patients have at least two dissociative identity states classified as the neutral identity state (NIS) and the trauma-related identity state (TIS) (Reinders, Willemsen, Vos, Boer & Nijenhuis, 2012). NIS and TIS can also be described as "apparently normal parts of the personality" and "emotional parts of the personality", respectively (Reinders et al., 2012, p.2). During the neutral identity state, DID patients are not able to access traumatic memories, so that they can hide their pathology, and adapt to daily life (Reinders et al., 2006). It can be considered that NIS is a kind of protective mechanism against painful memories because patients in NIS regard themselves as not having experienced the traumatic event (Reinders et al., 2006). In contrast, during the trauma-related identity state, DID patients can have access to autobiographical traumatic memories as personal experiences, and display emotional response and defensive actions when their memories are reactivated (Reinders et al., 2006). As a support for this theory, a study of Reinders et al. (2003) demonstrated the possibility of the human brain to contain at least two dissociated personalities which have distinct autobiography, consciousness and self-awareness. In the study, subjects listened to two autobiographical memory scripts including neutral and trauma related experience, and changes of rCBF (regional cerebral blood flow) patterns during NIS and TIS monitored by positron emission tomography (Reinders et al., 2003, p.2). As a result of the study, they observed different rCBF patterns in medial prefrontal cortex and posterior associative cortex. It is known that medial prefrontal cortex and posterior associative cortex are highly related with conscious experience and self-concept; therefore, different activations of these areas during different identity states supported the existence of different autobiographical selves produced in one brain (Gusnard, Akbudak, Shulman & Raichle, 2001; Reinders et al., 2003). In addition, deactivation of the medial prefrontal cortex was observed during NIS after switching from TIS (Reinders et al., 2003). This second result is consistent with the first finding and shows that during NIS, patients are not able to access their autobiographical memory which includes traumatic events, and it has a different autobiographical sense compared to TIS (Craik et al., 1999; Wheeler, Stuss & Tulving, 1997).

In another study, Reinders et al. (2014) aimed to reveal the neurobiological basis of the dissociative identity disorder, and they monitored the brain areas activated in dissociative identity disorder patients by using PET. In the study, Reinders et al. (2014) compared the neural activity of DID patients during neutral identity state and trauma-related identity state, and the healthy control group which simulated dissociative identity states while they were listening to neutral and trauma-related texts. They showed that when participants in the neutral identity state were exposed to trauma-related text, their brain regions including prefrontal cortex, bilateral cingulate gyrus, posterior association areas and parahippocampal gyri were highly activated (Reinders et al., 2014; Schlumpf et al., 2013). Hyper-activation of these areas leads to suppression of sympathetic nervous system together with subcortical systems controlling fear, nociception and anguish (Nijenhuis & Boer, 2009). When participants in the trauma-related identity state listened trauma-related text, hyper-activation in subcortical and limbic regions including left amygdala, left insula and bilateral caudate was observed (Reinders et al., 2014). Activation of these regions causes stimulation of sympathetic nervous system and under modulation of emotions (Lanius et al., 2010). These findings revealed that DID patients show opposite rCBF patterns during NIS and TIS conditions (Reinders et al., 2014).

The neural mechanism of the dissociative identity disorder can affect cognitive mechanisms including the memory process of patients as well. One important aspect of dissociative identity disorder is that patients are diagnosed with significant memory impairments (Eich et al., 1997). Dissociative patients show memory dysfunction such as fluctuation in basic skills, and recall of knowledge (Putnam, 1997). It was reported in almost all DID patients that they experienced blank periods when the other identities took control of their behavior, and these periods could last from seconds to even years (Huntijens, 2003). Some DID patients reported that when they returned back from the blank state, they found themselves in different locations (Huntijens, 2003; Nissen et al., 1988). Similarly, they claim that strangers know them, and they are called by different names (Huntijens, 2003, p.12). The interpersonality amnesia seen in DID patients can be either “two-way”, in which both identities have amnesia for each other’s memory or “one way”, in which one identity does not have amnesia for other’s memory (Huntijens, 2003). The dissociation of memory seen in DID patients is different from repression, in which traumatic and distressing memories are excluded from conscious and repressed into unconscious where they are not directly available for consciousness (Huntijens, 2003). Another difference is that in the dissociative mind, memories of the past are not lost, but different aspects of these memories are remembered by different identities (Huntijens, 2003; Mollon, 2002).

In the neural aspect of the disorder, the activation of different brain regions during NIS and TIS conditions result in different emotion modulation abilities and memory processes. For instance, it was stated that activation of the posterior association areas and parahippocampal gyri during the NIS condition inhibits access to unwanted memories, because these areas act in the suppression of trauma-related information and autobiographical memories (Anderson et al., 2004; Reinders et al., 2003). Furthermore, it was suggested that the activation of dorsal striatum during TIS condition is responsible for maintaining stability of the dissociative state, and regulating memory access (Reinders et al., 2006, 2012). In addition, Vermetten et al. (2006) used the MRI method to compare the volume of the limbic system in the brains of DID patients and healthy subjects. It was demonstrated that the limbic system including hippocampus and amygdala of DID patients is smaller than those of the healthy subjects (Vermetten et al., 2006). Previous studies stated that stress leads to change in the volume of the hippocampus. Glucocorticoids released under stressful events directly target hippocampus, and cause atrophy of hippocampus (Vermetten et al., 2006). Therefore, this study can also provide consistent explanation for the formation of dissociative identity disorder: DID patients who were exposed to stressful experiences such as child abuse during their childhood can have a relatively smaller limbic system compared to healthy individuals (Vermetten et al., 2006).

In 1988, Nissen et al. conducted a study with a DID patient who had 22 alternate personalities. They used explicit and implicit memory assessment tests to understand the accessibility of knowledge and memory between multiple identities. For example, explicit tasks, such as free recall, need conscious recollection of past experiences (Eich et al., 1997). Implicit tasks were used to measure priming of past experience without conscious recalling (Nissen et al., 1988). These tasks were implicit fragment-completion tasks in which half of a word can only be completed in one possible way (e.g., jui can be completed only to juice), and implicit word-stem task in which half of a word can be completed by multiple completions (i.e, mot can be completed to motive or motel) (Huntijens, 2003; Nissen et al., 1988). Word-stem completion test is more related to the free association tasks, and it aims to detect the effect of identity-specific selection of words during retrieval because each alternate state may give different responses (Huntijens, 2003; Nissen et al., 1988). At the end of the study, it was found that one identity couldn't explicitly recall the events performed by other identity, which is an evidence for interpersonality amnesia (Nissen et al., 1988). Consequently, they concluded that implicit memory assessment (priming) is a necessary condition for demonstrating interpersonality memory transfer or transfer of information between identities (Nissen et al., 1988).

Priming between alternate states was shown by some implicit tasks including the fragment completion task (Nissen et al., 1988). However, it is not a sufficient condition because interpersonal priming can occur in some implicit tasks such as fragment completion task, but cannot occur in other tasks such as word-stem completion (Eich et al., 1997, Nissen et al., 1988). The reason for this situation was that the compartmentalization of knowledge among different identities differs by the uniqueness of the material to personality, and how extent the retrieval of material is personality-specific (Eich et al., 1997, Nissen et al., 1988). Some materials which are encoded strategically and can be interpreted differently based on one's mood or beliefs are not accessible for other personalities (Nissen et al., 1988). In 1997, Eich et al. repeated the study by using multiple subjects of 9 DID patients. Their study supports the idea that the amount of leakage between different personality states depends on the susceptibility of the encoding process to personality-specific factors.

In conclusion, dissociative identity disorder is considered as one of the most severe and complex psychological phenomena in which patients possess multiple distinct identities having dissociated consciousness, memories and behaviors. The common reason for this disorder can be reported as an unconscious attempt to build a self-protection mechanism against childhood abuse and severe trauma in early ages resulting in an identity split in individuals. When the brain activation of these patients was examined during both NIS and TIS conditions, it was observed that different areas such as parahippocampal gyri related with memory and limbic system related with emotion regulation are activated (Anderson et al., 2004; Reinders et al., 2003). In addition, activation of different brain regions during NIS results in different memory processes, such as damping traumatic memories and regulating memory access. Patients suffering from dissociative identity disorder experience impairment in explicit recall of their other identities which is an indicator of interpersonality amnesia. The study conducted by Nissen et al. (1988) showed that an implicit assessment of memory is necessary but not sufficient for interpersonality aspects. Moreover, it was revealed that the accessibility of memory and information across identities is dependent on the nature of the material, and to what extent the material is susceptible to personality-specific factors.

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