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The Factual and Ontological Roots of Psychological Misconceptions: A Study on University Students in İstanbul

Psikolojik Yanılgıların Olgusal ve Ontolojik Kökleri: İstanbul'da Yaşayan Üniversite Öğrencileri Üzerine Bir Araştırma

Busra Eylem Aktas [1], Zeynep Temel [1] & Filiz Kumova [2]

[1] Istanbul Medipol University, Faculty of Humanities and Social Sciences, Department of Psychology, Istanbul, Türkiye
[2] Fatih Sultan Mehmet Vakif University, Faculty of Humanities and Social Sciences, Department of Psychology, Istanbul, Türkiye

Abstract

Speculations about psychology are widespread and difficult to reduce. Based on this, several studies have already examined the underlying reasons behind holding misconceptions about psychology. In previous studies, cognitive thinking styles were considered the ontological roots of misconceptions, whereas the media and education were considered the factual roots of misconceptions about psychology. However, as a limitation of past research, a smaller number of studies have investigated the interactions between the factual and ontological roots of misconceptions in holding misbeliefs about psychology. In this pre-registered study (N = 598), we aimed to delve deeper into the associations between analytical thinking tendencies, printed, visual, and social media usage, and education (psychology major [n = 350] vs. other majors [n = 248]). The findings showed that psychology students, compared to students from other majors, had fewer misconceptions. Additionally, higher levels of analytical thinking tendency were correlated with holding fewer misconceptions. Moreover, the results showed that there were no significant interactions between psychology education and analytical thinking tendency. Furthermore, there were negative relationships between misconceptions and the usage of print, social, and visual media. In addition, the significant moderator role of analytical thinking tendency was evident in the link between the usage of printed media and held misconceptions. Overall, the present research might shed light on future work aiming to reduce the spread of misconceptions about psychology by indicating the contributions of both ontological and factual sources of misconceptions in holding less erroneous beliefs about psychological concepts.

Öz

Psikoloji ile ilgili spekülasyonlar yaygındır ve azalması zordur. Bu bağlamda, hali hazırda birçok çalışma psikolojiyle ilgili yanılgıların temel nedenlerini incelemiştir. Önceki çalışmalarda, bilişsel düşünme eğilimleri yanılgıların ontolojik nedenleri olarak kabul edilirken, medya ve eğitim ise psikolojiyle ilgili yanılgıların olgusal nedenleri olarak kabul edilmiştir. Ancak önceki araştırmaların bir sınırlaması olarak, yanılgıların olgusal ve ontolojik kökleri arasındaki etkileşimleri inceleyen çalışmalar nadirdir. Bu ön kayıtlı (*pre-registered*) çalışmada (N = 598), analitik düşünme eğilimi, yazılı, görsel ve sosyal medya kullanımı ve eğitim (psikoloji bölümü [n = 350] vs. diğer bölümler [n = 248]) arasındaki ilişkilerin derinlemesine incelenmesi amaçlanmıştır. Bulgular, psikoloji öğrencilerinin diğer bölümlerden gelen öğrencilere kıyasla daha az yanılgıya sahip olduğunu gösterdi. Ayrıca, daha yüksek analitik düşünme eğilimi seviyelerinin daha az yanılgıyla ilişkili olduğu bulundu. Bunun yanı sıra sonuçlar, psikoloji eğitimi ile analitik düşünme eğilimi arasında anlamlı etkileşimler olmadığını gösterdi. Ayrıca, yazılı, sosyal ve görsel medya kullanımı ile yanlış anlamalar arasındaki ilişkilerin negatif olduğu bulundu. Ek olarak, analitik düşünme eğiliminin yazılı

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Corresponding author: Busra Eylem Aktas busra.aktas1@medipol.edu.tr

medya kullanımı ile yanlış anlamalar arasındaki bağlantıda anlamlı bir düzenleyici rol oynadığı tespit edildi. Genel olarak, bu çalışma gelecekte, psikolojiyle ilgili yanılgıların yayılmasını azaltmayı amaçlayan çalışmalara ışık tutabilir ve psikolojik kavramlar hakkındaki yanılgıların ontolojik ve olgusal kaynaklarının birlikte katkılarını göstererek bu alandaki çalışmalara yol açabilir.

Keywords Psychological myths · misconceptions about psychology · education · analytical thinking · media

Anahtar Kelimeler Psikolojik mitler · psikolojik yanılgılar · eğitim · analitik düşünme · medya

The Factual and Ontological Roots of Psychological Misconceptions: A Study on University Students in İstanbul

Given the fact that studies on the human mind and behavior are one of the fields that could have a strong influence on everyday life, the public image of psychology has been popularized. The popularization of psychology used attempts to inform the public regarding scientific knowledge, while it also increased the risk of facing the public with a considerable number of invalidated, oversimplified, and misinterpreted information. Beyond the risk of spreading misconceptions about psychological concepts among lay people, this could also lead people to misdiagnose themselves, overestimate (or underestimate) the problems, seek help from ineffective programs, and lose time to get help from an expert. Therefore, unveiling the roots of misconceptions about psychology is considered an important step for tackling the abovementioned risks (Lilienfeld et al., 2010).

In line with this, a growing number of studies have examined the potential factors that can ease the acquisition of misconceptions. Misconceptions have been defined as “inaccurate prior knowledge” by Taylor and Kowalski (2014, p. 259). Given the variations among previous definitions and recently obtained research findings (diSeSSa, 2006; Taylor & Kowalski, 2014), Bensley and Lilienfeld (2017, p. 378) proposed a more comprehensive definition of misconceptions about psychology as “claims about behavior and mental processes that are unsupported or contradicted by high-quality psychological research, that is, they are assertions inconsistent with well-established scientific research.”

Compatible with the abovementioned definition, Hughes et al. (2013) described two distinct categories as the roots of misconceptions about psychology: ontological and factual based misconceptions. On the one hand, cognitive biases were considered an ontological factor to obtain psychological misconceptions. On the other hand, formal education and media were addressed as factual factors to learn misinformation about psychology (Lewandowsky et al., 2012; Taylor & Kowalski, 2004). There are already several studies regarding the relationships between media, education, cognitive biases, and misconceptions about psychology. Past findings consistently revealed negative associations between misconceptions and the tendency for analytical thinking, while the results revealed mixed evidence regarding the link between psychological misconceptions, media usage, and education (Hughes et al., 2015; Kowalski & Taylor, 2009; Taylor & Kowalski, 2004). Some studies have shown a negative correlation between education and misconceptions (Gonzales-Cuevas et al., 2016), while positive correlations have been observed between media usage and misconceptions (Curtis & Kelley, 2023; Ferguson et al., 2022). However, there is also evidence suggesting that students’ self-reports indicate education as a source of misconceptions (Landau & Bavaria, 2003), whereas (printed) media contributes to fewer misconceptions (Gardner & Brown, 2013).

Hereby, in this pre-registered study, we aimed to examine the relationships between analytical thinking tendency, following media about psychology (including print, social, and visual media), academic major (psychology or others), and holding misconceptions about psychological concepts in a college sample.

Misconceptions about Psychological Concepts: Ontological and Factual Reasons

The roots of misconceptions about psychological concepts seem to be driven by both ontological (cognitive biases) and factual (as education and media) roots (Hughes et al., 2013). Ontological misconceptions refer to the naive theories held by laypeople about the human mind and behavior. In simpler terms, it means that people who are not experts in the field may have incorrect or simplistic ideas about how the mind and behavior work (e.g, individuals use only 10% of their brains). The dual process model is one of the explanations often used to understand the ontological origins of misconceptions (Bensley et al., 2017). The dual-process model, which divides cognitive thinking styles into intuitive (System 1) and analytical (System 2; intuitive) processes, relates to misconceptions as individuals often rely on quick, intuitive judgments (System 1), which are prone to biases and errors, instead of engaging in slower, effortful analytical reasoning (System 2; analytical) that could correct these misconceptions. Thus, in the dual process model, two distinct modes of human decision-making were proposed: intuitive and analytical thinking processes. On the one hand, intuitive thinking has been characterized as the default mode to guide behavior with rapid, automatic, and unconscious processes (Evans, 2012). The automatic and faster nature of intuitive thinking is described to ease people from postulating initially obtained irrational beliefs unless analytical thinking intervenes (Kahneman, 2011). Analytical thinking, on the other hand, has been described as intervening with intuitive thinking by activating effortful, longer, and conscious processes. The activation of analytical thinking, in this context, has been demonstrated as an effective approach to reducing irrational beliefs (Aarnio & Lindeman, 2005; Pennycook et al., 2012; Tosyali & Aktas, 2021; Vieira & Tenreiro-Vierira, 2016). Compatible with this, previous research documented the superiority of analytical thinkers in having fewer misconceptions (Bensley et al., 2014; Cho, 2021; Schwarz et al., 2016).

Another category of misconceptions is called factual misconceptions. Psychological misconceptions might arise from external sources like popular media, everyday conversations, or any situation where people share informal information, and even formal education or reliable sources, in some cases. For instance, previous work demonstrated that psychology students reported that they obtained psychological misconceptions from the courses they took (Landau & Bavaria, 2003); and educated people may believe misconceptions about their expertise, such as the belief that "people use only 10% of their brain" or "schizophrenia involves split personalities (Lilienfeld et al., 2010). On the other hand, Furnham and Rawles (1993) found that psychology students had fewer misconceptions. Furnham et al. (2003), in addition to this, claimed that reading serious sources about psychology was negatively related to misconceptions. In parallel, Cho (2021) showed a negative relationship between misconceptions and the number of psychology courses taken.

However, the results obtained from previous work are contradictory in the association between education and holding misconceptions. Interestingly, even some professionals can continue to hold misconceptions in the field of their expertise (Benjamin et al., 1984; Herculano-Houzel, 2002; Lilienfeld et al., 2010). Landau and Bavaria (2003), for instance, found that 38% of the participants reported psychology courses or instructors as the source of misconceptions. In another study, Holmes and Beins (2009) showed that psychology students tended to perceive psychology as less of a science over time. Additionally, 30% of students who completed a psychology course still maintained the misconception that individuals with schizophrenia have a "split personality" (Gardner and Dalsing, 1986), and three-quarters of students attending psychology courses were found to believe the myth that "most people only use 10% of their brain potential" (Higbee & Clay, 1998). Thus, there are mixed findings regarding the relationships between accepting erroneous beliefs and psychology courses taken or the education regarding the field of expertise of the people (Hughes et al., 2013).

Additional research sought to show effective teaching methods to combat spreading misconceptions about psychological concepts among university students. Past evidence consistently showed the efficiency of the refutation method in teaching to reduce misconceptions (e.g. Taylor & Kowalski, 2009; Kowalski & Taylor, 2017; Menz et al., 2021). Namely, the refutation method aims to lead students to question previously held misinformation and present a newly correct version of the prior inaccurate information (Kowalski & Taylor, 2009). In general, the refutation method supports students to learn much better how they should evaluate newly acquired knowledge without engaging in a cognitive bias (Menz et al., 2021; Prinz et al., 2022; Taylor & Kowalski, 2014).

Yet, before students attend psychology lessons, a myriad of preexisting misconceptions might already be held. Based on this, a limited number of studies have attempted to unveil the potential origins of misconceptions about psychology. In one of these previous studies, a significant number of students were found to attribute their misconceptions about psychology to the media sources (Taylor & Kowalski, 2003; Taylor & Kowalski, 2004). However, in another study, individuals reading news magazines (such as Time and Newsweek) were found to hold fewer misconceptions (Gardner & Brown, 2013). The researchers assessed those findings that pointed to a greater inclination for critical thinking among news readers (Holmes & Beins, 2009; Kowalski & Taylor, 2004; McCutcheon, 1991) . However, they did not directly examine whether there is a positive association between analytical thinking and news reading. In addition, several researchers mentioned the popular media channels and over-simplified textbooks as potential sources of misconceptions about psychological concepts (e.g. Hughes et al., 2013; Stanovich, 2009). Therefore, there is a need for further research examining the complex relationships between using different media sources, analytical thinking, and holding misconceptions to provide a comprehensive understanding regarding the previously documented mixed results.

The Present Study

Based on previous research, misconceptions about psychology could be attributed to two primary sources: ontological and factual information. In this research, media and education were considered as factual based while cognitive thinking was considered ontological based misconceptions. However, as a limitation of the existing literature, most of the research focused on either factual or ontological roots of psychological misconceptions. In this research, therefore, we aimed to examine the combination of both factors to unveil the complex relationships between misconceptions about psychology, media usage, education, and cognitive thinking style to provide a comprehensive understanding. Thus, the primary objective of this research was to specifically investigate whether there is a relationship between analytical thinking tendency, education in psychology, the frequency of utilizing three distinct media outlets (visual, social, and printed) to obtain information about psychological concepts, and holding psychological misconceptions. In addition, considering previously shown mixed findings, we also examined the interactions between cognitive thinking style and psychology education in holding less (or more) misconceptions about psychology. Moreover, given that there is a lack of information regarding the interactions between media usage and cognitive thinking styles, we exploratorily investigated the moderator role of analytical thinking in the association between the levels of media usage (social, printed, or visual) and holding misconceptions about psychology.

The hypotheses of this study are as follows:

H1. Psychology students report fewer misconceptions about psychological concepts than students from other majors.

H2. Participants who had superior analytical thinking scores reported fewer misconceptions about psychology than participants who had lower analytical thinking scores.

H3. Psychology students with superior analytical thinking skills reported fewer psychological misconceptions, relative to participants from other majors.

H4. Analytical thinking skills and social, visual, and print media usage significantly predict misconceptions about psychological concepts.

Methods

Participants

Data were collected online from 598 college students. Informed consent was obtained from all of the participants. Initially, the participants were asked to report whether they were studying psychology or not by a binary question. Detailed information about the demographics of the participants is presented in Table 1.

Table 1

Demographic Characteristics of Psychology and Non-psychology Students

	Psychology (*n* = 347)	**Other (*n* = 248)**
Female	314 (89.7%)	178 (71.8%)
Male	36 (10.3%)	70 (28.2%)
1st Grade	34 (9.8%)	46 (18.5%)
2nd Grade	73 (21%)	54 (21.8%)
3rd Grade	111 (32%)	72 (29%)
4th Grade	129 (37.2%)	76 (30.1%)

Psychology (*n* = 350) and other majors (*n* = 248) were asked to answer questionnaires via an online data collection platform. The majority of the participants were female (*n* = 492, 82.3%). Table 2 presents the descriptives of the main variables.

Table 2

Mean and Standard Deviations of Main Variables

	Psychology Students	**Non-Psychology Students**
MP	2.87 (0.2)	3.05 (0.15)
AT	4.06 (1.87)	3.69 (1.93)
VM	5.07 (1.19)	3.93 (1.34)
SM	5.27 (1.31)	3.88 (1.43)
PM	4.87 (1.31)	3.38 (1.58)

Note. Standard deviations were presented in parantheses.

AT= Analytical thinking; MP = Misconceptions about psychological concepts; VM = Frequency of being exposed to psychological topics via visual media; SM= Frequency of being exposed to psychological topics via social media; PM = Frequency of being exposed to psychological topics via printed media.

Twelve percent of the participants were in their first year, 20% were in their 2nd year 30 % were in their 3rd year and 33% were in their 4th year. In addition, we asked participants from non-psychology departments to write the major they studied (see Table 3 for the faculties of non-psychology students). Besides, non-psychology students reported whether they obtained any additional psychology education to ensure their unfamiliarity with psychological concepts. Only 10 participants studying in other departments reported their participation in training in the field of psychology. We also asked three open-ended questions regarding the details in relation to the type, duration, and year of the education. Four of them reported their majors'

as an answer to this question, probably due to a misunderstanding. Only six of ten participants reported an education program related to psychology (e.g., short-term solution-centered therapy about two days, cognitive psychology about one year, law and psychology about one semester, positive psychology about six months, sports psychology about four years, and play therapy about six weeks). Therefore, we can conclude that the majority of the participants from other majors than psychology did not acquire about the psychological concepts by any external academic program.

Table 3

Faculties Attended by Non-psychology Students

	f	%
Economic Administrative Sciences	20	8.93
Communication	11	8.93
Agriculture	1	0.45
Health Sciences	41	18.3
Literature	17	7.59
Architecture	23	10.27
Engineering	37	16.52
Business Administration	6	2.68
Education	24	10.71
Law	20	8.93
Fine Arts	5	2.23
Theology	7	3.12
Natural Sciences	7	3.12
Sports Sciences	5	2.23

Note. Twenty-four students did not report their departments.

Measures

The anonymized data including all of the items in this research have been deposited in the Open Science Framework database (see https://osf.io/bpxn5/?view_only=85a37bd2acc249a082854662e7e26450).

Demographics

The demographic questions were about education, including educational background, department, grade, and frequency of media exposure to psychology topics. The three questions regarding the frequency of media exposure to psychology-related topics were as follows: "How frequently are you exposed to visual/social/print media regarding psychology-related topics?". These three questions were coded with a seven-item Likert-type scale (1-*never*; 7-*everyday*) for each of the visual, social, and printed publication subtypes.

Misconceptions in Psychology Test

A 55-item Misconceptions in Psychology Test was used to obtain the number of misconceptions about psychological concepts held by students (Gardner & Brown, 2013). This questionnaire was devised using 11 different topic areas of myths (brain and behavior, development and aging, memory, intelligence and learning, consciousness, emotion and motivation, social psychology, personality, mental illnesses, psychology and law, and psychological treatment; Lilienfeld et al., 2010). Each topic has 5 items. Participants answered each question on a five-item (1 - *completely false,* 5-completely *correct*) Likert-type scale. The original questionnaire was in English. The researchers of this study translated the questionnaire into Turkish. After

the translation, we completed the back-translation process with an independent bilingual researcher to ensure the clarity of the items. Minor changes (e.g., selecting the appropriate word among synonyms) have been completed to finalize the Turkish version of the questionnaire. The internal reliability score was found to be good (Cronbach's alpha = .85)

Critical Reflection Test (CRT)

CRT was first developed by Frederick (2005) and translated to Turkish in a previous study (e.g., Bahçekapili & Yilmaz, 2017; Thomson & Oppenheimer, 2016) as a three question test to measure the level of analytical thinking tendency. Each question has a correct and an incorrect (intuitive) answer. Correct answers are worth 1 point each, and incorrect answers are worth 0 points. Missing answers were calculated as incorrect (intuitive) responses. The CRT-1 score was calculated as the sum of the points. Criticisms of CRT-1 questions, such as becoming common knowledge for potential participants and being composed of only mathematical questions, led to the development of a new CRT questionnaire, CRT-2, with four questions (Thomson & Oppenheimer, 2016). The scoring of CRT-2 remained the same as that of CRT-1. In the present study, the scores of CRT-1 and CRT-2 (Cronbach's alpha = .74) were combined and a composite score (sum of the scores of the mentioned seven questions in total) for analytical thinking was calculated. Higher scores indicated higher levels of analytical thinking tendency. The maximum score that could be gained from this test was 7, and the minimum score that could be gained was 0.

Procedure

The Ethics Committee approval (18/07) was obtained from the Social Sciences Ethics Committee of Fatih Sultan Mehmet University on 27th October 2022. Data were collected from two different private universities in Istanbul. Researchers made the announcement of the study via e-mailing university students. Participants were informed to gain an extra course credit as an incentive at the end of their participation. Participation took approximately 15 minutes to complete. At the end of the data participation process, we informed all participants about the aim of the research through a debriefing form and thanked them for their participation.

Data Analysis

Statistical analyses were conducted using SPSS 25. We began by examining bivariate correlations among the key variables. To test the first and second hypotheses, a 2 × 2 between-subjects ANOVA was performed. For the third hypothesis, we analyzed the interaction between students' majors and their analytical thinking scores in relation to reported psychological misconceptions. The fourth hypothesis was evaluated using a multiple linear regression analysis. Finally, we ran exploratory analyses to investigate whether analytical thinking tendency (low vs. high) moderated the relationship between media usage and beliefs in psychological misconceptions.

Results

Preliminary Analysis

Misconceptions in Psychology Test items representing accurate scientific information were coded as reversed items and the mean scores of the misconception items were calculated. Forty-two participants who failed the attention check question were excluded from the data. Furthermore, the analytical thinking scores of the participants were categorized as low (n = 347) and high (n = 251) using the median cut-off (4.00). Misconceptions about psychological concepts, analytical thinking, and the degree of exposure to psychological topics via visual, social, and printed media scores were analyzed to check the skewness and kurtosis

distribution of the results. It was found that all of the mentioned scores fit the normal distribution and the normality assumption was sustained. The present data were further analyzed for multivariate outliers using the Mahalanobis distance. No multivariate outliers were identified for a cut-off score of 20.52 (df = 5, p < .001).

The descriptive statistics of the study variables are presented in Table 4.

Table 4

Descriptive Statistics of the Main Variables

	Min.	Max.	M	SD
CRT	0	7	3.91	1.90
MP	2.24	3.55	2.95	.20
VM	1	7	4.60	1.37
SM	1	7	4.69	1.52
PM	1	7	4.69	1.60

Note. N = 598, CRT = Cognitive Reflection Test measuring analytical thinking; MP = Misconceptions about psychological concepts; VM = Frequency of being exposed to psychological topics via visual media; SM= Frequency of being exposed to psychological topics via social media; PM = Frequency of being exposed to psychological topics via printed media.

Main Analyses

First, we examined the bivariate correlations among the main variables. The correlation analysis revealed negative relationships between the number of psychological misconceptions held by students, analytical thinking, and the usage of visual, social, and print media to obtain information about psychological concepts. Table 5 presents the bivariate Pearson correlations among the study variables.

Table 5

Pearson Correlations Among the Number of Misconceptions Held, Media Usage, and Analytical Thinking Scores

	1	2	3	4
1. AT	−0.164***			
2. VM	−0.118**	0.23		
3. SM	−0.140***	0.10	0.64***	
4. PM	−0.203***	−0.21	0.57***	0.54***

Note. N = 598, *p < .05; **p < .01; ***p < .001, two-tailed. AT= Analytical thinking; MP = Misconceptions about psychological concepts; VM = Frequency of being exposed to psychological topics via visual media; SM= Frequency of being exposed to psychological topics via social media; PM = Frequency of being exposed to psychological topics via printed media.

To test the first and the second hypotheses, we conducted a 2 (low vs. high analytical thinking) x 2 (psychology vs. other majors) between-group ANOVA. As expected, the main effect of analytical thinking was significant on holding misconceptions about psychology, $F(2, 598) = 21.42$, $p < .001$, $\eta^2 = .035$. The results indicated that the misconceptions about psychological concepts scores of the psychology students (M = 2.87, SD = .20) were significantly lower than those of the students from other departments (M = 3.05, SD= .15) Additionally, as we hypothesized, students who have superior analytical thinking scores (M = 2.98, SD = .20) reported fewer misconceptions than students who have lower analytical thinking scores (M = 2.90, SD = .19), $F(2, 598) = 122.71$, $p < .001$, $\eta^2 = .17$.[1]To test the third hypothesis, we explored the interactions of the major of students (psychology vs. non-psychology) and the higher (and lower) analytical thinking scores on the

[1]Furthermore, we tested this hypothesis by controlling the usage of visual, social, and printed media to eliminate any third variable effect of media usage. Two-way ANCOVA analysis indicated that neither of the mentioned covariants had a significant effect (ps>.10). Thus, the results of the two-way ANOVA remained unchanged when being exposed to psychological topics via visual, social, and printed media were controlled.

psychological misconceptions reported. The two-way ANOVA analysis revealed no significant interaction between analytical thinking and major, p = .99. Thus, our hypothesis was not confirmed.

To test our fourth hypothesis, we conducted a multiple linear regression analysis[2]. As suggested, analytical thinking and print media usage were the variables predicting the number of misconceptions held, (ps < .001). However, unexpectedly, there was no link between social and visual media usage and misconceptions about psychology. Thus, these results partially support our last hypothesis. The results of the multiple linear regression analysis are presented in Table 6.

Table 6

Results of Multiple Regression on Misconceptions About Psychology

	Misconceptions about psychology				
R^2 = 0.7***	*ß*	*SE*	*p*	*LLCI*	*ULCI*
Analytical Thinking	-.17***	.004	< .001	-.026	-.01
Print Media	-.20***	.006	< .001	-.037	-.012
Social Media	-.05	.007	.34	-.021	.007
Visual Media	.03	.008	.56	-.011	.02

Note. ***p < .001, two-tailed.

Finally, we conducted exploratory tests on the moderating role of analytical thinking tendency (low vs. high) in the relationship between media usage and misconceptions about psychology. Three moderated regression models were run using Model 1 of SPSS's Hayes PROCESS Macropackage. In these models, the outcome variable was misconceptions about psychology, while the indicators consisted of social media, printed media, or visual media usage. Analytical thinking tendencies were included in the model as a continuous moderator across all three tested models.

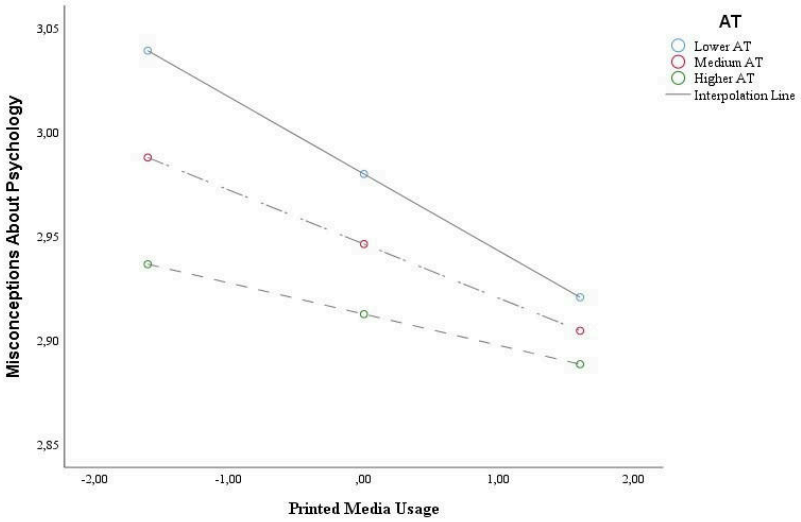
In the first model, social media usage was considered as a predictor. The model was significant, $F(3, 594) = 9.6$, $p < .001$, $R^2 = .05$. Results showed no significant moderator role of analytical thinking tendency, $p > .05$ while there was a significant association between social media usage and holding misconceptions about psychology, $b = -.02$, $SE = .005$, $p < .01$, 95% CI [-.03, -.008]. Besides, the link between analytical thinking and misconceptions about psychology was significant, $b = -.02$, $SE = .004$, $p < .001$, 95% CI [-.03, -. 009].

The second model tested was significant where the printed media usage was the predictor in holding misconceptions about psychology, $F(3, 594) = 16.53$, $R^2 = .08$, $p < .001$. Printed media was negatively associated with misconceptions about psychology, $b = -.03$, $SE = .005$, $p < .001$. In addition, analytical thinking tendency significantly and negatively predicted holding misconceptions about psychology as well, $b = -.02$, $SE = .004$, $p < .001$. Moreover, the moderator role of analytical thinking tendency was significant in the association between the levels of usage of printed media and misconceptions about psychology, $b = .006$, $SE = .003$, $p = .03$, 95% CI [-.002, .037]. In a sense, the negative relationship between printed media usage and misconceptions about psychology would be more salient when the levels of analytical thinking tendency were lower for the participants, compared to participants with moderate and higher levels of analytical thinking (see Figure 1).

[2]As no collinearity problem was detected for multiple regression analysis (VIF<3), we continued to evaluate the findings.

Figure 1

The Moderator Role of the Analytical Thinking in the Relationship between Printed Media Usage and Misconceptions about Psychology. AT = Analytical Thinking Tendency



The last model was significant in which visual media usage was the predictor of misconceptions of psychology in predicting misconceptions about psychology, $F(3, 594) = 8.61$, $p < .001$, $R^2 = .04$. Specifically, the results showed that the associations between misconceptions about psychology and media usage, $b = -.02$, $SE = .006$, $p = .005$, 95% CI [-.03, -.005] and analytical thinking, $b = -.17$, SE = .004, $p < .001$, 95% CI [-.02, -.009] was significant. However, the findings yielded no significant moderator role of analytical thinking tendency in the link between visual media usage and holding misconceptions about psychology, $p > .05$.

Discussion

The purpose of this study was to examine the relationships among misconceptions about psychological concepts, academic psychology education, analytical thinking tendency, and visual, social, and printed media usage. Our findings partially supported our expectations. First, as we hypothesized, the results showed that psychology students held fewer misconceptions about psychological concepts than non-psychology students. This finding aligns with prior research suggesting that psychology education is associated with a reduction in misconceptions (Cho, 2021; Furnham & Rawles, 1993; Kowalski & Taylor, 2009; Kuhle et al., 2009). However, some previous studies have reported contradictory findings in which psychology students still retained a considerable number of misconceptions or that education alone was insufficient to significantly reduce these misconceptions (Chew, 2004; Hughes et al., 2013; Landau & Bavaria, 2003). In other words, while the present findings are in line with some previous research showing that psychology education is associated with lower levels of misconceptions, they also point to the deeper complexity of how such misconceptions are formed and maintained. Several studies emphasize that the content and quality of education are crucial factors in reducing psychological misconceptions, rather than the mere presence of formal instruction (Kowalski & Taylor, 2017; Menz et al., 2021; Taylor & Kowalski, 2009). This perspective reflects the conceptual distinction between the factual and ontological roots of misconceptions (Hughes et al., 2013). From this viewpoint, formal education represents a factual source that can either help eliminate or, paradoxically, reinforce misconceptions—depending on how psychological knowledge is presented, structured, and critically discussed (Landau & Bavaria, 2003).

To address the factual roots of misconceptions about psychology, we investigated the associations between cognitive thinking styles and the misconceptions about psychology held by university students who

belonged to either the psychology department or other departments. Aligning with previously shown results, the present results demonstrated a negative relationship between holding psychological misconceptions and analytical thinking tendencies (Bensley et al., 2014; Cho, 2021).

Additionally, we also examined whether analytical thinkers studying psychology would be superior in believing fewer misconceptions, relative to students who belong to other departments, or not. The findings showed that students with higher analytical thinking scores had fewer misconceptions about psychological concepts than students with lower analytical thinking scores, regardless of their university majors. It is important to examine the connection between critical thinking education and the prevalence of psychological misconceptions. Critical thinking education requires individuals to reassess the information they receive. Instead of acquiring knowledge through rote memorization, processing information through a critical filter enables individuals to distinguish between accurate and inaccurate information more effectively. Various methods can be incorporated into the educational process to support the development of this skill (Bailin, 2002). As a result, students can critically re-evaluate the information they acquire (e.g., from social media, magazines, or news sources), reducing their likelihood of holding false beliefs. Thus, psychology education and analytical thinking skills were found to independently contribute to having fewer misconceptions. These findings point out the importance of questioning, ratiocination, and examining scientific evidence with a critical perspective for scientific education to combat holding misconceptions about psychology as it was the case regarding general misconceptions (Hughes et al., 2013). Therefore, the present results support the previously proposed arguments regarding structuring education systems to enhance critical thinking to combat erroneous beliefs in psychology among university students.

One of the factual sources of psychological misconceptions was proposed as the media (Hughes et al., 2013), but previous findings regarding the relationships between media usage and misconceptions were sparse. Thus, our results contributed to filling this gap by showing the negative relations between visual, printed, and social media exposure and accepting misconceptions about psychological concepts. In addition, the present findings demonstrated that the relationship between printed media and misconceptions about psychology was moderated by the levels of analytical thinking style. A particular study by Gardner and Brown (2013) documented similar findings by showing a negative link between holding misconceptions about psychology and reading newspapers such as Time and Newsweek. In addition, Furnham et al. (2003) showed that reading scientific books covering accurate knowledge about psychology positively predicts having accurate knowledge about psychological concepts. However, there was no prior research –up to date —regarding the moderator role of analytical tendency in the link between printed media usage to obtain information about psychological concepts and the number of misconceptions held. Combining the previously documented results with the present findings, reading print media products appears to be an efficient way to combat psychological misconceptions held among university students. Furthermore, building upon previous work (Cho, 2021; Gardner & Brown, 2013), the present results also contribute to the existing literature by demonstrating that greater analytical thinking abilities could enhance the efficiency of using printed media to reduce erroneous beliefs regarding psychological concepts.

In summary, since our dataset is correlational, it is not possible to determine whether students use media in a way that generates fewer misconceptions because they think analytically, or if, conversely, the way they use media makes them more analytical and less likely to have misconceptions. Although it may seem more reasonable to prioritize analytical thinking, we do not have definitive information on this matter. An experimental dataset is needed to explore this further. Based on this, there is a possibility that print media followers might be the students who are seeking more reliable sources to obtain information about psychology, relative to other students who use social media to acquire information about psychological concepts. One way to interpret these findings is through the lens of analytical thinking, which is closely

linked to the ability to assess and analyze information. Since the analytical thinking style leads people to be more critical and selective regarding newly acquired information, individuals with a higher propensity for analytical thinking might effectively use media sources to dispel misconceptions. However, there is a scarcity of research examining these complex relationships, which in turn deserve more attention in future work.

Limitations, Strengths, and Recommendations

There are many limitations to this study. First, the exploration of media exposure to psychological topics through various media channels was carried out using one-item questions. Further research is necessary to measure media usage with a more detailed scale that incorporates the intentions, goals, and attributions of the participants regarding their media usage. Additionally, we did not ask participants to report either the specific channels or the quality of the media sources from which they sought psychological information. Thus, future research should aim to gather more information about the frequently visited channels during media usage among college students to provide a more comprehensive analysis. Second, our participant group was recruited from two universities in Istanbul, Türkiye, and most participants were women. As a result, this limitation limits the generalizability of the present findings. Thus, future studies with a more representative sample of Turkish students (from diverse cities, regions, universities with or without accreditation, etc.) are required to examine the hypothesized relationships. Furthermore, our comparisons were confined to departmental differences (psychology vs. non-psychology) without delving into detailed comparisons of majors and participant characteristics in terms of their academic achievements. Moreover, although lacking empirical evidence, theoretical arguments suggest that misconceptions are associated with cognitive biases such as confirmation bias, illusory correlations, the tendency to infer causation from correlation, post hoc ergo propter hoc reasoning, and selective sampling (Lilienfeld et al., 2009; Schick & Vaughn, 2010). Additionally, it has been argued that misconceptions stem from a set of explanatory concepts (referred to as folk psychology) that individuals use to understand, predict, and influence behavior (Amsel et al., 2011). Therefore, future research should systematically investigate the independent or combined roles of these potential factors to provide a more comprehensive understanding. Therefore, future research that incorporates factors such as class standing (freshman or senior), educational accreditation, and GPA scores could help elucidate individual variations in the acceptance of misconceptions about psychological concepts among college students. Third, due to the relatively small effect sizes observed in the aforementioned relationships, it is important to evaluate our results with caution.

Receiving psychology education in Türkiye has gained increasing popularity over the last 15 years (Sümer, 2016). There are numerous psychology departments[3], some of which hold accreditation by the Turkish Psychological Association upon meeting stringent scientific quality criteria, while others are not accredited. As a limitation, we did not classify participants considering the accreditation of their departments. Possibly, being a student in an accredited psychology department would make a difference in the number of misconceptions held by students. Additionally, we did not ask about students' GPA scores or the number of lectures they attended about psychology. These factors could influence the relationship between education in psychology and the tendency to hold misconceptions about psychology. Therefore, future investigations can go further in this study by making comparisons among college students studying in psychology departments accredited and non-accredited as well as other characteristics of the academic education taken. Overall, the results of this study might contribute to the existing literature by showing that academic psychology education can reduce misconceptions about psychology, as shown in the present study.

[3] In Türkiye, 111 psychology departments are admitting students (in 2023).

Beyond the limitations mentioned above, this study might contribute to the existing literature in several ways. First, this is the only study exploring the associations between psychological misconceptions, media usage, cognitive thinking styles, and psychology education in Türkiye. Furthermore, we addressed the important factors that have been overlooked in the previous literature, such as the interactions between media usage and the analytical thinking tendency of students. Our results suggest, for the first time, that various types of media usage can be useful in combating misconceptions. Additionally, according to the present results, the positive role of printed media usage was more pronounced among students with higher levels of analytical thinking tendency.

Conclusion

Overall, the present study demonstrated both independent and combined contributions of factual (media, education) and ontological (analytical thinking tendency) roots of misconceptions in holding fewer erroneous beliefs regarding psychological concepts. In an era where misconceptions about psychology are increasingly prevalent both within universities and among the general public, this study can provide insight into the existing literature not only by showing the interactions of ontological and factual factors contributing to the origin of psychological misconceptions but also by providing data-driven evidence for future preventions/interventions to combat spreading erroneous beliefs about the field of psychology.

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Author Details

Busra Eylem Aktas (Assistant Professor)
[1] Istanbul Medipol University, Faculty of Humanities and Social Sciences, Department of Psychology, Istanbul, Türkiye
0000-0002-0125-7903 busra.aktas1@medipol.edu.tr

Zeynep Temel (Assistant Professor)
[1] Istanbul Medipol University, Faculty of Humanities and Social Sciences, Department of Psychology, Istanbul, Türkiye
0000-0001-8563-5635

Filiz Kumova (Assistant Professor)
[2] Fatih Sultan Mehmet Vakif University, Faculty of Humanities and Social Sciences, Department of Psychology, Istanbul, Türkiye
0000-0001-8420-629X

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