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EDITOR'S NOTE

One year ago when I came back from my exchange, I remember myself being on the train and talking to my friend *Can* telling him that I really wanted to establish a psychology journal. After a couple of weeks I recall encountering *Betül* on the hallway and telling her that I was going to a journal meeting and her spontaneous eagerness to attend the meeting –this was the first step of our attempt and we thought of creating a student journal instead of an academic one. After this meeting I remember myself e-mailing *Kağan* and *Erim* about their writings for the non-academic journal. Both of them wrote pages about everyday psychology topics. Yet in another meeting I recall asking the attenders about creating an academic journal, and I vividly remember *Orhun*'s enthusiasm and how he raised his hand eagerly.

Now, a year has passed and here we are with our fifth issue! Over time our journal team has expanded capturing more readers and authors. We published articles from institutions other than Koç University (*Yeditepe University, Middle East Technical University, University of Durham, Kadir Has University, Pomona College*), and once again in our fifth issue we happily present an article from *Boğaziçi University*. As it was the case in our previous issues, in this one we are again able to print only a small portion of the articles we have received, however as the KUUPJ team we are thankful to all the authors who submitted their research to our journal and we hope to include these valuable articles in our later issues.

First of all I would like to thank all the authors who shared their work with us, as their research is the foundation of this journal. It has been a pleasure to work with all the participants, exchange ideas, and enhance their papers with a mutual cooperation. I would also like to thank to the Koç University Psychology Department with its entire faculty who supported our journal and this issue throughout the process.

This is my last issue as Editor's in Chief (although I will continue as a graduate editor) therefore it is a very special one for me. I really want to present my gratitude to this wonderful team. Without you, your efforts, and your patience there would have been no KUUPJ. I am really thankful for the volunteer time you dedicated to this project, but more importantly I am so pleased to work with a team which is able to think critically, is open-minded and is willing to share and boost ideas. I really believe that this is one of the most important investments we can do to ourselves and to our world. I am so proud of all of us for creating this journal!

Lastly, I want to thank our brilliant advisors Dr. Fuat Balcı and Dr. Tilbe Göksun who inspired us to create this journal, who believed in us, let us explore ourselves and supported us throughout the process.

I wish our graduate editors a great future, hopefully whilst reading more KUUPJ issues. As to our new editors I am pleased to have you in the team and wish you to have a great experience as we did, and I truly believe that you will create valuable issues and increase the potential of KUUPJ!

Finally, I wish you readers to enjoy this issue, and as the journal team we wish you to be inspired and share your research with us.

Editor-in-chief
Eylül Turan

The Effects of the Colors on Task Performance and Awareness of People

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The effects of colors on perception, cognition, and performance of individuals in various tasks/domains have been widely examined by many researchers. Elliot and Maier (2014) emphasized that these effects are mostly dependent on contexts in which colors are perceived. Context dependence effect on individual performance was studied by Kwallek et al. (1997), especially in achievement contexts like work environment and found that especially the color red has an inhibiting effect on the performance. Also, many other studies found that the color red is related to the feelings of excitement, anxiety, and alertness in achievement contexts (Aaronson, 1970; Elliot et al., 2007; Murray & Deabler, 1957; Wexner, 1954). In this study, we sought to find an inhibitory effect of the color red on task performance by using colored anagrams (green, red and black). Three groups of participants (N = 93; M_{age} = 23.21) received anagrams in different colors (between-subjects design) and follow-up questions to measure their task performance awareness. We expected (1) to see whether the performance of the participants in the red condition will be lower than the green and black condition, and (2) to observe the awareness of the participants about the color having an inhibitory effect on their performance in the given task. However, the results did not support either of the hypotheses; we could not replicate findings from previous literature and our hypothesis for the performance awareness difference was not supported. Possible limitations and further study suggestions were discussed.
Keywords: anagram, task-performance, context dependence effect, achievement context, inhibiting effect of red color

Colors are prominent parts of daily life affecting mood, emotions, perception, and behaviors of human beings (Jalil, Yunus, & Said, 2012). The interaction between colors and humans can be encountered in many areas including work environment, communication, affect formation and behavioral contexts. In this sense, colors seem to influence people's physical, social and psychological conditions, and these influences have been widely studied in psychology. Especially in the last few decades, examining the effects of colors on people's cognition, perception and affect has become a prominent issue (Kaspar, Grümmer, Kießler, Neuß, & Scröter, 2015).

On the other hand, the contexts in which colors are perceived are also significant in terms of their effects. Since people process information according to concepts, their feelings, or past experiences, they attach meanings to colors in relation to their emotions, cognition, or the context in which they perceive those colors. Based on this, Elliot and Maier (2012) suggested that the effects of colors are context-dependent. They proposed that both meanings and effects of the colors, according to the color-in-context theory, are biologically based and related to their learned sources. Hence, this theory relies on two explanations; the evolutionary tendency to react to certain colors such as competitive acts in reaction to red stimuli (Hill & Barton, 2005), and the associative link system evoked by certain colors which is formed by repetitive presentation of a color in some context (e.g. mistakes marked with a red pen in educational settings) (Elliot, Maier, Moller, Freidman & Meinhardt, 2007) explaining the biological and learning accounts of the theory respectively.

Among the color psychology literature, researchers have tried to examine the context dependence effect of colors on individual performance, especially in achievement contexts

like work environment (Kwallek, Woodson, Lewis & Sales, 1997). Achievement contexts are defined as the contexts which require people to have the competence to fulfill the given tasks and include an evaluation based on the performance of people in those tasks (Elliot & Maier, 2007). Although there is not a set of results showing the direct effects of colors on mood or performance, (rather context-dependent) researchers interested in color psychology investigate contrasting and complementary colors such as warm (e.g. red, orange), and cool (e.g. blue, green) colors (Kwallek, Woodson, Lewis, &Sales,1997), and among many studies red was found to be somehow related to excitement, anxiety, and alert feelings in achievement contexts, whereas blue was found to be related to feelings of safety, relaxation, or less stress (Aaronson, 1970; Elliot et al., 2007; Murray & Deabler, 1957; Wexner,1954). These differences in the effects they create, however, affects people's performance in daily tasks (Helvacıoğlu & Olguntürk, 2011).

Incompatible effects of those two groups of colors might be explained by Yerkes–Dodson law partially considering the level of arousal that they cause (Kwallek, Woodson, Lewis, & Sales, 1997). However, as a recent view, the opposing effects of these colors are explained by the motivational tendency for approach or avoidance behaviors. According to this view, approach behavior is motivated by a positive event or a desirable possibility of the positive event, while avoidance behavior, is motivated by a negative event or an undesirable possibility the negative event (Elliot, 1999). The fact that facing a negative incident may indicate a possibility of failure activates the motivational system for withdrawal from that stimulus and lead to avoidance (Cacioppo, Gardner, & Berntson, 1999). Therefore, the color red leads motivational behavior that impairs performance and using the color red in an achievement context negatively affects the performance due to an increased motivation for avoiding failure (Elliot, Maier, Moller, Freidman & Meinhardt, 2007).

In light of these studies presented above, the focus of this study was to investigate whether there is an inhibiting effect of the color on people's performance on an achievement-related task, and we were also curious whether people had awareness (i.e. knowledge or perception of a situation or a fact) about the colors' effects on their performance, especially the inhibitory effect of the color red. In the literature, to our knowledge, there are no fulfilling studies about the awareness of the effects of these colors on the performance of people in achievement contexts. Therefore, in this research, we wanted to examine the awareness that people had about their performances, and to create an achievement context, as well as to replicate the previous findings in a feasible manner, we used anagram puzzles. Anagram puzzles were previously used in various studies as a cognitive performance measure (e.g. Miura, & Itoh, 2016; Kezilas, Kohnen, McKague, Robidoux, & Castles, 2016).

In the present study, anagram solution paradigm was used with the color manipulations. The main aim of this study was to examine whether the types of colors would have an impact on people's cognitive performance and their awareness of that influence if present. We hypothesized that (1) the cognitive performance of the participants in the red condition will be lower than the green and black condition, and (2) the awareness of the participants about whether the color red had an inhibitory effect on their performance will be lower in the given task.

Method

Participants

Convenience sampling method was used in the data collection process. 93 participants (M_{age} = 23.21, SD_{age} = 6.14; 59 women, 34 men; 35 Psychology students, 50 from other departments, 8 non-students) from Ankara and Antalya provinces volunteered to participate in the experiment without any compensation. All participants were native Turkish speakers.

Materials

30 Turkish Multiple-Solution anagram puzzles, ranging from 3 to 6 letters, were used in the study to measure participant's cognitive performance. Puzzles were consisting of the same Turkish words that were used by Gülgöz (2001). 3 versions of the anagram puzzles were used in the

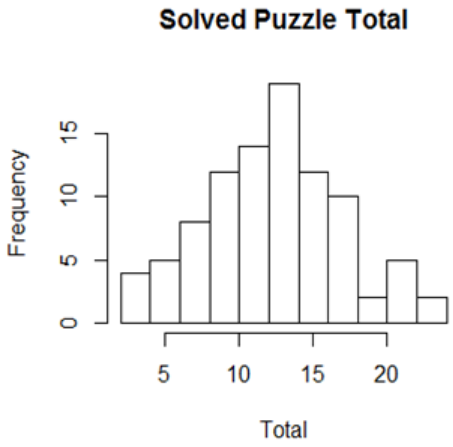
study, differing in the colors of the letters. The colors of the letters were standard black, red (Red = 255, Green = 0, Blue = 0), and green (Red = 0, Green = 176, Blue = 80) from Microsoft Word, with Times New Roman font and the font size of 12. The order of the anagram puzzles was the same in each condition to minimize sequence effects that may possibly originate from the variance in the difficulties of puzzles. Additionally, to assess participants' awareness of their performance depending on the color of the letters, follow-up questions were developed specifically to be used in this study. Questions measuring the performance-related awareness of the participants were consisting of items both manifest and latent in their nature, such as 'Did the color of the letter affect your performance? If so, how much?' and 'Can you guess the percentage of the anagrams from the list you were able complete?'. Demographics form (asking about the participants' age, gender, and department) were added to the end of the follow-up questions. All of the materials used were hard-copy A4 prints. Example anagram puzzles and follow-up questions were provided in the Appendix Form.

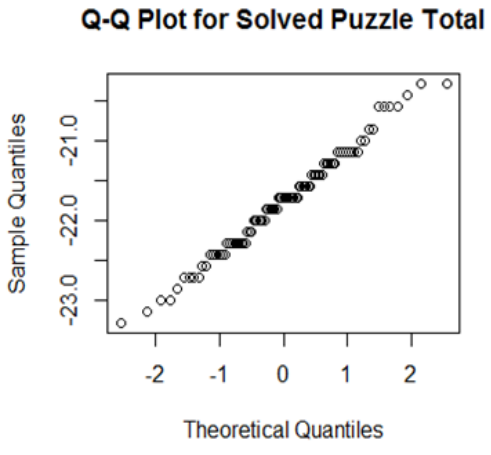
Procedure

5 researchers collected data for the present study. Each participant was assigned to only one condition. The order of the assignment of the conditions (Anagram puzzles with black, red, or green letters) to the participants for each researcher was counter-balanced. Written informed consents were collected from all participants prior to the study and researchers verbally instructed each participant about the upcoming procedure. Participants were given 60 seconds to solve and write down their answers to the anagram puzzles. The total number of successfully solved puzzles were recorded to be analyzed as for their cognitive performance. After completing the first session, participants were given the follow-up questions and demographics form. Debriefing form was provided at the end of the experimentation. Each participant was given an ID and recorded anonymously. Data collected by each researcher was combined in a Microsoft Excel data sheet and was analyzed in R statistical computing software.

Results

10 participants were dropped out of the data before analyses; 7 due to the detection of their misunderstanding while completing follow-up questions, 2 due to the participants failing to provide answers for the main dependent variables (missing values for influence indications and performance guess), 1 due to detection of one researcher's inaccurate coding on the data sheet. After purging for the possible mistakes in the data, there were 29 participants in the Black Anagram condition, 31 in the Red, 33 in the Green Anagram conditions. In the next part of this section, the assumption of normality, specifically for the dependent variables is checked.





The total number of correctly solved anagram puzzles as the study's main dependent variable did not violate any assumptions of normality. Furthermore, the variable for the subjective estimation of the performance of the participants ("Guess") was significantly correlated with their total number of correct answers, $r(91) = .78$, $p < .001$.

After finding no violation of the normality assumptions, further investigation for other multivariate relations was included in the hypotheses testing procedure. 75% of the participants (25 out of 33) in the Green Anagram condition reported that the color of the letter did not affect their performance while solving puzzles; 65% of the participants (20 out of 31) in the Red Anagram condition reported that the color of the letter did not affect their performance while solving puzzles. Consistent with the percentages, a chi-square test of independence showed that the relation between color condition and participants' indication of performance effect (Yes/No) was significantly different $X^2(2, N = 93) = 9.33$, $p < .01$, indicating that in each condition, participants' frequency of rejecting any effect was higher than accepting an effect due to colors.

There was no significant correlation between the total number of solved puzzles and participants' quantitative indication of color effect, $r(93) = .005$, $p = .96$. Participants' report on the quantitative influence of the letter's colors on their performance was presented in Table 2 (negative scores indicating negative influence).

Table 2
Means & Standard Deviations for the Quantitative Influence of Colored Conditions

	Mean	SD.	Min.	Max.
Total Influence	-.04	.81	-3.00	+3.00
Black (Control)	-.07*	.37	-2.00*	0.00
Red Influence	-.16	1.00	-3.00	+2.00
Green Influence	.09	.88	-2.00	+3.00

*One of the participants in the control condition indicated that lines for the solutions were too far and small, no other participant indicated any influence in the black condition

A between-subjects design one-way analysis of variance showed that there was no significant difference between the color conditions for the total number of correctly solved anagram puzzles, $F(2,90) = 1.18$, $p > .05$. The effect of the letters' color was not present for the total scores on the anagram solutions. Summary for the analysis results is presented in Table 3.

Table 3
ANOVA results of total scores between color conditions

	Sum of Squares	df	Mean Squares	F	Sig.
Between Groups	49.24	2	24.622	1.176	0.313
Within Groups	1883.42	90	20.927		
Total	1932,66	92			

In addition, results of the contrasts analyses showed that there was no significant difference between the total scores between the red anagram condition and the black anagram condition, $F(1,90) = 2.26$, $p = .13$.

Another between-subjects design one-way analysis of variance showed that there was no significant difference between the color conditions for the percentage of performance guess, $F(2,90) = 2.34$, $p < .05$. The effect of letters' color was not present for participants guesses about their performance in each condition. Summary for the analysis results is presented in Table 4.

Table 4
ANOVA results of total scores between color conditions

	Sum of Squares	df	Mean Squares	F	Sig.
Between Groups	1769	2	884.5	2.342	0.102
Within Groups	33996	90	377.7		
Total	35765	92			

In addition, results of the contrasts analyses showed that there was no significant difference between the performance guess of the participants between the red anagram condition and black anagram condition, $F(1,90) = 2.34$, $p = .10$.

Discussion

In this study, we have sought to examine whether different colors have varying impacts on people's cognitive performance in an achievement

context by using anagram puzzles. Additionally, we were curious about whether people would be aware of the impacts of those colors, if there were, on their cognitive performance, especially the inhibitory effect of the color red. For this purpose, we constructed two hypotheses: we expected that (1) participants assigned to the red color condition would perform worse than those assigned to black and green color conditions and that (2) the awareness in terms of performance inhibition of the participants in the color red condition would be lower than those in the other conditions since it is suggested that the inhibitory effect of the color red is implicit (Rutchick, Slepian & Ferris, 2010). However, neither of the hypotheses were supported by the results of the analyses. There was not a significant difference among conditions of all three colors on the total amount of solved anagram puzzles, meaning that the task performance of the participants was not affected by the colors of anagram puzzles. Moreover, there was no effect of color on participants' performance awareness, which was measured by analyzing the participants' guesses on the percentage of the number of anagrams that they solved over the total amount of anagrams in the given list. That is, participants in each almost had some degree of awareness regarding their performance which was mostly accurate.

The effect of color in different contexts has been studied in the literature of color psychology. However, since there is no consensus on this issue heretofore, findings of this study is important. For instance, due to the association between red and making mistakes in an achievement context, it was thought that red would provoke avoidance and that it would decrease the cognitive performance (Elliot & Maier, 2007), yet, as in the case of the current study, the influence of color on cognitive performance was not clearly found. In one study by Olsen (2010) in which one of the hypotheses was to find the avoidance impact of color red and the enhancing effect of color blue in different cognitive tasks (i.e. conscious vs. unconscious; detail-oriented tasks vs. creative tasks), and failed to provide statistically significant results of the impact of red and blue on the cognitive performance across various tasks. Another study conducted by Caschera (2015) used easy and difficult anagrams to see the impact of red and green on the cognitive performance and found that those in the easy condition performed better than the ones in the hard condition, but there was no significant effect of the color on participants' performance. Our results also support this side of the front since we failed to demonstrate the inhibitory effect of the color red on people's cognitive performance in achievement context.

Some studies suggest that the effects of the color red are sensitive to the characteristics of the given cognitive task. The color red can facilitate performance on easy (Mehta & Zhu, 2009), basic, and, detail-oriented cognitive tasks requiring a little amount of mental flexibility and manipulation; hence, in such tasks avoidance motivation can create an opposite effect and facilitate performance (Friedman & Förster, 2010). Therefore, it is hard to suggest that the inhibitory effect of the color red on cognitive tasks can be easily generalized to all cognitive tasks and we might have failed to choose an effective cognitive task.

Limitations

For colors to influence cognitive performance in given tasks, Elliot and Maier (2007) proposed some assumptions, one of which states that the color in the task must have a particular meaning which should be different from purely aesthetic senses, and must be applied to everyone under the exposure of the stimuli. In our study, one limitation could be our failure to clearly transfer this specific meaning (red color and failure association) we attached to the color red. On the other hand, since the words were written in relatively small and thin fonts, the effect we hypothesized to observe might have been failed to take place.

Another point from these assumptions is that for the color red to evoke avoidance, the achievement motivation context must be implied. In our study, we might have failed to come up with an accurate procedure that provokes sufficient levels of achievement motivation to the participants.

Further Studies

To see the influence of colors in a clearer way, different manipulations on the background of the text, rather than on the font, might be designed for the further studies (see Elliot & Maier, 2014;

Brooker & Franklin, 2015). In other words, further studies may use words projected on a differently colored background so that the possibility of participants not recognizing the color would be diminished. Since Elliot and Maier (2014) argue that some characteristics, such as the reactivity of individuals to the cues, mostly lead to the demonstration of the effects of the color red, using a within-subjects design would be more appropriate to obtain the actual effects of the colors on participants' cognitive performance in an achievement context by eliminating the individual differences.

On the other hand, for some participants adapting to the procedure in 60 seconds (fixed time for the given task) and using this time efficiently for just solving anagram puzzles was problematic, therefore, providing some practice sessions would be beneficial to obtain more precise results of their performances. Finally, stronger manipulations, maybe including deception like indicating that their results would be evaluated, should be considered for creating an achievement context in the further studies.

Inhibitory effect of the color red in achievement context has been examined by many of the researchers and there are incompatible evidences both supporting (see Elliot et al., 2007; Elliot, Maier, Binser, Friedman, & Pekrun, 2009) and not supporting (see Olsen, 2010; Caschera, 2015) this argument. Since the possible implications of this effect are important especially in educational settings (e.g. using the color red might affect students' performance in negative ways), further studies should examine the inhibitory effect the color red in achievement context. It is noteworthy that the discussed limitations here are critical to clarify this issue. The current study is important since it brings up this issue to the agenda.

References

Aaronson, B. S. (1970). Some affective stereotypes of color. *International Journal of Symbology, 2*, 15-27.

Brooker, A., & Franklin, A. (2015). The effect of colour on childrens cognitive performance. *British Journal of Educational Psychology, 86*(2), 241-255. doi:10.1111/bjep.12101

Cacioppo, J. T., Gardner, W. L., & Berntson, G. G. (1999). The affect system has parallel and integrative processing components: Form follows function. *Journal of personality and Social Psychology, 76*(5), 839.

Caschera, D. (2015). *The impact of colour perception on cognitive task performance* (Master's thesis). Retrieved from The Huron University College Journal of Learning and Motivation.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational psychologist, 34*(3), 169-189.

Elliot, A. J., & Maier, M. A. (2007). Color and psychological functioning. *Current directions in psychological science, 16*(5), 250-254.

Elliot, A. J., & Maier, M. A. (2012). Color-in-context theory. *In Advances in experimental social psychology, 45*, 61-125.

Elliot, A. J., & Maier, M. A. (2014). Color Psychology: Effects of Perceiving Color on Psychological Functioning in Humans. *Annual Review of Psychology, 65*, 95-120 doi:10.1146/annurev-psych-010213-115035-120.

Elliot, A. J., Maier, M. A., Binser, M. J., Friedman, R., & Pekrun, R. (2009). The effect of red on avoidance behavior in achievement contexts. *Personality and Social Psychology Bulletin, 35*, 365–375.

Elliot, A. J., Maier, M. A., Moller, A., Friedman, R. & Meinhardt, J. (2007). Color and psychological functioning: The effect of red on performance attainment. *Journal of Experimental Psychology: General, 136,*154-168. doi: 10.1037/0096-3445.136.1.154

Friedman, R. S., & Förster, J. (2010). Implicit affective cues and attentional tuning: an integrative review. *Psychological Bulletin, 136*(5), 875.

Gülgöz, S. (2001). Need for cognition and cognitive performance from a cross-cultural perspective: Examples of academic success and solving anagrams. *The Journal of Psychology, 135*, 100-112. doi: https://doi.org/10.1080/00223980109603683

Helvacıoğlu, E., & Olguntürk, N. (2011). Color contribution to children's wayfinding in school environments. *Journal of Optics & Laser Technology, 43*, 410-419. doi: 10.1016/j.optlastec.2009.06.012.

Hill, R. A., & Barton, R. A. (2005). Psychology: red enhances human performance in contests. *Nature, 435*(7040), 293.

Jalil, N. A., Yunus, R. M., & Said, N. S. (2012). Environmental color impact upon human behaviour: A review. *Procedia-Social and Behavioral Sciences, 35*, 54-62. doi.org/10.1016/j.sbspro.2012.02.062

Kaspar, K., Grümmer, M., Kießler, A., Neuß, C., & Schröter, F. (2015). The effects of color and valence on news evaluation. *International Journal of Psychology, 52*, 491-498. doi: 10.1002/ijop.12234

Kezilas, Y., Kohnen, S., McKague, M., Robidoux, S., & Castles, A. (2016). Word and pseudoword superiority effects on letter position processing in developing and skilled readers. *Journal of Experimental Psychology, 42*, 1989-2002. doi: http://dx.doi.org/10.1037/xhp0000273

Kwallek, N., Woodson, H., Lewis, C. M., & Sales, C. (1997). Impact of three interior color schemes on worker mood and performance relative to individual environmental sensitivity. *Color Research & Application, 22*(2), 121-132.

Mehta, R., & Zhu, R. J. (2009). Blue or red? Exploring the effect of color on cognitive task performances. *Science, 323*(5918), 1226-1229.

Miura, H., & Itoh, Y. (2016). The effect of the feeling of resolution and recognition performance on the revelation effect. *Consciousness and cognition*, *45*, 100-108. doi: https://doi.org/10.1016/j.concog.2016.08.002

Murray, D. C., & Deabler, H. L. (1957). Colors and mood-tones. *Journal of applied psychology*, *41*(5), 279.

Olsen, J. (2010) *The effect of color on conscious and unconscious cognition* (Master's thesis). Retrieved from Dietrich College of Humanities and Social Sciences at Research Showcase Carnegie Melon University.

Rutchick, A. M., Slepian, M. L., & Ferris, B. D. (2010). The pen is mightier than the word: Object priming of evaluative standards. *European Journal of Social Psychology*, *40*(5), 704-708.

Wexner, L. B. (1954). The degree to which colors (hues) are associated with mood-tones. *Journal of applied psychology*, *38*(6), 432.

Socio-Cognitive Development of Fairness and Theory of Mind in Early Childhood

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This review paper addresses how sense of fairness and sharing behavior emerge in early childhood. Recent literature emphasizes a link between fair sharing behavior and developed theory of mind (ToM) abilities, thus this review paper aims to present an overview of this line of research. Considering that theory mind includes several aspects such as attributing beliefs, intentions and emotions to other people, this paper is organized in a such a way that recent studies focusing on fairness and each of these aspects of ToM are discussed under different sections and finally concluding remarks are presented with a brief proposal for future studies.

Keywords: socio-cognitive development, fairness, theory of mind

As a social species, humans generate most of their resources collaboratively and build social relationships which rely on sharing and exchanging resources (Hamann, Warneken, Greenberg, & Tomasello, 2011). Regarding the imperative role of sharing in our daily lives, various studies have been done to investigate how sharing behavior emerges in the early childhood and how it is related to sense of fairness. According to many cognitive developmentalists, making fair decisions and behaving in a fair manner are thought to be closely linked to socio-cognitive development of theory of mind and perspective taking abilities (Fehr, Bernhard, & Rockenbach, 2008). This review paper will elaborate on the role of theory of mind and perspective taking in the socio-cognitive development of fairness and a brief research proposal will be provided in the end.

From the very early ages of life, children and even infants conceptually start to build an idea of what is fair and what is unfair depending on how much each person gets in terms of distributive justice. A recent study by Ziv and Sommerville (2017) found that 15 months old infants look longer at unfair distribution outcomes compared to fair outcomes, suggesting that infants originally expect equal distribution of resources whereas witnessing an inequal distribution violate their expectations and cause longer looking time. This finding might imply that a simple understanding of distributive justice emerges as early as 15 months. Yet, acquiring a sophisticated understanding of fairness and putting this knowledge into practice is not an easy developmental stage to achieve. There is evidence showing that most of the young children, despite knowing what the fair outcome would be, act in contradiction to norms of fairness when their own resources are at stake (Blake, McAuliffe, & Warneken, 2014). For instance, it was founded that in a peer to peer sharing task, children younger than 8 years old rejected disadvantageous offers where they had less than their peer but accepted advantageous offers which put the peer into the disadvantageous condition (Blake & McAuliffe, 2011). This finding shows that preschoolers are more sensitive to disadvantageous inequity aversion but not to advantageous inequity aversion. Considering that the preschoolers prioritize self-focused fairness rather than a more comprehensive, other-focused perspective, it is seen that socio-cognitive development of fairness and sharing behavior is a complex process which is susceptible to self-serving decisions which overlook the expectations and needs of the other. Could these kinds of self-centered sharing behaviors of preschoolers might be related to their limited theory of mind abilities? Or, if there is a relationship, in which ways theory of mind can

contribute to the development of fairness and sharing behavior?

Theory of mind (ToM) is one of the most important aspects of socio-cognitive development as it relies on attributing mental states such as true and false beliefs, emotions, intentions and needs to others (Premack & Woodruff, 1978). Thus, in order to infer how the other thinks, feels and behaves, one needs to bear in mind a broad set of cues, knowledge and assumptions. In social interactions, having a developed theory of mind ability helps to comprehend other people's perspectives, therefore the individual can regulate his/her behavior accordingly (Fehr et al., 2008). Regarding the relationship between theory of mind and fairness, many researchers have come up with different suggestions which can be collected under three subtitles as followed. For instance, Takagishi, Kameshima, Schug, Koizumi, and Yamagishi (2010) hypothesize that understanding other people's false beliefs might be useful for the proposer to determine how a fair allocation should be made depending on the expectations and the possible reactions of the recipient. Secondly, reading and interpreting the recipient's intentions is also thought to be an important component of sharing behavior (Warneken & Tomasello, 2013). And last but not least, according to Paulus and Moore (2015), understanding the emotions of the recipient might be relevant for anticipating the ideal and fair sharing behavior. All these ideas shed light on the potential role of theory of mind in the development of fairness and sharing behavior. In order to evaluate the underlying mechanisms about fairness and different aspects of theory of mind, below relevant empirical article will be examined in detail.

Role of False Belief Understanding

Takagishi et al. (2010) investigate their hypothesis about the relationship between false belief understanding and fairness by letting preschoolers (M_{age}= 65.4 months) play The Ultimatum Game in pairs and then measuring their ToM skills through a false belief task. The Ultimatum Game is one of the popular tasks used in economic behavior experiments and in this version, they had an apparatus with two trays, one for the proposer and one for the recipient. The children who were randomly selected for the proposer role was asked to allocate 10 candies on the trays and then the responder had the chance to accept or reject the offer by the pulling a lever. If the responder rejected the offer, both children receiving nothing. Following the game, all children were given a video-based version of Sally-Anne task (Baron-Cohen, Leslie & Frith., 1985). In the video, there were two characters and it was shown that after one of the characters leaves the room, a random object in the room was moved to another location. After the character returns, children were asked where that character would look for that object. If the children told the new location, it was assumed they have not acquired false belief understanding because the character could not see the displacement of the object and if the children could tell the previous location it was an indicator of false belief understanding.

Takagishi et al. (2010) find that children who performed better in Sally Anne test had made fairer or even more generous offers as a proposer. This finding might entail that preschoolers who can infer mental states and beliefs of other people are better at making fair allocations. On the other hand, they find that 36% of children who failed the Sally-Anne task also proposed fair allocations, indicating that false belief understanding is definitely not a requisite for fairness but might act as a contributor.

In a more recent study, Cowell, Samek, List and Decety (2015) tackle the same question of whether false belief understanding correlates with fair sharing behavior or not by using a different economic game called as the Dictator Game. The distinct characteristic of this game is that children (M_{age}= 51.69 months) were initially given some amount of incentives (in this case 6 stickers) and they were told about an unknown child who is not able to play the game and cannot get any stickers. Children were told that they could give some of their stickers to the other child if they wanted to and children's sharing behavior was measured by the number of stickers they put for the other child. In terms of false belief, they also had a similar location change task which required children to answer where the character would look for the displaced object. Contrary to Takagishi et al. (2010), this study concludes that children who passed the false belief task shared less stickers than the children who

performed worse (Cowell et al., 2015). This finding takes us further away from determining a unidirectional relationship between false belief understanding and sharing behavior. Taking into account that these two studies were conducted with different economic games, it is also worthy to consider the role of contingency. Since the other child was not physically present and children did not know much about him/her in the dictator game, it could have reduced any chance of reciprocity in the future. Possibly this reduced chance of reciprocity could have made the children prioritize their own benefit whereas face to face setting of the Ultimatum Game could have boosted a more mutual relationship. Additionally, since a different task, independent of the economic game was used for measuring false belief understanding, it is still questionable whether it is a valid measure for children's true potential of false belief understanding. Of course, the alternative explanations may vary but the contradictory results of Takagishi et al. (2010) and Cowell et al. (2015) show us that either the rules and the setup of the sharing games trigger the contradiction. Additionally, it is possible that the relationship between false belief understanding and sharing is not a direct relationship but possibly moderated by other socio-cognitive factors which requires further research.

Role of Reading Others' Intentions

As mentioned above, expectation of reciprocity might alter how one behaves in sharing tasks (Warneken & Tomasello, 2013). Expectation of reciprocity is known to "favor mechanisms that lead individuals to conditionally help others as long as the costs of helping are outweighed by the future benefits scaled by the likelihood of future interactions" (House Henrich, Sarnecka, & Silk, 2013). According to Sebastián-Enesco and Warneken (2015), calculating the possible future benefits depends on tracking the amount of resources exchanged and discriminating between cooperators and defectors. While the first requirement is about numerical ability, the second one is related to theory of mind since determining the intentions of other people requires understanding their motives and their behavioral patterns. Hence, the question arises: Can young children interpret other people's intentions by looking at their prior sharing decisions and if they can, how would it influence their own sharing behaviors and sense of fairness?

In order to investigate whether children can differentiate between reciprocal and nonreciprocal interactions in their resource sharing or not, Sebastián-Enesco and Warneken (2015) conduct an experiment with 3 and 5-year olds. Their experimental design relies on the one to one interaction of children with a puppet, alternating the roles of the donor and the recipient in consecutive trials. The logic behind this design is to see if children can generate their allocation decisions in respect to how the puppet behaves in the previous trials, for instance, in the manipulation trials the puppet reciprocates but in the control trials it does not. Their findings indicate that 5-year-olds, but not 3-year-olds, increase their sharing as the puppet reciprocated in the previous trials (Sebastián-Enesco & Warneken, 2015). This finding leads the idea that anticipating future reciprocity requires cognitive maturity of at least 5 years of age and therefore, for children younger than 5 it can be concluded that their sharing decisions are not specifically based on possibility of future reciprocity. This finding implies that prior to 5 years of age and being able to anticipate future reciprocity, younger children are to some extent capable of understanding other people's intentions and make their sharing decisions accordingly. Also, it should be questioned whether children who understand how reciprocity works are also aware of the fact that their own sharing might influence the future behaviors of the other agent, possibly because it might be one of the reasons why they sustain a mutual relationship with a reciprocator. From this experiment, it is not possible to know whether children knew their impact on the other agent's preferences or if they only acted in response to the puppet's behaviors. Nevertheless, this line of thought is also worthwhile/worthy to investigate in future studies.

Another important point about reading other people's sharing intentions is about how children differentiate someone intentionally benefiting them from a random behavior that benefit them regardless of the agent's intentions. Vaish (2018) focus on children's (3-year olds) perception of positive intentions and their reciprocating behaviors towards

those individuals who intentionally treat them well. In the experiment, children experience different cases such as in the first condition children were directly given the items required in the game and in the other condition the items were randomly dropped near the child. In other words, the first condition included an intentional agent whereas the second one provided an unintentional benefit to the child. In the following stages, it was found the children significantly shared more items with the agent who intentionally gave them the items compared to the amount they shared with the unintentional benefactor (Vaish, 2018). Therefore, it is evident that 3-year olds can distinguish who intends to help them from someone who is neutral, and as a result they treat the others accordingly. This finding implies that prior to 5 years of age and being able to anticipate future reciprocity, younger children are to some extent capable of understanding other people's intentions and make their sharing decisions accordingly. Additionally, this is thought provoking in the sense that children's perception of fairness could be related to how others intend to benefit them. Even if the benefit children received in both the intentional and neutral conditions were equal, their more generous attitude towards the positive intentions might be explained by feelings of gratitude or indebtedness (Vaish et al., 2018). Role of these kinds of emotions should be evaluated in a detailed manner since they might constitute a greater portion of children's sharing decisions.

Role of Others' Emotions

Research on the role of emotions in resource allocation elaborates on children's own emotional states in addition to their understanding and anticipation of others' emotions. The theoretical framework suggests that anticipating the consequences of sharing rely on imagining how another or the self would feel as a result of the allocation outcome (Batson, Early, & Salvarini, 1997).

Starting with the idea that comparing these two self and other perspectives might reveal the dynamics of early childhood sharing behavior, Paulus and Moore (2015), conduct a study by placing young children (M_{age}= 55.9 months) into different experimental conditions. In the "other" condition children were shown pictures of two children who are the characters of the stories told by the experimenter. In the first story, experimenter tells that the giver shares his/her balloons equally with the protagonist and in the second story it is told that the giver does not want to share his/her balloons. Further, the "self" condition was designed in such a way that the same two stories were told by the experimenter but instead of presenting two characters, in this condition the protagonist was the child him/herself and the giver was represented by a picture shown by the experimenter. Following the stories, in the "other" condition children were asked to rate the emotions of the protagonist who either received the balloons or not whereas in the "self" condition children were asked to rate their own emotions concerning the consequences of two scenarios. For this rating process they use The Facial Affective Scale (FAS) which has 9 faces ranging from happy to sad. Also, in order to investigate how anticipation of emotions and sharing tendencies are related, children were presented with a Dictator Game where they were asked to share some of their stickers with an unknown child afterwards.

Paulus and Moore's (2015) comprehensive experimental design illustrates that young children matched equal sharing with positive emotions and non-sharing behavior of the giver with negative emotions both in self and other conditions. This finding shows that young children can attribute positive and negative emotions depending on the sharing outcomes, irrespective of whether they are the agent in the story or a 3rd person witnessing the allocation. Although children associate themselves and the other protagonists with the same type of emotions, the intensity of emotions was found to be different in both conditions. Unexpectedly, it is found that children attributed more negative emotions to the other than to themselves when not being shared with (Paulus & Moore, 2015). This finding contradicts with simulation theories which suggest that children understand other people's emotional states by using their own emotions as a reference model (Goldman, 2006), since children's concern for others' negative emotions surpass their own emotional states. This result might be explained by a sort of negativity bias in children but still it is not certain why children attribute less negative emotions to themselves (Vaish,

Hepach, & Tomasello,2008). This finding should be investigated in terms of moral development and coping strategies of young children which are not included in the scope of this paper, but it encourages an intriguing research question for future research. Going back to the relationship between attributing emotions and sharing, another striking finding of this study is that children who attributed more negative emotions to the other were also the ones who shared most in the dictator game. This finding reveals that a relationship between children's judgment of others' negative emotions and their generosity exists and briefly it can be concluded that the more negative emotions children attribute to the other, the more they share. Overall, Paulus and Moore's (2015) study present strong evidence in favor of the idea that preschoolers' anticipations of the consequences of one's own behavior for another's emotional state can act as a motivational basis for generous sharing behavior.

Apart from how the recipient would feel, how the proposer feels as a consequence of the allocation might also influence the motivations and decisions of the sharing behavior. In other words, how the proposer feels after a fair allocation or a non-sharing allocation and how do these feelings influence the sharing decision in the first place? At first glance, this line of thought might be seen as a part of internal decision-making mechanism of the proposer, but the affective states of the proposer might also be influenced from the recipient's mental states. For instance, knowing that sharing will make the recipient happy might lead the proposer to share, just to feel positive about making someone feel happy (Paulus & Moore, 2017). As a different version of the study mentioned above, Paulus and Moore (2017) repeat the same procedure except they ask children how the giver would feel in response to the same two stories told by the experimenter again in the same other and self-conditions. The results of the experiment specify that the children's emotion ratings for the giver's affective states were more positive for sharing than the non-sharing event, proving that sharing and generosity leads more positive emotions for the giver. It might be possibly because the receiver feels better about the outcome and acting prosocially might make the giver feel better. Additionally, in the following dictator game task it is also found that children's emotion ratings were correlated with their sharing behaviors, highlighting that the more the giver feels positive about sharing, the more they shared (Paulus &Moore, 2017). Evaluating these results together with the findings of the previous study, it is possible to conclude that preschoolers understand not only the affective consequences of sharing for the recipient, but also for the giver; and that both factors play a role in their sharing decisions (Paulus & Moore, 2017).

Considering the aforementioned empirical studies regarding the different aspects of theory of mind and perspective taking, it is inevitable to see the complex mechanisms taking place in preschooler's sharing behaviors. Taking false belief understanding, reading intentions and emotions of other people as subcategories of theory of mind and perspective taking, various studies show us that there is not a single aspect leading to fair sharing behavior. Rather, it is worth questioning how these different aspects interact with each other and develop over time. Keeping all these studies and their findings in mind, it would be promising to suggest a comprehensive longitudinal design measuring false beliefs, emotions and intentions periodically (every year) through sharing games which are not identical in terms of design and difficulty depending on the age groups of 3, 4, 5 and 6. For measuring each of these aspects, methods of the mentioned studies will be taken as a starting point and their designs should be modified in such a way that they could be measured in appropriate ages.

As a reminder, Takagishi et al. (2010) find that children who are better at false belief understanding share more with their peers but Cowell et al. (2015) find a negative relationship. One of the reasons behind this contradiction might be due to the different sharing games used in the experimental methodologies and also it might be due to using a separate false belief task which is not directly related to sharing behavior in terms of content. In future studies, it would be more convenient to use the Ultimatum Game (Takagishi et al., 2010) instead of the Dictator Game (Cowell et al., 2015). because it would help us to rule out the possible contingency effect and it would be a more realistic and easier

experimental setup for younger ages. For measuring false belief understanding, rather than showing children an unfamiliar displacement event, the task could be designed in such a way that the event itself was related to sharing and possibly similar to the Dictator Game. For instance, as a suggestion, the false belief task might be something such as two children are playing the Dictator Game but one of them leaves and when he/she is away the other child changes something in the room.

Regarding the role of intentions in sharing games, Sebastián-Enesco and Warneken, (2015) present that children who are at least 5 years old are able to anticipate future reciprocity and act more generously towards the more promising recipients. This finding leads us to think that younger children are not capable of assuming who will be more generous in the future trials. It is important to highlight that children's capabilities of understanding others' intentions develop over the years with their overall theory of mind and perspective taking abilities, therefore it is a good reminder to consider different age group's abilities and what could be the optimum task difficulty for their age group. In the future studies, Sebastián-Enesco and Warneken's (2015) methodology could be used for children who are 5 and 6 years old. And for 3 and 4-year-old children, study of Vaish et al. (2018) could be replicated, since Vaish et al. (2018) show that 3 years olds can distinguish donors who intentionally or randomly benefit them and arrange how much to share accordingly by favoring the intentional agent. Also, the future studies should elaborate on what drives younger children to act in such a manner. Vaish et al. (2018) suggests that feelings of gratitude and indebtedness might be influential in this process. In order to reveal the underlying emotional motivations of the children a few questions should be asked after the game and if there is a psychometrically appropriate scale for children's emotional motivations, it would be better to use it as a standard measurement tool.

As the last category, understanding others' emotions is found to be an important aspect of young children's decision making about sharing and fairness. Paulus and Moore's (2015) direct method of wanting children to rate how would the other/self feels about such an allocation both in the role of the giver and the recipient, is a very relevant method for unfolding children's actual emotions about the sharing behavior and how they attribute emotions to other people. Their findings showing that children's emotional attributions predict their sharing amounts present a strong basis for the role of emotions in sharing decisions. For future studies my suggestion would be to use this method along with the other tasks mentioned above.

Conclusion

Overall, since theory of mind and perspective taking are very broad concepts, in order to find how they are related to young children's understanding of fairness and sharing behavior, it is necessary to consider different aspects. As the literature review shows, it is not easy to come up with a simple formulization of how children's ToM abilities contribute to fair sharing behaviors. Therefore, I believe the most comprehensive method would be to conduct a longitudinal study in which those different aspects are measured separately but then evaluated in terms of correlational analyses. In the long run, understanding the developmental trajectories about the development of ToM and fair sharing behavior might provide us methods to develop educational activities and programs which would be beneficial for children to develop their ToM abilities and internalize a sophisticated sense of fairness.

References

Baron-Cohen, S., Leslie, A. M., Frith, U. (1985). "Does the autistic child have a "theory of mind"?". *Cognition*. Elsevier. *21*(1), 37–46.

Batson, C. D., Early, S., & Salvarini, G. (1997). Perspective taking: Imagining how another feels versus imaging how you would feel. Personality and Social Psychology Bulletin, *23*, 751–758.

Blake, P. R., McAuliffe, K., & Warneken, F. (2014). The developmental origins of fairness: The knowledge–behavior gap. *Trends in Cognitive Sciences*, *18*(11), 559-561.

Blake, P. R., & McAuliffe, K. (2011). "I had so much it didn't seem fair": Eight-year-olds reject two forms of inequity. *Cognition*, *120*(2), 215-224.

Cowell, J. M., Samek, A., List, J., & Decety, J. (2015). The curious relation between theory of mind and sharing in preschool age children. *PLoS One*, *10*(2), e0117947.

Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature*, *454*(7208), 1079.

Goldman, A. I. (2006). Simulating minds: The philosophy, psychology, and neuroscience of mindreading. New York: Oxford.

Hamann, K., Warneken, F., Greenberg, J. R., & Tomasello, M. (2011). Collaboration encourages equal sharing in children but not in chimpanzees. *Nature*, *476*(7360), 328.

House, B., Henrich, J., Sarnecka, B., & Silk, J. B. (2013). The development of contingent reciprocity in children. *Evolution and Human Behavior*, *34*(2), 86-93.

Paulus, M., & Moore, C. (2015). Preschool children's anticipation of recipients' emotions affects their resource allocation. *Social Development*, *24*(4), 852-867.

Paulus, M., & Moore, C. (2017). Preschoolers' generosity increases with understanding of the affective benefits of sharing. *Developmental Science*, *20*(3).

Premack, David, Woodruff, Guy. (1978). Does the chimpanzee have a theory of mind?. *Behavioral and Brain Sciences: Cognition and Consciousness in Nonhuman Species*, *1*(4), 515–526.

Sebastián-Enesco, C., & Warneken, F. (2015). The shadow of the future: 5-year-olds, but not 3-year-olds, adjust their sharing in anticipation of reciprocation. *Journal of Experimental Child Psychology*, *129*, 40-54.

Takagishi, H., Kameshima, S., Schug, J., Koizumi, M., Yamagishi, T. (2010). Theory of mind enhances preference for fairness. *Journal of Experimental Child Psychology*, *105*, 130-137.

Vaish, A., Grossmann, T., & Woodward, A. (2008). Not all emotions are created equal: The negativity bias in social-emotional development. Psychological Bulletin, *134*, 383–403.

Vaish, A., Hepach, R., & Tomasello, M. (2018). The specificity of reciprocity: Young children reciprocate more generously to those who intentionally benefit them. *Journal of Experimental Child Psychology*, *167*, 336-353.

Warneken, F., & Tomasello, M. (2013). The emergence of contingent reciprocity in young children. *Journal of Experimental Child Psychology*, *116*(2), 338-350.

Evaluation of Ballet Dancers' Job Environment from IWOP's (Industrial, Work and Organizational Psychology) Perspective

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Today, ballet dancers have been widely investigated as a high-risk group for developing eating disorders as their success and performance highly depend on their body proportions and physical appearance. High control over the body and diet restriction as a job requirement have both psychological and physiological consequences for a ballet dancer. Regarding this issue, the general health of ballet dancers is under question and there is a high effort in the field to understand the risk factors and their underlying mechanisms for the development of psychopathology. Although the health of ballet dancers came into awareness, a perspective questioning and investigating the bidirectional relationship between the job environment and the health is missing. Health, stress, motivation and job satisfaction are very crucial concepts which are highly associated with each other. Hence, this review aims to evaluate and discuss contemporary scientific findings in a more comprehensive way by focusing on and questioning the job environment of ballet dancers rather than being restricted only to health problems. Considering reviewed findings, it could be deduced that there are more severe and essential problems in the job environment beyond the health issues. Therefore, it may be influential to target directly missing links between job satisfaction, job motivation, stress and employee health as future directions and revise intervention programs in light of IWOP's perspective.

Keywords: job satisfaction, job motivation, eating disorders, risk factors, IWOP

IWOP (Industrial, Work and Organizational Psychology) is a branch of psychology which examines both employees' and employers' well-being at the same time in all jobs from industrial, work and organizational aspects (Spector, 2016). Therefore, it reflects a dual role which acts as a buffer between organizations and employees, and its practice is extremely important in terms of providing a functional, beneficial and healthy work environment (Spector, 2016). Regarding this issue, motivation, job satisfaction, job stress, and employee health are some crucial interests of study under the responsibility of IWOP (Spector, 2016). However, some underrepresented employees may still experience some difficulties or problems in their work environment. From one perspective, these problems may not be observable or available in the population to get attention of people. Conversely, from another perspective, these problems may be so available or melted within the job description that they do not seem as a problem anymore since they are perceived as normative or legitimate. However, there might be still problematic issues within the job description and it does not mean that the problems do not exist.

One of these underrepresented groups of employees is ballet dancers (Wainwright & Turner, 2006) whose performance highly depends on the body balance and smooth movements (O*NET). These movements are presented in accordance with a classical music and a choreography composed of very structured techniques that generally tells a story (O*NET). Since this kind of dance requires a good body coordination and balance, body proportions also seem to be an important factor for ballet dancers which may affect

their performance directly (Wainwright & Turner, 2006). For this reason, ballet dance students restrict their nutrition to maintain their physical appearance, similar to the cases of other sports (Thomas, Keel, & Heatherton, 2005; Ravaldi, Vannacci, Bolognesi, Mancini, Faravelli, & Ricca, 2006). Although there is not a written rule about the physical appearance of ballet dancers, there is a pressure on them and it possibly creates a stressful environment considering that their performance always depends on their body proportion which they need to maintain (Goodwin, Arcelus, Marshall, Wicks, & Meyer, 2014; Holderness, Brooks-Gunn, & Warren, 1994). According to Festinger's Social Comparison Theory (1954), individuals have tendencies to evaluate and compare themselves especially their abilities with similar others. A highly motivated individual may prefer to make "upward comparisons" by comparing himself/ herself with a more competent individual in a given domain. On the other hand, a less motivated individual may make "downward comparisons" by comparing himself/ herself with a less competent individual which may relatively increase the self-worth. If we adopt this perspective, it could be argued that highly motivated ballet dancers compare themselves with more competent and physically ideal dancers who are usually thin. These comparisons may lead to a distorted body image and they may become not satisfied with their body anymore. This dissatisfaction may decrease the dancer's both motivation and job satisfaction while increasing stress and pressure.To avoid such a situation, ballet dancers may apply some diets or use drugs which directly affect their health (Holderness et al., 1994). Eventually, this can lead even to depression or perfectionism as those practices also affect the mood and cognition of dancers and they become more likely to suffer from eating disorders (Arcelus, Dantas, Martin, & Del Rio, 2015). Therefore, those measures may be applied to increase motivation and job satisfaction while providing aesthetics for dance performance, but suddenly, a cyclic relation may appear, and then they negatively affect both their performance and health. Thus, all motivation, job satisfaction, job stress and employee health are in question. From this point of view, firstly, job-related health problems of ballet dancers will be examined. Secondly, injuries, ageing, and retirement will be discussed as stress factors affecting job satisfaction. Thirdly, it will be discussed whether disabilities cause a problem for ballet dance performance or not, and then some examples of the interventions in the field will be viewed. Finally, all examinations from different perspectives will be evaluated and possible solutions will be discussed.

Psychological Health Problems of Ballet Dancers and Factors Triggering Them

In today's world, health problems of dancers are under investigation and current articles underline that dancers are more likely to suffer from eating disorders compared to non-dancer people (Arcelus, Dantas, Martin, & Del Rio, 20152015). Although dancers seem to be potential victims of eating disorders, the mechanism through which they show this tendency was unknown, which seem to be crucial in order to find appropriate and useful solutions to the health problems of dancers. One of the possible explanations for this tendency is perfectionism which is consist of various factors such as concern over mistakes, high standards, personal standards, and self-criticism. In their study, Arcelus et al. (2015) aimed to focus on two important factors of perfectionism (concern of mistakes and personal standards) and investigated their relationships with the risk factors for developing eating disorders. In light of previous literature, they proposed and verified a model of relationships which was useful in interpreting the role of underlying mechanisms of perfectionism on the development of eating disorders via the factors such as cognitive anxiety, body dissatisfaction and diet restriction. In their study, 281 female dancers (33.1% ballet dancers) in Spain, aged between 12 and 20 and with average 7 years of dance experience, were assessed in terms of perfectionism, performance anxiety, body dissatisfaction, eating attitudes, and symptoms of depression. Overall, all variables were significantly correlated with each other, and further analysis showed that concern over mistakes positively affect depression through both direct and indirect

pathways, whereas personal standards do not have any direct or indirect effect on depression. Besides the direct effect, concern over mistakes affects depression indirectly by affecting cognitive anxiety or body dissatisfaction. In addition, body dissatisfaction positively influences cognitive anxiety and diet. Although personal standards do not show any effect on depression, it significantly affects the diet. Overall, concern over mistakes, cognitive anxiety, body dissatisfaction and depression seem to be closely related to each other, and body dissatisfaction directly influences the diet of dancers.

In the literature, it is suggested that eating disorders, substance use and emotional distress are associated with each other and ballet dancers are likely to suffer from eating disorders (Holderness, Brooks-Gunn, & Warren, 1994). However, it is unclear that whether non-dancing and dancing groups differ in terms of their psychopathological tendencies. Regarding this issue, Holderness et al. (1994) aimed to investigate which factor causes the association between eating disorders and substance use. Therefore, they tested the environmental effects by comparing dancers in which thinness is highly favored with non-dancers for whom thinness is not necessarily supported. They performed a longitudinal study based on bone density (an indirect measure of developmental problems caused by eating disorders) with 50 dancers and 56 non-dancers between ages of 13-31. They collected both physiological data through medical controls and psychological data through administering questionnaires and clinical interviews. Physiological results showed that dancers have lower ideal weight compared to non-dancers but both dancers and non-dancers are below their ideal weight. According to psychological data, dancers and non-dancers did not significantly differ in their disordered eating and substance use except the consumption of beer and hallucinogens which was significantly higher among non-dancers. Interestingly, they could not find any significant association between disordered eating and substance use for the dancing group. However, for non-dancers, this association was significant. Additionally, although their scores for disordered eating were similar, a strong correlation between psychological symptoms (emotional distress and depression) and disordered eating was found among non-dancers. Considering all results, the researchers concluded that, according to clinical interpretation, neither dancers nor non-dancers show a pathological case to be significantly diagnosed with eating disorders. Nevertheless, they reveal physiological characteristics of eating disorders. Therefore; the researchers suggested that although these groups do not meet the diagnostic criteria, the environment of the dancers increase the likelihood of eating disorders to occur due to pressures on the dancers to be thin. Hence, they hypothesized that in the absence of this pressure, eating disorders are more likely to be associated with substance use, and both internal and external factors should influence that link.

In the literature, different cultures and gender roles are also questioned to understand whether they have an influence on the link between body image and eating disorders or not (Stice & Shaw, 2002; McCabe & Ricciardelli, 2005; Hepp, Spindler, & Milos, 2005). However, this link still needs to be studied in nonclinical and nonprofessional athletes (Ravaldi, Vannacci, Bolognesi, Mancini, Faravelli, & Ricca, 2006). Regarding this issue, Ravaldi et al. (2006) investigated the link between eating disorders, body image self-perception and gender role in nonprofessional female ballet dancers (N=110) and physically inactive female students (N=59). Participants were randomly selected from different schools in Florence and they were administered three self-rating questionnaires: The *Beck Depression Inventory* (BDI; Beck, 1987), the *Body Uneasiness Test* (BUT; Cuzzolaro, Vetrone, Marano, & Battacchi, 1999) and the *Bem Sex Role Inventory* (BSRI; Bem, 1974) for assessing respectively depression levels, body uneasiness and sex roles. Then they were examined through the *Structured Clinical Interview for DSM-IV* (SCID; First, Spitzer, Gibbon, & Williams, 1995) and the *Eating Disorder Examination* (EDE; Cooper & Fairburn, 1987). Characteristics of samples were similar in term of body mass index, age and age at menarche and there were no significant differences

between them in the distribution of diagnoses. However, body image experiences and eating behaviors of ballet dancers were significantly higher compared to the control group. Both ballet dancers and controls were dissatisfied with their hips and thighs as body portions but additionally, ballet dancers were more dissatisfied with their height, hair, teeth, thorax and blushing. The proportions of gender roles significantly differed between ballet dancers and controls. The majority of ballet dancers showed undifferentiated gender whereas the majority of controls showed female gender. Interestingly, the lowest scored of BMI was observed in male-typified subjects among dancers and in female-typified subjects among controls. Therefore, Ravaldi et al. concluded that there is a specific relationship between male gender role and eating disorders for ballet dancers and based on this association they suggested that in ballet schools there is somehow an interference between gender role acquisition and idealization of thinness because "male" gender refers to power, independence, strength and competition which are very common characteristics of ballet and in such a competitive environment losing weight acts as a way to increase self-esteem and obtain power over others.

Body image of ballet dancers and the pressure on them to be thin are highly studied issues as we previously discussed. Differently from those studies, Nerini (2015) investigated the role of media influence and the internalization of ideal thinness imposed by media in the formation of risk factors leading to body dissatisfaction and disrupted body image. For that purpose, researchers recruited 67 Italian non-professional preadolescent ballet dancers and 68 non-physically-active girls to the study from different schools in Tuscany (Nerini, 2015). In the study, media pressure, internalization of thin and athletic ideals and body dissatisfaction were measured through the administration of the *Pressure Subscale, the Internalization-General subscale and the Internalization-Athlete subscale* of the Italian version (Stefanile, Matera, Nerini, & Pisani, 2011) of the *Sociocultural Attitudes towards Appearance Scale-3* (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) and the Italian version (Matera, Nerini, & Stefanile, 2013) of *the Body Shape Questionnaire-14* (BSQ-14; Dowson & Henderson, 2001) respectively. Then, the body mass index (BMI) and demographic information were obtained through self-reports. They hypothesized that BMI and media are major predictors of body dissatisfaction and expected to find that for controls, media predicts body dissatisfaction directly and indirectly via thin-ideal internalization of whereas for dancers media predicts body dissatisfaction directly and indirectly via both thin-ideal internalization and athletic internalization. Overall, they expected that dancers have higher levels of body dissatisfaction compared to non-physically active girls. Obtained data showed that dancers have a significantly lower average BMI and higher average body dissatisfaction (when BMI is controlled) compared to non-dancers. But BMI found to be significantly and directly associated with body dissatisfaction for both dancers and non-dancers. As expected, perceived media pressure was associated with body dissatisfaction both directly and indirectly and it influenced body dissatisfaction indirectly via thin-ideal internalization in case of non-dancers. However, interestingly, the indirect association took place only via athletic-internalization in case of dancers. Regarding these results, Nerini et al. concluded that even preadolescent and non-professional ballet dancers show high levels of body dissatisfaction, both perceived media pressure and BMI are good predictors of body dissatisfaction and media pressure is a potential risk that should be targeted through intervention programs.

In their study, Goodwin, Arcelus, Marshall, Wicks and Meyer (2014) investigated the mechanism through which critical comments of teachers and peers in the dancing world could be associated with eating psychopathology. Hence, they hypothesized that dancers who are exposed to severe critical comments increase their eating psychopathology via mediator of self-esteem which is expected to decrease in this case (Goodwin et al., 2014). For this purpose, they conducted a cross-sectional study and they recruited 74 females within the age range of 18-25 years from

vocational dance training colleges in the UK. Participants were assessed with a background questionnaire and a set of self-report scales that measure eating psychopathology, social hassles including the source and context of weight/body related critical comments and self-esteem. As a result, critical comments receiving (CC) dancers showed significantly higher scores in eating psychopathology compared to dancers who did not receive critical comments (Non-CC). In addition to that, they obtained also lower scores for self-esteem although they were not significant. However, after running a series of regression analysis Goodwin et al. (2014) found out that self-esteem acts as partial mediator. Lastly, they determined that the source of most of the critical comments in CC group was the dancing teachers. Therefore, they concluded that critical comments received especially from teachers affect the psychological health of dancers which leads to higher eating psychopathology via self-esteem. However, as self-esteem is a partial mediator they suggested that there should be other factors mediating that relationship between critical comments and eating psychopathology.

Whereas Goodwin et al. (2014) focused on critical comments which creates a microenvironment within a dance school, Thomas, Keel and Heatherton (2005) focused rather on different school troupe affiliations as an environment. Indeed, they studied the interaction of both genetic and environmental factors and their associations with eating disorders (Thomas et al., 2005). They suggested that the family background may be influential, and more perfectionist people may show a tendency to choose regional ballet schools which are more competitive local ones. Therefore, both individuals as people who choose their environment depending on their genetic dispositions and different environments in different competition levels are under examination. According to this perspective, disordered eating attitudes and behaviors of ballet dancers at national, regional and local dance schools in a summer program were compared and analyzed in the US. They expected to obtain highest scores of disordered eating behaviors from national schools, medium scores from regional schools and lowest scores from local schools. For the study, 239 female ballet dancers aged 13-18 years were recruited from two national, one local and two regional schools. Participants were assessed with eating disorder inventory including the drive for thinness and perfectionism subscales and also, they were asked to indicate their current height, weight, their satisfaction with their weight, whether they want to lose or gain weight and behaviors that they engage such as vomiting and dieting. They were also asked to report their home school type and category of ballet school (national, regional or local). According to results, although BMI data did not differ across different schools, weight satisfaction and dieting behavior were significantly higher for national dancers than regional dancers. However, although students from local schools showed significantly lower scores in dieting they also showed medium levels of weight dissatisfaction that did not significantly differ from other types of schools. In term of EDI as well as drive for thinness and perfectionism subscales, scores of both national and local students were significantly higher compared to regional students. The percentage of national students who reported eating disorder and fasting were significantly higher than the percentages obtained from local students. However, regional students showed an intermediate level of forming and eating disorder which was not found significant. In addition to that, self-induced vomiting was also about three to four times higher among national students compared to other students. Considering all results and unexpectedly high EDI scores of local students, Thomas et al. concluded that both individual and environmental factors have an influence on the increase of risks for eating disorders among ballet dancers.

J. Neumärker, N. Bettle, O. Bettle, Dudeck and U. Neumärker. (1998) investigated eating attitudes and behaviors of female and male dancers, non-dancers (controls) and anorexia nervosa patients through age differentiated analysis. Through the administration of the German version (Szmuklaer, Eisler, Gillies, & Hayward, 1985) of EAT-40 (Garner & Garfinkel, 1979) , self-report of menstrual patterns and measurement of body weight and height, data was collected from 37 female dancers (aged between 13-18

years) and 20 male dancers (aged between 14-17) at the Public Ballet School of Berlin, 95 female and 61 male students (controls) at a Berlin High School and 19 adolescent female patients of anorexia nervosa (according to ICD-10 criteria) who did not begin a therapy yet (Neumärker et al.,1998). According to results, age-specific EAT scores were higher for female dancers compared to male dancers and controls. EAT total scores of male dancers were also higher than controls. However, there was no any male dancer or control obtained a higher score from the cutoff for eating disorder. Only 8 female dancers and 7 female controls obtained higher scores than the cut-off score (>30) and most of these females were 16 years old. In terms of factors of the scale, oral control scores of male dancers especially were significantly higher than the scores of male students and diet and bulimia scores of female dancers were significantly higher than the scores of male dancers. When females' over the cut-off score were compared to female anorexia nervosa patients, Neumärker et al. (1998) figured out that both female ballet dancers and female controls significantly differed from female anorexia nervosa patients in term of their oral control scores. Overall, they concluded that although most dancers obtained high EAT scores they do not fit to the pathological criteria in term of menstrual pattern and body weight. Therefore, by considering also low and similar numbers of female dancers and female controls over the cut-off, they suggested that female dancers just become more sensible in term of nutrition due to the requirements of professional dance.

Fietze, Strauch, Holzhausen, Glos, Theobald, Lehnkering and Penzel. (2009) investigated the sleep-wake rhythm and sleep quality of 24 ballet dancers between ages of 18 and 40 years at the Berlin National Ballet before their ballet premiere. The research group performed a prospective field study for 67 days (Fietze et al., 2009). During that period, to analyze sleep patterns wrist actigraphy as a quantitative measure and sleep diaries as subjective measures were used. For all participants, medical interviews and physical examinations including measures such as BMI, blood pressure and heart rate were performed. In addition to that, participants filled out a set of questionnaires to assess sleepiness, sleep habits, health status, attention and cognitive performance and they were asked to note down the times when they go to bed, fall asleep, wake up and leave the bed. According to results, even at the beginning of the study sleep efficiency and sleep duration were low compared to normal values. During the study, the sleep-wake schedule was affected and resulted in a decrease of time in bed and an increase in time spent awake. However, the time required to fall asleep, the amount of activity during sleep, performance and injury frequencies were not influenced. Change in sleep-wake schedule made worst the sleep efficiency and sleep quality so that obtained data was comparable to mild insomnia. Although the measured data showed a decrease in sleep quality, such a change was not indicated in diaries which means that dancers were not aware of that change. In addition to that, participants also obtained low scores in mental health, cognitive performance and attention scales. These results were reasonable because skills such as cognition, attention and memory may be affected by low quality sleep. Therefore, Fietze et al. (2009) also underlined factors such as stress levels, the absence of free day and physical pain experienced at the end of the day as possible reasons for the decline in sleep efficiency and quality. Through this study, they emphasized the importance of relaxation as well as nutrition and physical health and proposed some interventions such as napping time or napping room and individualized schedules to reduce body pressure.

Body-based Changes: The Effect of Injuries, Ageing and Retirements in Work Life of Ballet Dancers

Injuries and ageing. According to the psychosocial stress-injury model (Williams & Anderson, 1998), some psychosocial factors such as personality, stressors and coping strategies influence stress response and the probability of injury occurrence. Based on this theory, Noh, Morris and Anderson (2005) questioned whether there is a causal relationship between psychosocial factors and dance injuries. To answer that question, they conducted a prospective research with 105 Korean dancers (101 females and 4 males) with the average age of 20.46

years (Noh et al., 2005). Participants were assessed with a set of questionnaires (translated and adapted to dance) measuring life-event stress, dance stress, trait anxiety, coping skills and social support. After ten months, they were asked to report their history of injury in detail including frequencies and duration. The results showed that professional ballet dancers experienced more frequently injuries compared to university and ballet institute students and their recovery also required longer time. According to overall correlation analysis, psychosocial factors were moderately associated with injuries. However, the regression analysis revealed that freedom from worry and confidence predict significantly the variance in frequency of injury whereas again freedom from worry and negative dance stress was a significant predictor of the variance in the duration of injuries. Based on these results, Noh et al. (2005) asserted that coping skills for the frequency of injury and freedom from worry and negative stress for the duration of the injury were the most crucial factors among other psychosocial factors in Korean ballet dancers.

Moreover, P. Wainwright and S. Turner (2006) studied the embodiment of both ballet dancers and ex-balled dancers (now dance teachers) by focusing on ageing, career and injury dimensions and investigating the relationship between body, self and society. In order to collect data, 11 ex-dancers, 9 young dancers active in the field and 9 injured dancers were interviewed and tape-recorded at the Royal Ballet, London (Wainwright & Turner, 2006). The research group also observed classes and performances for 40 days to obtain additional information. The detailed analysis of the data showed that the ballet environment acts as a habitus resulted from social practice and most of the ballet dancers perceive the ballet as a vocation instead of a job. Ageing as a social construct creates a discrepancy between the way ballet dancers think and the way their body moves because their body is their physical capital and the basis of their performance. Therefore P. Wainwright and S. Turner (2006) interpreted this observation through the death of people with the decline of physical capital. In other words, as the body is a part of self-identity for ballet dancers, it is difficult to accept ageing. However, interestingly, results showed that indeed they perceive themselves much older than they look, and they feel pressure and anxiety on themselves due to the short career defined through artistic capital because the passage from the peak of the career to retirement is very sharp. Regarding this issue, it was concluded that there is a reciprocal relationship between the professional ballet and the embodiment and the body indeed is shaped by the expectations of the field.

Retirement from ballet and rehirement. Retirement could be considered as a transitional phase in the life for all professions but the patterns of retirement for ballet dancers differ in terms of their thinking processes (Roncaglia, 2006). Based on this idea, Roncaglia (2006) studied the ballet dancers' retirement, reasons for ending their career and rehirement processes. In their study, they performed semi-structured interviews with 14 international ballet dancers (8 females and 4 males) with a mean age of 40.4 years. Tape recordings of these interviews were transcribed verbatim and analyzed specifically for the reasons for retirement, the role of social support, the coping mechanisms and the outcomes. Analysis revealed 5 main categories (reasons for retirement, social support, coping, emotional states and resolutions) which seem to determine the way dancers experience before, during and after retirement periods. Reasons for retirement was classified as either voluntary or involuntary which also play a role in emotional states (positive vs negative experience of retirement). Whereas some of the factors such as injuries, redundancy, deselection acted clearly as involuntary reasons for retirement, factors such as a change in interests and priorities acted as voluntary reasons. However, some factors (especially age) were able to become both involuntary and/or voluntary reasons depending on the context. Therefore, Roncaglia (2006) underlined that some dancers choose to control the situation by quitting the job when they have still abilities to show performance instead of feeling exclusion from other young dancers due to ageing. In addition to that, Roncaglia (2006) also indicated that the age at which physical abilities decline

and the chronological age did not overlap for each person. In term of transition from retirement to rehirement, different dancers showed different patterns in term of length of time. Some feel still in transition although they found new roles for themselves in life and some continued to find different careers as alternatives to dance.

Willard and Lavallee (2016) investigated retirement transition of elite ballet dancers by focusing on the role of self-identity and social support and they hypothesized that strong self-identity would cause difficulties during retirement transitions and during this period they would lose the major social network, therefore, social support which is one of the significant coping strategies. For this purpose, they performed retrospective semi-structure interviews with six former elite ballet dancers (2 males and 4 females) between 32-39 years in the UK (Willard & Lavallee, 2016). Through content analysis, 20 clusters out of 146 raw data and 4 general dimensions from previously defined 20 clusters were obtained. Those dimensions were dancer journey and formation of identity pre- and post-retirement, imbalance of power, regaining control and dancer network. Detailed analysis of those factors revealed that elite ballet dancers who developed strong and exclusive dancer identity during pre-retirement period showed identity loss and confusion during the post-retirement period. This identity formation was mediated through coaching style and training environment that formed the perception of imbalanced control. Unexpectedly, social support was preserved between dancers and it was beneficial in term of coping with retirement process. Besides social support, interviewed dancers developed also different kind of coping strategies such as pre-retirement planning, the redefinition of self and keeping themselves always busy immediately after retirement.

The Control of Body Proportions as a Ballet Dance's Requirement vs. Ballet Dancers with Disabilities

Gregory (1998) investigated the reactions of middle school, high school and college students to wheelchair ballet dancers and analyzed the association between observed reactions and self-report of experiences. For the study, 32 students were recruited from each middle school, high school and college school (Gregory, 1998). Middle school students and high school students were attending a summer camp in a university whereas college students were studying music as major at the same university. Participants were watched two video excerpts related to a ballet performance. One of the excerpts included the collaborative performance of disabled and non-disabled ballet dancers (newscast) whereas the other included a classical ballet performance. The order of the display was interchanged for different participants. While participants were watching videos, their emotional reactions were measured through Continuous Responses Digital Interface (CRDI). After completing the first part of the experiment, subjects were asked to complete a written questionnaire. According to the analysis of data, mean CRDI ratings of the newscast were significantly different and positive than ratings of classical ballet performance for each group. The most positive ratings were obtained from college students whereas middle school ratings showed slightly negative ratings and high schools showed neutral mean ratings. Therefore, Gregory (1998) underlined that only age as a factor influenced those differences. According to the written questionnaire, 20% of all subjects had formal training, 50% participated to a dance performance in last 3 years, 75% indicated that they enjoy dancing for fun, 58% interacted with people in wheelchairs and 15% used a wheelchair in the past. In conclusion, Gregory suggested that if younger subjects are exposed more frequently to performances with disabilities they may break borders of traditional thinking and create more positive emotions and attitudes toward those inclusive arts.

Possible Intervention Programs

In their study, Clark, Gupta and Ho (2014) established a wellness program (developmental evaluation) for ballet dancers which is based on developing, evaluating and then revising it by enabling a continuous improvement both of itself as methodology and health of dancers by reducing and tracking injuries. The study was conducted with 32

contracted dancers of a professional ballet company in North America (Clark et al., 2014). For the study, a medical team, an annual injury prevention screen and injury surveillance were developed. In the first season, 22 dancers were screened and then asked to complete an evaluation survey. The results of surveys and screens were discussed with managers of the company, artistic staff and representative dancers. According to those discussions, the wellness program was revised and performed for 30 dancers in the second season. Then, evaluation and revision steps were repeated. Obtained feedbacks were categorized as the continued development of the screening protocol, wellness program and the ballet company's approach to rehearsal. In the first category, participants reported their dissatisfaction about the location where the screening was conducted and the insufficiency of feedbacks coming from researchers. Regarding this issue, the location of the program was changed, and results were individually discussed and evaluated with dancers during the second season. In term of the second category different mental and physical health concerns appeared and new members were participated in the medical team to supply their needs. In term of the third category, the company obtained a better understanding of risk factors for ballet dancers. However, interestingly injury rate increased physical fitness decreases during the second session. Overall, Clark et al. (2014) concluded that such a program was very informative for both researchers and ballet dancers especially in term of understanding limitations and challenges and provided insights about developing the wellness program.

Furthermore, J. Sandham and J. Nicol (2015) analyzed experiences of elite ballet dancers, who failed to become a professional ballet dancer and therefore retired from that career and discussed how to develop interventions about the transition to life from the ballet career. The retrospective qualitative study, including three in-depth semi-structured interviews, was conducted with 5 dancers (women) in a mid-size city on the Canadian prairies (Sandham & Nicol, 2015). The results showed that all these dancers passed through same phases: discovering the dream, living the dream and losing the dream. Interviewed ballet dancers were either internally or externally motivated to begin ballet education at very young ages. During their training, they described a high level of pressure, self-discipline, dedication and perfectionism. In addition to those characteristics, interviewees also reported problems with injuries and competition, the feeling of being different from "normal" people, lack of different interests, social activities and networks except the ballet and its environment. Therefore, their whole lives were ballet and they were defining themselves (their self-identity) as a ballerina but nothing else. Due to perfectionism and limitless competition, their effort did not seem enough, and they end up by giving up from ballet. However, the retirement caused the loss of identity, the loss of peer support, depression and decrease in self-esteem as well as feelings of uselessness and emptiness. Although they tried to form a new lifestyle, due to lack of interests and social network outside the ballet, they experienced lots of difficulties. Regarding this issue, this study proposed the emergence of professional counsellors specifically specialized for ballet dancers to give psychological support during such transitions, to provide new interests and new roles in life, to re-establish the self-identity and increase the self-esteem and to help to determine and evaluate in different fields the other capabilities that they have already gained from ballet such as attention, concentration, loyalty and self-discipline. Finally, J. Sandham and J. Nicol (2015) underlined that more research should be conducted to increase awareness in the society and to provide the basis for the development of interventions.

Discussion

Detailed examination of various research based on ballet dancers revealed that they are very likely to suffer from both psychological and physical health problems which entail the development of intervention programs by Industrial, Work and Organizational psychologists in order to provide a healthy work environment for employees. The major problem in ballet dancer literature seems to be eating disorder and body dissatisfaction which is indeed tightly connected

to factors or characteristics such as perfectionism, depression, cognitive anxiety, self-identity, gender role and criticism (Arcelus et al., 2015; Ravaldi et al., 2006; Goodwin et al., 2014). The general finding is that ballet dancers obtain significantly higher scores on questionnaires measuring disordered eating behaviors compared to controls although they do not fit to the pathological criteria when they were examined through psychiatrists or when they are compared to a pathological group by determining a cut-off score (Holderness et al., 1994; Neumärker et al., 1998). Therefore, it is crucial to question whether these higher scores were false positive scores or whether there is an atypical form of eating disorders specific to ballet dancers which could not be detected through classical ways of measuring (Neumärker et al., 998). Consistently, other studies also showed similar results in term of a tendency for eating disorders (e.g., Benn & Walters, 2001; Ribeiro & Da Veiga, 2010; Ringham et al., 2006; Schluger, 2009) which may be a reason to eliminate the first explanation. Additionally, it is also important to indicate that although male dancers obtained lower scores of eating attitudes compared to female dancers, their scores are still higher than controls (Neumärker et al., 1998). Regarding this issue, those data may be accepted as reliable and they indicate that this group of employees is at high risk for developing eating disorders. In addition, it should be also considered that although psychiatrists are specialized to diagnose, it is still a subjective way of measuring which can possibly cause false negative responses while considering ballet dancers as not pathological. On the other hand, questionnaires, a relatively more objective way of measuring, may be too selective to detect the case of ballet dancers. From this perspective, the cut-off score may be also considered as too high. Besides, generally, athletic ballet dancers are compared to non-athletic people who show already high eating attitudes as they are not at all interested in sports. However, unhealthy attitudes may still exist in the presence of dance or sport. Therefore, it could be better to adapt measurements for people who are active in sport or an alternative may be to compare people involved in sports/other types of dances and ballet dancers in term of eating attitudes to see whether they obtain still significantly higher scores or not. When the link between eating disorders and substance use was questioned, any significant difference was not found for ballet dancers (Holderness et al., 1994). However, considering social desirability effect, indirect measurements are required instead of asking directly for substance use. Hence, it is still probable that ballet dancers use some substance for their dieting or performance.

Besides eating disorders, body dissatisfaction and depression were other health problems that ballet dancers experience. First of all, it was investigated that ballet dancers show perfectionism and high competitiveness in term personality characteristics (Arcelus et al., 2015; Thomas et al., 2005). Over concern for mistakes due to perfectionism may impose the feeling of insufficiency. At the same time, according to Festinger's Social Comparison Theory (1954), the individual who always compares himself/herself to similar others probably sets his/her personal standards high to compete with others. Regarding this, dancers experience cognitive anxiety and body dissatisfaction which lead to depression (Arcelus et al., 2015). For body dissatisfaction, there are two main factors: Individual and Environmental factors. Again, according to Festinger's theory, people may choose the environments which fit their personal characteristics (Festinger, 1954; Thomas et al., 2005). However, there also some external factors which may be always improved such as criticism of ballet teachers, thin idealization and perceived media (Goodwin et al., 2014; Nerini, 2015). In more detail, while perceived media affects directly body dissatisfaction, critical comments indirectly affects eating psychopathology and body dissatisfaction through lowering the self-esteem of ballet dancers (Goodwin et al., 2014; Nerini, 2015).

A priori, these problems about body precept seem to be related just to health issues. However, they influence also job satisfaction because the ballet performance is directly based on the body itself. A ballet dancer who is not satisfied with his or her body, who has a low self-esteem due to harsh critics and who

feels herself or himself always insufficient due to his/her perfectionism probably may not be satisfied with his/her job especially when it is coupled with negative dance stress although the link between all these factors and job satisfaction is missing. Nevertheless, from retirement narratives of ballet dancers, it could be deduced that especially toward the end of ballet career their motivation and their job satisfaction probably decline because they feel themselves much older than they look due to the pressure about their body age which is indeed socially described or maybe due to increased body dissatisfaction (Wainwright & Turner, 2006). For this reason, they use preretirement plannings as coping strategy (Roncaglia, 2006). In other words, although the legal age does not overlap with the age of body or physical decline, around the age of 30s ballet dancers feel themselves invisible in front of their teachers because they focus always on younger ballet dancers (Roncaglia, 2006). Such an experience obligates ballet dancers to give up their dreams because indeed they lose possibly their motivation to compete for a non-guaranteed success and their job satisfaction (Sandham & Nicol, 2015). Furthermore, some choreographers and directors are unwilling to include some dancers which show a stress and worry about future retirement and they want that dancers focus just on their performance because their career will be already short as most dancers reach to the peak in term of performance around age of 20 s but then they retire voluntarily or forced to retire involuntarily around age of 30s (Roncaglia, 2006; Wainwright & Turner, 2006). Thus, besides health issues, job motivation and job satisfaction, there is also a hugely problematic issue about ageing and thinness concepts. In order to solve such questions, it seems significant and necessary to understand the job description of ballet dance. According to O*net, physical appearance is not included in the job description. However, there is a general understanding of "thinness" as a requirement of ballet both among dancers and non-dancers. Nevertheless, it remains unclear whether it is really a requirement of this job or a bona fide occupational qualification (BFOQ) or it is a type of discrimination which is legalized by the society. However, there is also an example for a ballet dance performance performed through the cooperation of disabled and non-disabled people and the results of a study based on that performance showed positive scores compared to usual classical ballet performance (Gregory, 1998). Hence, it could be deduced that the ballet dance could be just based on the performance instead of body and it could be very influential if such a study would be conducted with ballet dancers who are not thin. Therefore, the results of this study indicate that the stereotypes about ballet dance may be disrupted if we are exposed to an unusual performance and this could be also tried for the stereotype of thinness in the future.

Another problem about the retirement of ballet dancers is the loss of identity after the dance career. It may be still evaluated from IWOP's perspective because their feelings during that retirement process inform us a lot about experienced problems which should be improved in the work environment and these problems seem important for the rehirement process. Narratives reported by ballet dancers revealed that they begin to dance at very young ages and they work very hard and very disciplined manner (Sandham & Nicol, 2015). For that reason, their all social network is formed of dancers and they don't have enough time to discover other interests and be involved in social activities other than the ballet (Sandham & Nicol, 2015). Therefore, the ballet is so dominated on their life that they define their identities as just "ballet dancers" (Sandham & Nicol, 2015). Regarding this issue, they feel themselves different from others (people who are not ballet dancers). As their identity is mostly composed of ballet after retirement they experience adaptation problems and difficulties due to lack of social network and loss of self-identity. Such a life gives significant clues about the work environment: long working hours, lack of social activities, excessive load and shifted schedules. Beside the role of intense work in the development of self-identity, imbalanced behaviors and unpredictable moods of teachers also seem to affect the self-identity by influencing the self-worth and sense of achievement (Willard & Lavallee, 2016). This self-identity crisis may be an explanation for the results obtained by

Ravaldi et al. (2006) which indicated that most dancers showed undifferentiated gender roles and dancers showing male-specific gender roles obtained higher scores of disordered eating attitudes. Therefore, it may be an indication of crisis about the identity acquisition because the ballet dance favors the male-specific characteristics: strength and competition.

Consistently with a work environment lacking social activities and relaxing times, job stress is also one of the experienced problems by ballet dancers and they generate also physical consequences as well as psychological effects. For instance, Noh et al. (2005) investigated that freedom from worry and negative dance stress are significant predictors of injuries for Korean dancers. Therefore, it could be deduced that job stress indirectly may influence performance and cause injuries. Relatedly, due to stressful and unstable schedule and physical pain of injuries, Fietze et al. (2009) investigated that ballet dancers' sleep quality and sleep effectiveness are lower than controls especially during premiums and they also impact their attention and mental abilities which may also influence their job performance.

Conclusion

Overall, it could be emphasized that ballet dancers experience various problems in their work environment which are highly related to their health, job stress, job motivation, job satisfaction and performance. Nevertheless, the literature focused on just problems experienced by ballet dancers and their associations, however, there is no any study yet linking those problems directly to the working environment. Although very useful intervention programs were proposed by integrating the feedback from ballet dancers and the professionals to assist ballet dancers (Sandham & Nicol, 2015; Clark et al., 2014), they are generally focused on temporary solutions such as decreasing injuries or providing psychological support for retirement transitions. However, nobody focused on the basis of all these problems: coaching styles and working environment. In order to decrease stress and increase both job satisfaction and motivation, social activities outside the ballet program may be scheduled. By this way, the problem of retirement and self-identity may be resolved because these activities create an area where they can discover new interests and abilities to which they can relate themselves in term of identity. In addition to that different groups may be formed like job rotation and directors or coaches may provide free days / free hours for ballet dancers. Therefore, those young students may spare time for other activities and may socialize with people outside of the ballet company by forming new social networks by turn which decreases the feeling of being "different" from others. A dance education may be both disciplined and funny and relaxing at the same time if the environment is changed. For instance, job crafting may be adapted also for ballet dancers. Although each dancer cannot shape his/her job within the job description, as in dance everybody acts as a team, they can shape their work as a team. For instance, a dance group may work together by interacting with nature which may have also a relaxing effect. Another interesting idea, in term of environmental change, may be to get rid of mirrors. By this way, the psychological pressure about body proportions and competition via appearance may be decreased. In addition to environmental changes, if we consider dance coaches as employers, they may be educated to regulate their behaviors toward ballet dancers and informed about how to decrease stress and provide better performance without harming dancers both physically (for example; injuries) and psychologically (for example; self-esteem). An even more radical solution may be to change the consideration of "thinness" as a dance requirement. In order to provide such a radical change, this issue should create awareness among coaches and they should be focused on the technique and the dance performance itself. Then they may show less emphasis on body proportions both in selections and during the course of dance education. If coaches become more inclusive by decreasing the emphasis on body proportions, people normalize variances in term of weight and appearance which can also decrease the overall observed body dissatisfaction and disordered eating behaviors. If such a perception or stereotype is disrupted even ageing and retirement do not appear as

problems in the field because if people are judged just based on their performance, they can have a longer dance career. Therefore, the influence of media also decreases on ballet dancers as they are not perceived in the same way anymore.

To conclude, it could be underlined that a meta-analysis in term of health issues of ballet dancers is required to draw a clearer picture and studies relating those problems to job satisfaction, job motivation and performance are also needed to understand the major reasons behind them. After forming missing links and measuring directly job-related factors that possibly related to those problems, it could be better to develop some intervention programs that target directly the basis of problems for suggesting more fundamental rather than temporary solutions with the involvement of industrial, work and organizational psychologists.

References

Arcelus, J., García-Dantas, A., Sánchez- Martín, M., & Del Río, C. (2015). Influence of perfectionism on variables associated to eating disorders in dance students. *Revista De Psicología Del Deporte*, 24(2), 297-303.

Beck, A. T., & Steer, R. A. (1987). Manual for the revised Beck depression inventory. *San Antonio, TX: Psychological Corporation*.

Bem, S. L. (1974). The measurement of psychological androgyny. *Journal of consulting and clinical psychology*, *42*(2), 155.

Benn, T. and Walters, D. (2001). Between Scylla and Charybdis. Nutritional education versus body culture and the ballet aesthetic: the effects on the lives of female dancers. *Research in Dance Education*, 2(2), 139-154.

Clark, T., Gupta, A. and Ho, C. H. (2014). Developing a dancer wellness program employing developmental evaluation. *Frontiers in Psychoogyl*, *5*, 731.

Cooper, Z., & Fairburn, C. (1987). The eating disorder examination: A semi-structured interview for the assessment of the specific psychopathology of eating disorders. *International Journal of Eating Disorders*, *6*(1), 1-8.

Cuzzolaro, M., Vetrone, G., Marano, G., & Battacchi, M. W. (1999). BUT, Body Uneasiness Test: a new attitudinal body image scale. *Psichiatria dell'infanzia e dell'adolescenza*, *66*, 417-428.

Dowson, J., & Henderson, L. (2001). The validity of a short version of the Body Shape Questionnaire. *Psychiatry Research*, *102*(3), 263-271.

Festinger, L. (1954). A theory of social comparison processes. *Human relations*, *7*(2), 117-140.

Fietze, I., Strauch, J., Holzhausen, M., Glos, M., Theobald, C., Lehnkering, H. and Penzel, T. (2009). Sleep quality in professional ballet dancers. *Chronobiology International*, *26*, 1249–62.

First, M. B., Spitzer, R. L., Gibbon, M. W. J. B., & Williams, J. B. (1995). Structured clinical interview for DSM-IV axis I disorders. *New York: New York State Psychiatric Institute*.

Garner, D. M., & Garfinkel, P. E. (1979). The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. *Psychological medicine*, *9*(2), 273-279.

Goodwin, H., Arcelus, J., Marshall, S., Wicks, S. and Meyer, C. (2014). Critical comments concerning shape and weight: associations with eating psychopathology among full-time dance students. *Eating and Weight Disorders- Studies on Anorexia, Bulimia and Obesity*, *19*, 115–8.

Gregory, D. (1998). Reactions to Ballet with Wheelchairs: Reflections of Attitudes toward People with Disabilities. *Journal of Music Therapy*, *35*, 274–283.

Hepp, U., Spindler, A. and Milos, G. (2005). Eating disorder symptomatology and gender role orientation. *International Journal of Eating Disorders*, *37*, 227–33.

Holderness, C. C., Brooks-Gunn, J. and Warren, M. P. (1994). Eating disorders and substance use: a dancing vs a nondancing population. *Medicine & Science in Sports & Exercise, 26*, 297–302.

Matera, C., Nerini, A., & Stefanile, C. (2013). Assessing body dissatisfaction: Validation of the Italian version of the Body Shape Questionnaire-14 (BSQ-14). *Counseling 6 (2)*, 235-244.

McCabe, M. P. and Ricciardelli, L. A. (2005). A prospective study of pressures from parents, peers, and the media on extreme weight change behaviors among adolescent boys and girls. *Behaviour Research and Therapy*, *43*, 653–68.

Nerini, A. (2015). Media influence and body dissatisfaction in preadolescent ballet dancers and non-physically active girls. *Psychology of Sport and Exercise*, *20*, 76-83.

Neumärker, K., Bettle, N., Bettle, O., Dudeck, U., & Neumärker, U. (1998). The eating attitudes test: Comparative analysis of female and male students at the Public Ballet School of Berlin. *European Child & Adolescent Psychiatry*, *7*(1),

19-23. http://dx.doi.org/10.1007/s007870050040

Noh, Y.-E., Morris, T. and Andersen, M. B. (2005). Psychosocial factors and ballet injuries. *International Journal of Sport and Exercise Psychology*, *3*(1), 79–90. doi:10.1080/1612197x.2005.9671759

Ravaldi, C., Vannacci, A., Bolognesi, E., Mancini, S., Faravelli, C. and Ricca, V. (2006). Gender role, eating disorder symptoms, and body image concern in ballet dancers. *Journal of Psychosomatic Research, 61*, 529–35.

Ribeiro, L. G. and Da Veiga, G. V. (2010). Risk behaviours for eating disorders in brazilian dancers. *International Journal of Sport Medicine*, 31(4), 283-288.

Ringham, R., Klump, K., Kaye, W., Stone, D., Libman, S., Stowe, S. and Marcus, M. (2006). Eating disorder symptomatology among ballet dancers. *International Journal of Eating Disorders*, *39*(6), 503-508.

Roncaglia, I. (2006). Retirement as a career transition in ballet dancers. *International Journal for Educational and Vocational Guidance*, *6*.

Sandham, T. J., & Nicol, J. J. (2015). Aspiring Ballerinas and Implications for Counselling Practice/Ballerines en herbe et implications pour la pratique du counseling. *Canadian Journal of Counselling and Psychotherapy (Online)*, *49*(1), 1.

Schluger, A. E. (2009). *Disordered eating attitudes and behaviors in undergraduate dance majors: A study of female modern dance and ballet students* (Doctoral dissertation, Capella University).

Spector, P. (2016). *Industrial and Organizational Psychology*. Wiley.

Stefanile, C., Matera, C., Nerini, A., & Pisani, E. (2011). Validation of an Italian version of the Sociocultural Attitudes Towards Appearance Questionnaire-3 (SATAQ-3) on adolescent girls. *Body Image*, *8*(4), 432-436.

Stice, E. and Shaw, H. E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology: a synthesis of research findings. *Journal of Psychosomatic Research*, *53*, 985–93.

Szmukler, G. I., Eisler, I., Gillies, C., & Hayward, M. E. (1986). The implications of anorexia nervosa in a ballet school. In *Anorexia Nervosa and Bulimic Disorders* (pp. 177-181).

Thomas, J. J., Keel, P. K. and Heatherton, T. F. (2005). Disordered eating attitudes and behaviors in ballet students: examination of environmental and individual risk factors. *International Journal of Eating Disorders*, *38*, 263–8.

Thompson, J. K., van den Berg, P., Roehrig, M., Guarda, A. S., & Heinberg, L. J. (2004). The sociocultural attitudes towards appearance scale-3 (SATAQ-3): Development and validation. *International journal of eating disorders*, *35*(3), 293-304.

Wainwright, S. P. and Turner, B. S. (2006). 'Just Crumbling to Bits'? An Exploration of the Body Ageing, Injury and Career in Classical Ballet Dancers. *Sociology*, *40*(2), 237–255. doi:10.1177/0038038506062031

Willard, V., & Lavallee, D. (2016). Retirement experiences of elite ballet dancers: Impact of self-identity and social support. *Sport, Exercise, And Performance Psychology*, *5*(3), 266-279. http://dx.doi.org/10.1037/spy0000057

Williams, J. M., &Anderson, M. B. (1998). Psychosocial antecedents of sport injury: Review and critique of the stress and injury model. *Journal of Applied Sport Psychology, 10, 5-25.*

A Review on Three Concepts of Psychoanalytic Theory Under the Light of Modern Cognitive and Neurological Evidence: The Conscious/Unconscious, Repression and Infantile Amnesia

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Freud was ahead of his time in theorizing human behavior and personality even though his justifications sometimes deviated from what the modern research have shown. In this article, my aim is to evaluate three particular concepts of the psychoanalytic theory by comparing them with the modern findings and theories of cognitive psychology and neuroscience. These concepts are (1) Freud's distinction of conscious and unconscious mind, (2) repression and (3) infantile amnesia. First, we attempt to show that how the concept of Freudian dual mind system, the conscious/unconscious, can be accounted by modern cognitive and neurological findings. Second, we try to illustrate that how the concept of repression, pushing memories deep into the unconscious, can be explained by cognitive and neural processes and can also be associated with the two-system hypothesis. Finally, we try to show that there is some evidence for Freud's claim that disturbing childhood memories are forgotten since they are repressed.
Keywords: psychoanalytic theory, cognitive psychology, two-system hypothesis

Psychoanalytic theory is a theory, developed principally by Sigmund Freud, which attempts to account for human personality and behavior based on its claim of existence of conscious/unconscious cognitive processes (Freud, 1910). Although Freud's psychoanalytic theory has an unpopular reputation as it has been long blamed to be constructed on unempirical and non-falsifiable concepts, it can be said that it still provides considerable insight about human personality. Even though Freud did not have the technology or accumulation of knowledge that we have today, he accomplished to form some intriguing concepts that have highly overlapping aspects with the concepts produced by modern research.

One of these concepts is Freud's (1915) proposal, which was formulated based on previous thinkers' ideas, that the human mind consists of two parts; conscious and unconscious. The existence of these two parts points to a dual mind system that affects human personality and behavior. Some cognitive processes take place with the awareness of the person, i.e. in the conscious level; while others take place with no awareness, i.e. in the unconscious level. Therefore, a significant number of actions people initiate may be the results the unconscious processes and motives while they think that they are in full control of these actions. Another concept is called repression by Freud (1910), which refers to the unconscious avoidance of the threatening, anxiety provoking, or inappropriate thoughts. Repression works as a defense mechanism which by suppressing unwanted thoughts and memories, people protect their self (or their ego, to use psychoanalytic terminology). A third concept, which is related to repression, is infantile amnesia; the common phenomenon of forgetting inappropriate childhood memories as they may have a threatening nature for the individual (Freud, 1953).

In this article, the aim is to evaluate these three concepts of the psychoanalytic theory by comparing them with the modern findings and theories of the cognitive psychology and neuroscience. More specifically, it is attempted to show that Freud's concept of *conscious and unconscious mind* may have cognitive and neural basis. Further, it is tried to show how modern research accounts for *repression*, the processes in which some 'unwanted concepts' (such as memories of traumatic

events) become unconscious and continue to influence people's actions without their awareness. Finally, it is attempted to show that the modern research may be able to explain the phenomenon of *infantile amnesia*, that is, our threating childhood memories, buried deep in the unconscious, may continue to exist and influence our personality and behaviors.

Conscious and Unconscious Minds

For Freud's distinction of conscious and unconscious minds, some evidence comes from a relatively new line of study in cognitive psychology, called the two-system hypothesis (of learning) (Lieberman, 2012). This hypothesis assumes that learning, more specifically conditioning, occurs by involving two different systems: The first one is quite primitive as it requires only an *automatic association* of conditioned stimulus (CS) with unconditioned stimulus (US) whereas the other system is more advanced as it is "a *cognitive* system in which expectations guide responding" (Lieberman, 2012, p. 124). This duality is explained by the evolution of the human brain suggesting that while new and more complicated structure of the brain (e.g., neocortex, which is responsible for advanced cognitive processes) was evolving, the old brain, the structure that responsible for mostly primitive functions, continued to exist and co-operate (Lieberman, 2012).

As an example, LeDoux (1997) describes how fear response involves these two distinct systems. When we encounter a possibly dangerous stimulus, the two systems start immediately and simultaneously processing the stimulus: since the first system is automatic and operated by the relatively more primitive structure of the brain (i.e., amygdala), it provides a rapid response to the stimulus (without analyzing it thoroughly). As the second system involves a process of cognitive analysis (though slower), it gives the organism the ability to decide rationally whether it really need to be aroused. This hypothesis was confirmed by some experimental studies on animal and human subjects who had damages in certain areas of their brains (e.g. amygdala and hippocampus) which are associated with either the first or the second systems (LeDoux, 1997; Bechara et al., 1995).

There is a relatively evident resemblance between Freud's concept of the conscious/unconscious mind and the two systems in terms of operation. We can associate the unconscious –which hosts the id and primitive desires– with the first system as both have an unawareness component. And, we can associate the conscious –which hosts the ego and rationality– with the second system as both operate on rational principles. We can say, for example, that when we see a snake-like shape (e.g. a piece of rope) on the floor, we become immediately aroused as a defensive response thanks to the first system (or *id* which tries to *avoid pain*). However, soon after, the second system inhibits the fear response as it figures out that the shape is actually "just a piece of rope" (or it is the *ego* who tries to *think rationally*).

The two systems generally work together in the process of classical conditioning: we *unconsciously* associate the CS and US –through the first system– and we *consciously* know (be aware of) the association –through the second system– (Lieberman, 2012). However, research shows that the conditioning may occur without involving one of the two systems (Lieberman, 2012). This means that there may be a fear response to a stimulus although the subject is not necessarily aware of the reason (as the learning may occur without the involvement of the second system). This thinking can explain why we have unreasonable thoughts or behaviors (e.g., phobias). Therefore, we may say that what Freud would think of behaviors caused by "unconscious motivations" may be the results of making associations (learning) without involving the second system.

The classic study by Bechara, Tranel, Damasio, Adolphs, Rockland, and Damasio (1995) provides striking evidence: They exposed three participants (who had brain damages in different areas; namely, amygdala and hippocampus) to conditioning procedures in which either a colored slide or a tone is associated with a disturbing sound (a loud boat horn). The first participant, who had damaged amygdala, was not conditioned to visual or auditory stimuli at all, meaning that when the stimulus –that hints the boat horn is coming– was presented, he showed no reaction (e.g., no fear or

irritation). However, when asked, he was able to say which colored slide or tone were followed by the horn. This suggests that he formed an *expectation* about the stimuli but not a fear response. The second participant, who suffered from damaged hippocampus, was conditioned to visual or auditory stimuli, but he was not able to report which stimulus was associated with the disturbing horn sound. In other words, when exposed to the CS (e.g., blue colored slide), he showed fear response, but he failed to answer the question "tell me the name of the color that was followed by the horn" (p. 1117). This suggests that he formed a fear response without forming any explicit (or conscious) expectations/associations. Finally, the third participant, who suffered from a damage to both amygdala and hippocampus, was not conditioned to any stimuli and also failed to answer questions about the pairings (Bechara et al., 1995).

This study is a good demonstration of the existence of a dual mind system that has a neural basis. The results of conditioning procedures in the experiment demonstrate that learning may happen without forming a conscious awareness of the association just as the two-system hypothesis predicts.

Repression/Suppression

Before moving on to discuss repression, it is necessary to address the difference between repression and suppression. Freud made a distinction between repression and suppression, that is, repression is an unconscious process whereas suppression is a conscious process (Erdelyi, 2001). However, this sharp distinction was not made by Freud, rather it was introduced later by Anna Freud (Erdelyi, 2001). In this article, the both terms will be used interchangeably, referring Freud's broader idea that unwanted thought/memories are pushed into the unconscious (whether through a conscious or unconscious process) in order to protect oneself (i.e., ego) from anxiety (Freud, 1910).

Some evidence for repression comes from the classic study of Anderson and Green (2001) in which they developed a creative method, called "think/no-think task". They gave college students word pairs (e.g., ordeal-roach) to memorize. Then, they presented the first words of the pairs and asked participants either to remember the paired word (*think* task) or to try not to remember the paired word (*no-think* task). The results showed that the inhibition of retrieval caused impairment of remembering for the unwanted items as the participants remembered those words that they were told not to think about significantly less than the paired words that they were told to think about (Anderson & Green, 2001).

In a further study, by applying the think/no-think task while participants' brain activity was being scanned by using fMRI, Anderson et al. (2004) showed that there are indeed some neural processes involved in the suppression of unwanted memories. They found that "people suppress unwanted memories by recruiting prefrontal cortex [which can override or stop retrieval process] to disengage hippocampal processing [which is involved in formation and retrieval of memory]" (Anderson et al., 2004, p. 232). Furthermore, Depue, Banich, and Curran (2007) conducted a similar study, but they carried out the think/no-think procedure by using faces (associated with annoying photographs such as accidents scenes) instead of words. Their findings were consistent with the previous studies and, thus, confirmed Freud's claim that people tend to forget unwanted thoughts and memories by repressing/suppressing them.

Although these findings provide substantial evidence for the existence of repression, they only involve the suppression of the memories for not-so-powerful stimuli (in terms of anxiety provocation) such as words or disturbing photos. However, repression may involve overwhelming traumatic events either. A case study by Christianson and Nilsson (1989) provides such an example for us to evaluate the findings with a real case. The subject of this case study, C.M., had been raped, but she had no explicit memory about this traumatic event Consistent with Freud's repression concept and the findings of the above-mentioned studies, the authors claim that she developed a state of amnesia that prevented her from remembering that highly traumatic event (p. 291). What is more interesting about C.M.'s case is that when she was taken to the place of the assault, she felt an extreme emotional distress even though she could not remember (i.e., could not tell) that she had been raped in this very

place. This clearly shows that although C.M. has no conscious (or explicit) memory of the incident, some traces of the incident definitely retain in an unconscious level (or retain as an implicit memory). This aspect of C.M.'s case is consistent with the two-system hypothesis: she may have associated the place with unpleasant feelings (via the first system) but the cognitive component that provides an awareness of the association (via the second system) may have disappeared as a result of repression. Therefore, although she does not know why, she becomes quite upset when she goes back to the place of assault.

Infantile Amnesia

Suffering from experiences that were encoded as implicit memories is not special to patients who have some kinds of amnesia, such as C.M.'s (Christianson & Nilsson, 1989) or the patients' in Bechara and his colleagues' (1995) study. Adults who were abused as a child may suffer from those experiences and develop depressive disorders even though they do not have any explicit memory of those experiences (van der Kolk, 1994; Newcombe et al., 2000). Freud (1953) proposed that adults cannot remember their early traumatic or inappropriate experiences as they repress them. This phenomenon, as Freud called infantile amnesia, has been *partially* confirmed by some research. "Partially" because Freud emphasized that only inappropriate memories of childhood are repressed whereas it seems that adults cannot remember *most* of their early experiences, whether they are appropriate or not (actually they can remember *some* of them) (Newcombe et al., 2000). Nevertheless, consistent with Freud's theory, research findings show that those *some* memories that people are able to remember, if at all, are generally "positive" ones as "negative experiences do not promote memory formation but contribute to an extended period of childhood amnesia" (Joseph, 2003, p. 172).

What is clearer about infantile amnesia is that research (Newcombe & Fox, 1994; Lie & Newcombe, 1999) shows that implicit memories encoded in the early years can affect adulthood behaviors. Some evidence comes from a study by Newcombe and Fox (1994), in which they showed participants the faces of either their preschool classmates or unknown children and measured their skin conductance responses. They found that "even children who had no apparent explicit (i.e., consciously statable) memory of the faces exhibited skin conductance responses that discriminated between classmates and unknown children" (p. 56). In a further study, they found that participants were faster in processing the pictures of faces if the pictures showed the former classmates, although participants had no explicit memory of these former classmates (Lie & Newcombe, 1999).

Conclusion

So far in this article, it has been attempted to show, first, how the concept of Freudian dual mind system, the conscious/unconscious, can be accounted by modern cognitive and neurological findings. Second, it has been tried to illustrate how the concept of making memories go deep into the unconscious, namely repression, can be explained by cognitive and neural processes and can also be associated with the two-system hypothesis. Finally, it has been shown that there is some evidence for Freud's claim that disturbing childhood memories are forgotten since they are repressed. The findings we have reviewed throughout this paper indicate that Freud was able to form concepts that can give insight to some aspects of human behavior and personality. As a summative view, Freud asserted that the unconscious has a great influence on human personality (thanks to the three concepts that are the subject of this article). The evidence provided from the studies of two-system hypothesis and underlying brain mechanisms, repression, and infantile amnesia is in favor of Freud's stand. However, we should be cautious since all these studies have their own limitations (that have been not mentioned here) as to explain what they originally try to explain. For example, it is not clear whether prefrontal cortex's inhibitory processes over hippocampus is the only process that can account for neural bases of repression (see Benoit & Anderson, 2012). Also, it is not clear whether implicit memory test for childhood classmates can be appropriate to reach conclusions about infantile amnesia. Even if we disregard these general limitations, they are still limited in accounting for Freud's concepts (for example, as in the ambiguity about what we actually remember from our childhood: some happy

memories or maybe nothing at all). At this point, nevertheless, at least we are able to say that Freud was ahead of his time in theorizing human behavior and personality even though his justifications deviated from what the modern research has shown.

References

Anderson, M. C., & Green, C. (2001). Suppressing unwanted memories by executive control. *Nature, 410*(6826), 366-369. doi:10.1038/35066572

Anderson, M. C., Ochsner, K. N., Kuhl, B., Cooper, J., Robertson, E., Gabrieli, S. W., Glover, G. H., Gabrieli J. D. E. (2004). Neural systems underlying the suppression of unwanted memories. *Science, 303*(5655), 232-235. doi:10.1126/science.1089504

Bechara, A., Tranel, D., Damasio, H., Adolphs, R., Rockland, G., and Damasio, A. R. (1995). Double dissociation of conditioning and declarative knowledge relative to the amygdala and hippocampus in humans. *Science, 269,* 1115–1118.

Benoit, R. G., & Anderson, M. C. (2012). Opposing mechanisms support the voluntary forgetting of unwanted memories. *Neuron*, 76(2), 450-460. doi:10.1016/j.neuron.2012.07.025

Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Research report: Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, *82*217-225. doi:10.1016/j.jad.2003.12.013

Christianson, S. A., and Nilsson, L. G. (1989). Hysterical amnesia: a case of aversively motivated isolation of memory. In T. Archer and L.-G. Nilsson (eds.), *Aversion, avoidance, and anxiety: perspectives on aversively motivated behavior* (pp. 289 - 310). Hillsdale, NJ: Erlbaum.

Depue, B. E., Banich, M. T., and Curran, T. (2007). Prefrontal regions orchestrate suppression of emotional memories via a two-phase process. *Science, 317,* 215–219. doi:10.1126/science.1139560

Erdelyi, M. (2001). Defense processes can be conscious or unconscious. *American Psychologist, 56*(9).

Freud, S. (1910). *Five Lectures on Psycho-Analysis*. SE, 11.

Freud, S. (1915). *The Unconscious*. SE, 14.

Freud, S. (1953). *Three Essays on the Theory of Sexuality*. London: Hogarth Press.

Joseph, R. (2003). Emotional trauma and childhood amnesia. *Consciousness & Emotion, 4*(2), 151-179. doi:10.1075/ce.4.2.02jos

LeDoux, J. E. (1997). Emotion, Memory and the Brain. *Scientific American Special Issue, 7*(1), 68.

Lie, E., & Newcombe, N. S. (1999). Elementary school children's explicit and implicit memory for faces of preschool classmates. *Developmental Psychology, 35*(1), 102-112. doi:10.1037/0012-1649.35.1.102

Lieberman, D. A. (2012). *Human Learning and Memory*. Cambridge: Cambridge University Press, 2012.

Newcombe, N., & Fox, N. (1994). Infantile amnesia: Through a glass darkly. *Child Development*, 65, 31–40.

Newcombe, N., Drummey, A., Fox, N., Lai E., Ottinger-Alberts W. (2000). Remembering Early Childhood: How Much, How, and Why (or Why Not). *Current Directions in Psychological Science*, 9(2): 55–58. doi:10.1111/1467-8721.00060

van der Kolk, B. A. (1994). The body keeps the score: memory and the evolving psychobiology of posttraumatic stress. *Harvard Rev Psychiatry, 1*(5): 253-65.

Paternal Sensitivity and Executive Functioning in Early Childhood: A Literature Review

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Sensitivity, which is one of the aspects of parenting behaviors, refers to perceiving the child behavior and responding accurately and in a well-timed manner. Although studies usually focus on maternal sensitivity and there are few studies on paternal sensitivity, researchers believe that paternal sensitivity is important for cognitive development in early childhood. The current literature review will focus on studies which examine paternal sensitivity and executive functioning as one of the significant components for cognitive development. The relationship between paternal sensitivity and development of executive functioning has not been examined sufficiently yet. Although it seems that there is not a strong relationship between paternal sensitivity and development of executive functioning in early childhood, the existing studies may not be enough to make accurate claims. Developing more appropriate coding systems to measure father sensitivity seems to be important since fathers and mothers can have different roles on their children's cognitive development. Further, adapted measurement tools from mothers may not reflect fathers' unique contribution. Future research should focus on not only paternal sensitivity but also paternal hostility or paternal scaffolding.

Keywords: paternal sensitivity, cognitive development, executive functioning

The relationship between cognitive development in early childhood and parenting behaviors became an exciting topic in developmental studies. It is widely known that because of the brain's plasticity, cognitive development can be affected by early relational experiences (Bernier et al., 2012; Bernier et al., 2010). These experiences are important when determining whether the synaptic connections will continue to be active or whether they will be pruned because of insufficient use.

Executive function (EF) development in early childhood is critical for learning, self-regulatory behavior, and mental health, hence it is an important element in children's cognitive development (Towe-Goodman et al., 2014). Executive functions can be defined as monitoring and controlling of thoughts and actions with higher order, self-regulatory and cognitive processes (Zelazo et al., 2003). Indeed, higher-order mental processes (i.e. working memory, cognitive flexibility, attention shifting, and inhibitory control) provide goal-directed behavior and flexibility in ambiguous or unusual situations (Fay-Stammbach, Hawes, & Meredith, 2014; Towe-Goodman et al., 2014). Executive functions influence different domains of child functioning including theory of mind, academic achievement, social and moral competence and emotion regulation (Lucassen et al., 2015). Individual differences in executive function skills are related to children's theory of mind in preschool years (Carlson, Mandell, & Williams, 2004), and attention and effortful control predict later social functioning including moral conduct (Kochanska, Murray & Harlan, 2000). Therefore, EF is an important cognitive construct for development of a child.

Executive functions are usually associated with the prefrontal cortex within a biological framework (Lucassen et al., 2015). The prefrontal cortex, which regulates perception, thought, and behavior seems to be a center to activate and inhibit other brain areas, and it is accepted as the primary location for executive functions in the brain (Garon, Bryson, & Smith, 2008). Therefore, it influences the

development of executive functions during early childhood (Diamond, 2006; Garon, Bryson, & Smith, 2008). Development of executive functions can be followed not only in early childhood but also in infancy period. For example, Diamond (2006) mentioned that the emerging of detour reaching, which necessitates some components of executive functions such as directing a goal, planning and inhibiting, can be seen in infants who are 8-12 months of age. Although more studies on this topic are needed to support the claims, it can be argued that executive functions begin to develop in the first 5 years of life, and the development of prefrontal cortex is affected by environmental experiences (Lucassen et al., 2015). Parenting can be an example of these environmental experiences. In early childhood, social interactions are valuable for the development of executive functioning, and parents having sensitive relationships with their children can serve as a support and increase the chance for development of executive functions by providing a positive and safe environment which is emotionally supportive and cognitively stimulating (Towe-Goodman et al., 2014). However, there has been little interest in the link between executive functioning and parenting behaviors which includes sensitive relationships with children (Fay-Stammbach, Hawes, & Meredith, 2014), especially fathers' importance on the development of executive functions in early childhood (Towe-Goodman et al., 2014).

Parenting behaviors are divided into four theoretical categories which are scaffolding, stimulation, sensitivity versus hostility, and control (Fay-Stammbach, Hawes, & Meredith, 2014). Parental scaffolding is associated with the guidance of parents to provide some strategies when the child is trying to solve problems which s/he would not be able to solve on her/his own (Rochette & Bernier, 2016). Parental stimulation helps children develop their cognitive skills with empowered interactions such as reading to children (Fay-Stammbach, Hawes, & Meredith, 2014). Social-cognitive theories argue that supportive behavioral control can be related to children's regulatory capacities (Fay-Stammbach, Hawes, & Meredith, 2014). For example, Bindman et al. (2013) found that low parental control is positively associated with the development of executive functions in early childhood.

Sensitivity, which can be defined as perceiving the meaning of the child's behavior precisely and giving an accurate response to this behavior (Ainsworth, Blehar, Waters, & Wall, 1978) is an important concept regarding children's cognitive development, and its relationship with executive functioning development in early childhood has yet to be investigated. To make it clear, infants can experience their social environment with their parents' appropriate and consistent responses. Hence, verbal and nonverbal communication, by stimulating and rewarding the child, enables an interactive environment for the child (Hibel et al., 2011). Thus, children can have successful experiences of influencing their social environment and they can trust their self-regulatory capacities with the help of these experiences, and they can meet the expectations of their environments in an organized way (Bernier et al, 2012).

Sensitive parenting enhances the cognitive, behavioral and emotional development of children, but the relationship between the development of executive functioning and sensitivity of parents has not received sufficient attention (Towe-Goodman et al., 2014). Nevertheless, children start to build confidence, enhance their self-regulatory capacities and acquire and develop skills for executive functions when they are supported with parental sensitivity (Bernier, 2012 & Towe-Goodman et al., 2014). Even in infancy, sensitivity is associated with prospective executive functioning (Fay-Stammbach, Hawes, & Meredith, 2014). Although parental sensitivity seems to be important for a child's development, studies in the literature usually focus on the relationship between the development of children's executive functions and mothers' sensitivity in early childhood (Lucassen et al., 2015). As an example of these studies, Bernier and colleagues (2010) found that executive functioning skills of children between 18-26 months of age are related with maternal sensitivity, mind-mindedness (i.e. parents' ability or tendency to recognize the independent thoughts of children and provide mental terms for them) and autonomy support (i.e.

supporting children to play an active role when they complete a task). These were assessed when the children were between the ages of 15 and 18.

Only a few studies focused on the relationship between paternal sensitivity and executive functioning in early childhood because fathers are usually perceived as secondary caregivers. In an insensitive caregiving environment, children's cognitive capacities decrease, but fathers can be an alternative for providing a sensitive environment for their children. Martin and colleagues (2010) claimed that paternal supportiveness, which includes sensitivity, compensates for the deficits in maternal supportiveness for children. On the contrary of the secondary or substitute caregiver approach, fathers' parenting has a significant role in cognitive development and regulatory skills of children, and mothers and fathers have independent and interrelated effects on the development of executive functions (Towe-Goodman et al., 2014). Mills-Koonce and colleagues (2015) pointed out that fathers have a unique contribution to children's cognitive development between 18 and 36 months and that the behavior of the mother does not limit fathers' positive contribution.

Mothers were believed to play a central caregiving role in previous studies. However, Lamb (1997) argued that the benefits of mothers' caregiving on children's cognitive development is similar to fathers' contribution. Interestingly, Malmberg and colleagues (2016) found that paternal sensitivity could be related to cognitive outcomes of children more than maternal sensitivity. They tried to explain their findings with an indirect effect of self-regulation, as a mediator to enhance the influence of fathers' sensitivity on children's cognitive outcomes. Indeed, the quality of father-child interaction at 7 months was positively related with children's self-regulation at 52 months (Kochanska et al., 2008). Executive functioning is one of the aspects of self-regulation, therefore, it may be helpful to examine fathers' sensitivity and its effects on the development of executive functions in early childhood.

One of the rare studies to examine fathers' sensitivity and executive function development was conducted by Towe-Goodman and colleagues in 2014. They found that children's executive functioning at 3 years of age was predicted by fathers' sensitive parenting at 24 months of age. However, they did not find the same effect when the child was at 7 months of age. On the other hand, mothers' parenting quality had similar effects on executive functioning not only in toddlerhood, but also in infancy. Their results overlap with the study of Bernier and colleagues conducted in 2012, which examined the relationship between the father and the child when the child was 18 months old, considering that previous studies have shown that fathers increasingly spend time with their children, as they grow older, and mothers are more active in early infancy. In their study, they found that the caregiving relationship, which includes the mother's sensitivity and the quality of the father-child interaction, could be a predictor for the differences in conflict-EF for the children who were 3 years old.

On the contrary, Lucassen and colleagues (2015) did not find significant results about the predictions of executive functioning related to fathers' sensitivity. They mentioned that fathers and mothers have different roles for children's development which influence each other. Indeed, fathers help children for stimulation, exploration or physical play, whereas mothers usually provide emotional support and warmth. They found that fathers' sensitive parenting was not related to executive functioning development, although previous studies found a relationship between paternal sensitivity and executive functioning development (Bernier et al., 2012; Bernier et al., 2010). The reason for this difference may be the different roles of fathers and mothers for children's development. When fathers have different attitudes in their roles, their effects may change. For instance, Lucassen and colleagues (2015) claimed that harsh parenting of fathers could be related to executive functioning development.

Harsh parenting / hostility and sensitivity are viewed as related constructs (Lucassen et al., 2015). These claims are consistent with previous studies which found that negative parenting of fathers is more effective than maternal parenting on children's behavior and development (Lucassen et al., 2015).

Hostility is related to the emotional behaviors which include a negative, critical and rejecting tone such as intrusiveness or negative affect (Fay-Stammbach, Hawes, & Meredith, 2014). According to Holochwost (2013), harsh or negative parenting can be associated with lower executive functioning, but sensitive parenting does not have a significant relationship with executive functioning.

Towe-Goodman et al. (2014) found that fathers' sensitivity does not have an independent and significant effect on children's executive functioning. The effect only emerged after accounting for maternal care quality, early cognitive skills of children, and other child and family factors (Towe-Goodman et al., 2014). Previous studies usually focused on parental scaffolding as another component of the development of EF, instead of parental sensitivity. This finding can be understood because instead of sensitivity, the findings of previous studies showed that there is a relationship between parental scaffolding and the development of children's EF (Bernier et al., 2010). Further, parental scaffolding is related to EF significantly when controlling for language development of children and prior EF. Lucassen et al. (2015) explained that EF flexibility might be related to parental scaffolding although it is assumed that the variance in parenting cannot be explained with only one aspect.

Lastly, it can be important to focus on the tools that were used in these researches to measure fathers' sensitivity. Since fathers' and mothers' sensitivity can play different roles in children's development as mentioned above, the measurement tools which were adapted from mothers' scales may focus on wrong points, and therefore, more sensitive measurement tools may give more accurate results. For example, Bernier et al. (2012) used the Mutually Responsive Orientation Scale (MRO) -a scale that is not an adapted version- to measure the quality of father-child interaction. MRO focuses on the communication, cooperation, and emotional ambiance, and it has good psychometric qualities. Although the scale was not directly related to sensitivity, Bernier and colleagues used it to create a comprehensive index to assess parental behavior. It supports the importance of developing measurement tools primarily for fathers as mentioned above.

Both Towe-Goodman et al. (2014) and Lucassen et al. (2015) also used an observational method to assess fathers' sensitivity, although their coding systems were different. In the study of Towe-Goodman et al. (2014), free play was observed at 7 months and at 24 months, while the parents and children completed a puzzle. Lucassen and colleagues (2015) used four problem-solving tasks. They coded sensitivity with revised Erickson scales (Egeland et al., 1990). The sensitivity scores were chosen from the supportiveness subscale which was scored on a 7-point rating scale. Towe-Goodman and colleagues (2014) used Sensitivity/Supportive Presence, Detachment/Disengagement, Stimulation of Cognitive Development, Positive Regard and Animation subscales which was derived from Cox & Crnic (2002) and NICHD (1999). Sensitivity/Supportive Presence assesses well-timed, well-paced and appropriate feedbacks of parents which consist of emotionally and responsively supportive behaviors. The Detachment/ Disengagement subscale focuses on negative, uninvolved or disengaged behaviors in parent-child interaction. The Stimulation of Cognitive Development subscale focuses on parents' intentive attempts to stimulate or teach the child. The Positive Regard subscale assesses parents' positive feelings for their children, physical affection and the speaking tone, specifically, whether it is warm or not. The Animation subscale captures the effortful intentions to animate the parent's face and voice in an activity. The coding systems which were used in the study of Towe-Goodman et al. (2014) focused on well-timed, well-paced and appropriate responses to children's cues, but the coding systems in the Lucassen et al. (2015) focused on positive emotional regard, support and expression of confidence.

Conclusion

In conclusion, fathers may play a role in the executive functioning development of early childhood. However, more accurate measurement tools and more studies that focus on different aspects of parenting (i.e. paternal sensitivity, paternal scaffolding or hostility) are needed.

Paternal sensitivity and development of executive functions have not been examined sufficiently to make a conclusion yet. It can be said that different parenting behaviors of fathers such as hostility or scaffolding have a relationship with executive functioning development; however, paternal sensitivity still needs to be further examined.

Future research should contain a broader range of age, should focus on different parenting practices used in different cultures, and should consider different developmental stages of children. It is important to evaluate fathers as one of the primary attachment figures like mothers because they may play important roles on children's cognitive development. Effective interventions that would contribute to children's development could be developed after an in-depth examination of paternal hostility and sensitivity.

References

Ainsworth, M., Blehar, M., Waters, E., & Wall, S. (1978). Patterns of attachment: Observations in the Strange Situation and at home. *Hillsdale, N: Erlbaum*.

Bernier, A., Carlson, S. M., Deschenes, M., & Matte-Gagne, C. (2012). Social factors in the development of early executive functioning: A closer look at the caregiving environment. *Developmental Scienc*e, *15*, 12–24.

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development*, *81*, 326– 339.

Bindman, S. W., Hindman, A. H., Bowles, R. P., & Morrison, F. J. (2013). The contributions of parental management language to executive function in preschool children. *Early Childhood Research Quarterly*, 28, 529–539. doi:10.1016/j.ecresq.2013.03.003

Carlson, S. M., Mandell, D. J., & Williams, L. (2004). Executive function and theory of mind: stability and prediction from ages 2 to 3. *Developmental psychology*, *40*(6), 1105.

Cox, M. J., & Crnic, K. (2002). Qualitative ratings for parent-child interaction at 3-12 months of age. *Unpublished manuscript, University of North Carolina at Chapel Hill*.

Diamond, A. (2006). The early development of executive functions. *Lifespan cognition: Mechanisms of change*, *210*, 70-95.

Egeland, B. R., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (24). Months coding manual: Project steep–revised 1990 from mother-child project scales. *Minneapolis, MN: Department of Psychology*.

Fay-Stammbach, T., Hawes, D. J., & Meredith, P. (2014). Parenting influences on executive function in early childhood: A review. *Child Development Perspectives*, *8*(4), 258- 264.

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: a review using an integrative framework. *Psychological bulletin*, *134*(1), 31.

Grossmann, K., Grossmann, K. E., Kindler, H., Zimmermann, P., Cassidy, J., & Shaver, P. R. (2008). Handbook of attachment: Theory, research, and clinical applications. *Handbook of attachment: Theory, research, and clinical applications*, 857-879.

Hammond, S. I., Müller, U., Carpendale, J. I., Bibok, M. B., & Liebermann-Finestone, D. P. (2012). The effects of parental scaffolding on preschoolers' executive function *Developmental Psychology*, *48*(1), 271.

Hibel, L. C., Granger, D. A., Blair, C., Cox, M. J., & Family Life Project Key Investigators. (2011). Maternal sensitivity buffers the adrenocortical implications of intimate partner violence exposure during early childhood. *Development and Psychopathology*, *23*(2), 689-701.

Holochwost, S. J. (2013). *Cumulative Risk, Parenting Behaviors, and the Development of Executive Functions in Early Childhood: A Moderating Role for Physiological Self- Regulation?* (Doctoral dissertation, The University of North Carolina at Chapel Hill).

Kochanska, G., Aksan, N., Prisco, T. R., & Adams, E. E. (2008). Mother-child and father-child mutually responsive orientation in the first 2 years and children's outcomes at preschool age: Mechanisms of influence. *Child development*, *79*(1), 30-44.

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: continuity and change, antecedents, and implications for social development *Developmental psychology*, *36*(2), 220.

Lamb, M. E. (1997). The development of father–infant relationships. In M. E. Lamb (Ed.), The role of the father in child

development (pp. 104-120). Hoboken, NJ, US: John Wiley & Sons Inc.

Lucassen, N., Kok, R., Bakermans-Kranenburg, M. J., Van Ijzendoorn, M. H., Jaddoe, V. W., Hofman, A., Verhulst, F. C., Lambregtse-Van den Berg, M. P., & Tiemeier, H. (2015), Executive functions in early childhood: The role of maternal and paternal parenting practices. *British Journal of Developmental Psychology*, 33: 489-505. doi:10.1111/bjdp.12112

Martin, A., Ryan, R. M., & Brooks-Gunn, J. (2010). When fathers' supportiveness matters most: Maternal and paternal parenting and children's school readiness. *Journal of Family Psychology*, *24*(2), 145.

Malmberg, L. E., Lewis, S., West, A., Murray, E., Sylva, K., & Stein, A. (2016). The influence of mothers' and fathers' sensitivity in the first year of life on children's cognitive outcomes at 18 and 36 months. *Child: care, health and development*, *42*(1), 1-7.

Mills-Koonce, W. R., Willoughby, M. T., Zvara, B., Barnett, M., Gustafsson, H., Cox, M. J., & Family Life Project Key Investigators. (2015). Mothers' and fathers' sensitivity and children's cognitive development in low-income, rural families. *Journal of applied developmental psychology*, *38*, 1-10.

NICHD Early Child Care Research Network. (1999). Child outcomes when child care center classes meet recommended standards for quality. *American Journal of Public Health*, *89*(7), 1072-1077.

Towe-Goodman, N. R., Willoughby, M., Blair, C., Gustafsson, H. C., Mills-Koonce, W. R., & Cox, M. J. (2014). Fathers' sensitive parenting and the development of early executive functioning. *Journal of Family Psychology*, *28*(6), 867.

Rochette, É., & Bernier, A. (2016). Parenting and preschoolers' executive functioning: A case of differential susceptibility?. *International Journal of Behavioral Development*, *40*(2), 151-161.

Zelazo, P., Müller, U., Frye, D., Marcovitch, S., Argitis, G., Boseovski, J., . . . Carlson, S. (2003). The Development of Executive Function in Early Childhood. *Monographs of the Society for Research in Child Development*, *68*(3), I-151.