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The Effect of Taboo Content on Incidental Vocabulary Acquisition in a Foreign Language: A Facial Expression Analysis Study

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This study aims to examine how taboo content affects language learner psychology and language learning gains in a multi-modal learning environment by using facial expression analysis. 40 Muslim language learners were initially asked about their opinions on pork and watched a subtitled cooking video including pork visuals and their facial expressions were recorded. Before watching the video, only 20 of them were told it was lamb. The video was followed by a stimulated recall procedure, a cloze test and an output test. The results of the facial data analysis showed that Muslim learners were disgusted by the taboo content, which was in line with their opinions on pork taboo. However, this negative emotion did not significantly affect their test performance. Computer assisted facial expression analysis was also introduced as a biometric research technique for second language research.

Key words: EFL, FACET, facial expression analysis, taboo

Introduction

Our behaviors and perception are not solely moderated by reasoning and rational thinking; the societal and cultural norms have an influential role in governing our actions and our understanding of the world around us. These norms may be culture specific and vary from culture to culture, thus creating the term "taboo". According to the Encyclopedia Britannica (2012), taboo is "the prohibition of an action based on the belief that such behavior is either too sacred and consecrated or too dangerous and accursed for ordinary individuals to undertake." Hence, an ordinary action or content for one society may be restricted to another culture: Muslims and Jewish people do not consume pork and Hindus never eat beef due to religious restrictions.

For language learners, gaining only systematic knowledge of the target language can never be enough; they are also required to acquire the target schematic knowledge and be familiar with the target culture (Alptekin, 1993). However, embedding cultural topics in language learning materials requires intensive scrutiny; most language teaching materials are designed with utmost care by considering taboo topics in order not to psychologically offend learners from different cultures. One of these taboo topics is "pork" which is a sensitive content for Muslim and Jewish learners of English (Gray, 2002). ELT (English Language Teaching) instructors with Muslim and Jewish audience or publishers pursuing global acceptance avoid the inclusion of this taboo topic such as pig related figures, visuals or even words (i.e., sausage, pork, boar, sow) in their course materials and instructional content; thus diverting learners to learn them from out-of-class contexts. This approach has some merits: a concept, an image or a visual (e.g., a pig figure) that appears natu-

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ral to a European learner may be considered offensive by learners from certain cultures. Taboo offense was also investigated in some related research (Argungu, 1996; Khuwaileh, 2000; Timina & Butler, 2011) concluding that using taboo motives might pose a negative effect on learner and learner psychology.

Beside its merits, this censorship also seems controversial. An opposing argument is that taboo free ELT content only reflects a romanticized Western culture by focusing on only general themes such as family, festivals or travel (Banegas, 2011), presenting a fake and sanitized culture. The primary but strongest argument has its basis in religious beliefs; pig related visuals and words are censored since they are offensive and have a negative effect on Muslim or Jewish learners. However, the words "offensive" and "negative effect" are not clear enough; how "pork" as a taboo threatens language instruction or learner psychology and academic performance is still vague. Does it hinder learning processes or is it solely a topic, which learners personally avoid? Or, how do offended learners react emotionally when they are exposed to pork content during instruction and how does it affect memory performance?

By using facial expression analysis technique (Ekman, 1982; Essa & Pentland, 1997), this study primarily aimed to reveal moment-by-moment reactions of Muslim learners towards pork visuals in a multi modal learning environment by objectively recording their facial expressions while they processed pork content for learning purposes. The secondary aim of this research was to see whether pork visuals affected vocabulary learning gains or not.

Facial Expression Analysis Technique and Emotions

Our face is a complex signal system and facial expressions are the external representations of internal emotional states formed by muscle movements under our skin (Ekman, 1982; Kling & Brothers, 1992; LeDoux, 1993). Facial muscles create facial expressions, which temporarily change the facial profile. These changes are mostly brief and temporary; rarely lasting over 5 seconds or less than 250 milliseconds (Fasel & Luettin, 2003). These facial changes have long been considered to be linked to emotions (Buck, 1984; Fridlund, Ekman, & Oster, 1987) and facial expression analysis refers to the measurement and recognition of these facial expressions regarding specific emotions.

Human emotions are wide but finite. Basically 6 expressions of emotions were defined; joy, anger, disgust, fear, sadness and surprise (Ekman & Friesen, 1971). Apart from 6 emotions, there are 3 types of emotional valence, which refer to the direction of emotions as positive, neutral and negative (Smith & Kosslyn, 2013). Valence is an umbrella term covering a wide range of emotions in similar qualities (i.e., anger, sadness and fear are categorized under negative valence).

Analysis of facial expressions dates back to 19th century, albeit, in modern meaning, the most influential work in this area is considered that of Ekman and Friesen (1978), who proposed the Facial Action Coding System (FACS), the most widely used system for facial expression analysis today. FACS defined 44 pre-determined facial spots on the face, each referring to one or more facial muscles called 'Action Units' (AUs). FACS relies on the combinations of these AUs, which refer to a large set of possible facial expressions.

The development of computer based facial expression analysis based on FACS led the practical analysis of facial expressions; thus, recently this technique is on the rise. Its application is totally non-invasive and does not have specific requirements from the participants. Also, in a well implemented experiment, participants are not aware of having their facial expression tracked. Recent computer based facial expres-

sion analysis can provide process oriented data collection by performing real-time frame-by-frame analysis of facial expressions and outputs data for at least 6 emotions and three emotional valences (also see Picard, 1995 for the term "affective computing"). Various fields of research have started to adopt facial expression analysis such as psychology (Calvo, Gutiérrez-García, & Del Líbano, 2016; Neubauer, Woolley, Khooshabeh, & Scherer, 2016), artificial intelligence (D'Mello, 2015; Nazari, Lucas, & Gratch, 2015), food science (Danner, Sidorkina, Joechl, & Duerrschmid, 2014; Pellegrino, Crandall, & Seo, 2015;), market research (Neto & Filipe, 2016) and education (Flynn, 2014; GhasemAghaei, Arya, & Biddle, 2016). However, facial expression analysis in educational research is yet in its infancy and no studies exist on language learning and teaching context.

Previous Taboo Research in Language Learning and Teaching

In a critical perspective, taboo research in language pedagogy is contradictory, and says little about the link between taboos and learning performance. Additionally, solely aiming to reveal personal opinions of the learners, most related research is methodologically too subjective. Deckert (1996) examined the writing topic preferences of ESL learners with 105 Asian students enrolled in ESL writing courses at Michigan University. The students were asked to rate 20 topics and choose 10. The topics included both common subjects such as pollution, advertisements and health and taboo topics such as abortion, pre-marital relationships and bisexuality. According to the results, participants avoided writing about the taboo topics and were

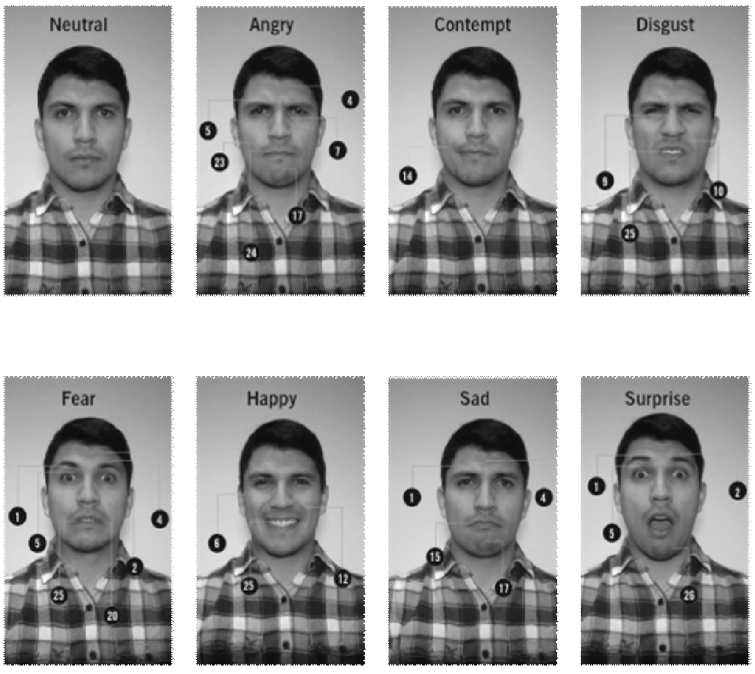

Figure 1 Some AUs, a neutral face and seven emotions (Taken from iMotions FACET™ FAQ)

mostly attracted by common subjects. Khuwaileh (2000) evaluated Jordanian EFL learners' perceptions towards sexually sensitive topics such as AIDS and birth control. Data was collected through a questionnaire, structured interview and classroom observations. The results showed that taboo topics caused learners to feel embarrassed and female learners in particular were fairly reluctant to discuss them. The author concluded that such topics should be avoided to maintain efficient learning. Hudson (2011) examined EFL learners' perceptions towards non-Islamic topics in Saudi Arabia. According to the questionnaire results, 60% of the participants were against using pork as a topic, along with sex, Christian values and alcohol. However, some participants also made positive comments, such as 'The fact that it is taboo and we should not eat it certainly does not mean that we cannot learn about it' (p. 133). In another study by Timina and Butler (2011), 70 Taiwanese students were asked to pick out topics uncomfortable for them, such as sex, politics, homosexuality and personal religious beliefs. The results of interviews and a questionnaire were inconclusive; 39% learners thought taboo topics should be avoided, while 34% were indecisive. Only 27% were positive about taboo topics. Learners also stated that such topics might be embarrassing, as they were not generally discussed in their native culture.

Not all previous taboo-related research showed negative results. Nelson (1999) aimed to create a gay-friendly classroom atmosphere and collected observational data from three ESL classes as they discussed sexual identity and homosexuality. This study also involved verbal data collection instruments such as written work, worksheets and interviews. The results showed that learners were not biased; they participated in discussions and showed an unexpected enthusiasm about the topics. In a more recent study, Tekin (2011) investigated Turkish EFL learners' attitudes towards instructional materials, including homosexuality and pre-marital sex. Pre- and post-questionnaires were used to collect data. Learners discussed these topics in the classroom and were asked how disturbing they found doing so. The learners were found to be enjoying the discussion and not being negative towards the materials. The author added that such topics acted as a catalyzer of motivation. Similarly, in Turkey, Üstünel and Öztürk (2014) evaluated 56 young EFL learners' attitudes, motivation and awareness of target language in a two-week culturally enriched class. They used an attitude and motivation questionnaire, interviews and took field notes to collect data. The learners were highly motivated with foreign culture themes.

Rather than relying solely on subjective data, this study adopted a process oriented biometric approach to reveal learners' emotional reactions while they processed pork content in a multi-modal learning environment and also aimed to reveal any possible effect of pork content on learning gains. Additionally, facial expression analysis as a biometric interdisciplinary technique was introduced for language learning and teaching research. Answers for the following research questions were sought:

1. What are the attitudes of Muslim learners towards pork?

2. How did Muslim EFL learners react to pork content in multi modal learning environment?

a. Were their facial expressions in line with their attitudes towards pork content?

3. Did pork content affect vocabulary learning gains?

Method

Design

This study had a between-subject design with two conditions: A "Pork" and a "Lamb meat" condition, in which a group of learners watched pork content (experimental group) and another

group watched lamb content (control group). Control group and experimental group actually watched the same video including pork but the control group was told that they will watch a recipe video involving lamb meat.

Participants

40 learners of EFL (English as a foreign language) (20 males and 20 females) from a university in Turkey in an age range of 19 to 23 voluntarily participated in this study and received course credit for their participation. All participants also filled out and signed a consent form in which a general information was given about the study. To control for any effect of language proficiency, participants were randomly chosen among volunteers, who completed English courses during the previous semester over an average of 80 points out of 100. All participants had the same L1 background and were brought up as Muslims without any international experience. None of the participants were vegetarian. The 40 participants were divided into two groups as the 'Pork Group' (PG) and the 'Lamb Group' (LG) and were randomly assigned to one of these groups. Both groups equally comprised 20 learners (10 males and 10 females). All participants had normal or corrected to normal eyesight and were naive to the research questions.

Apparatus

To collect facial expression data, FACET™ software by iMotions™ with an HD 720p Logitech™ webcam was used. This biometric platform automatically detects face in front of the computer with a high-quality HD webcam and acquires facial responses through a dedicated algorithm depending on the Facial Action Coding System (FACS) with 19 AUs. The software can register up to 30 frames per second for 7 emotions and 3 valences. In addition to basic 6 emotions, this software is able to analyze one extra emotion: contempt.

Instruments

Pork Taboo Survey

To determine participants' attitudes towards pork meat and ensure their unfamiliarity with pork, a 5-question survey was designed to investigate whether the participants had ever seen a pig or pork in real life, whether they had ever eaten pork meat or had any plan to eat it. Learners were also asked to state why they did not choose to eat pork. In the final question, learners were asked to match "pork" with an emotional expression (joy, sadness, surprise, disgust, anger, contempt and fear) or select "no emotion" option.

Disgust Scale

Disgust scale was a simple verbal data collection instrument in which learners were required to rate the dish from 1 to 10 after watching the recipe video. In this scale, 1 means 'extremely disgusting', 5 refers to 'neutral' and 10 is 'extremely delicious'. This instrument also included a question asking whether the participant would like to eat the meal or not.

Visual Stimulus

The visual stimulus used was a 3.20-minute cooking video with 1280 × 720 resolution, which described step by step how to cook "pork carnitas" – a special dish in Mexican cuisine. The original video was downloaded from the YouTube channel 'Food Wishes', shortened and edited by the researcher to add subtitles. 12 subtitle areas were produced and they were kept simple, comprising short and simple imperatives such as 'put, cut and add' and were 3–6 words in length. The final word for each

Table 1 *Non-words and semantic equivalents*

Non-Words	Semantic Equivalents
1. Baigs	Folio
2. Crigg	Knife
3. Drinn	Chopping board
4. Goomb	Bowl
5. Loast	Spice
6. Rhird	Tray
7. Smang	Spoon
8. Thoon	Oven
9. Toide	Strainer
10. Zirgs	Fat
11. Frupe	Water
12. Plood	Fork

subtitle was substituted with a five letter non-word generated from the ARC Non-Word Database (Rastle, Harrington, & Coltheart, 2002). Each subtitle lasted about 10 seconds. A sample substitution is shown below:

Cut the meat with a knife → *Cut the meat with a crigg*

Unannounced Post Test

The unannounced post-test consisted of 36 items and three main sections. Each item was scored as one point. In the first section comprising 12 questions, the same subtitles were given in the same order, leaving the non-word areas blank. Learners were asked to choose the correct non-words among the 18 items (6 extra non-words were given as distractors) and fill in the blanks. In this section, the Stimulated Recall Technique (STR) was used to promote retention: the researcher helped the learners by showing the video again, but with the non-words substituted with blanks. This section had a maximum duration of 5 minutes.

For the second section, similar to the first one, 18 non-words were given again, asking learners to place the correct non-words in the given 12 sentences. Unlike in the first section, the sentences did not match the subtitles: they were totally genuine and constructed by the researcher. The sentence structure was kept simple and high-frequency words were used to control any possible interference of EFL proficiency. For the 12 items, learners were given 5 minutes.

The final section was output-oriented; herein, the participants were shown pictures and were required to write down the correct non-words. This time, no clue or set of words were given. The duration of this section was also 5 minutes.

Procedure

For a preliminary study aiming to reveal learner attitudes towards pork, participants were given the Pork Taboo Survey one week before the experiment. The survey was conducted in-

dividually under the researcher's control, and participants were free to ask questions about the items. Preliminary findings were important for revealing any correlation between learner subjective pork perception and their real life reactions.

After a week, participants were given a schedule and sat for the experiment individually in a separate room. For facial expression data collection, all participants were baselined. Baselining is a type of calibration process for accurate facial data acquisition, wherein the software shows a grey screen for 6 seconds before the video and the participants' neutral facial profile is registered.

Before watching the video, the PG was told that they would watch, with English subtitles, a cooking video involving pork. After watching the video, they immediately took the disgust scale together with the unannounced post-test. For the LG, participants were tricked and instructed that they would watch a cooking video describing a dish involving lamb meat, with English subtitles. The same procedures were followed for this group. Although both groups watched the same video with the same English subtitles, LG perceived pork as lamb meat.

Data Analysis

Facial expressions were analyzed by iMotions FACET™ which works with FACS principles. It registers a facial frame every 32 milliseconds and ascribes a value to each frame regarding 7 basic emotions and 3 valences. This value is termed as "evidence number" ranging between -4 and +4. A positive evidence score means a stronger probability for an emotion to be expressed while negative values indicate lower probability. For instance, an evidence number of +4 for joy means that participant showed extreme joy towards a stimulus (i.e., laughter). Evidence number of -4 refers to no observable joy expression on the face of the participant. It should be noted that these values are the limits and are considered as extreme (see FACET Manual for details).

Facial data needs to be post processed for reliable results. Before analyzing facial expressions, all data frames were first post-processed by iMotions FACET™ with a minimum face size of 20% and two engines. After post processing, 90% data quality was obtained. The replays were watched by the researcher, and the remaining corrupted parts of the data (mostly caused by sudden head movements) were excluded by placing marker data. After post-processing, baselined raw data was exported for each participant to extract and analyze evidence scores for the 7 emotions and three valences.

After the extraction, the data were analyzed via *t*-tests to reveal group differences and effect of pork content on facial reactions. Descriptive statistics were also employed. To investigate the relationship between disgust scale and disgust evidence, Pearson correlation was used.

Pork Taboo Survey results were given through percentages. For post test results, *t*-tests were adopted to find out vocabulary learning gain differences between groups.

Results

Preliminary Findings: Learner Attitude towards Pork

The aim of this part was to introduce the results of the Pork Taboo Survey, which was conducted as preliminary research prior to the experimental phase. Survey results were important since they provided valuable insights about subjective pork perception of the participants. The results confirmed the expectations; 70% of the participants never saw a pig in real life. The remaining 30% had seen one at the zoo or in mountain villages; however, they probably saw wild boars. None of the learners had ever seen

pork meat or tasted it. Further, 90% of the participants reported that they would not eat pork or related foods under any circumstances, and 10% were curious about it and stated that they might eat it if they had to. Students were also asked why they did not eat pork meat within the scope of three main themes – religion, health and appearance – regarding the order of importance of their own preferences. The most important theme was religion; 80% of participants put it in the first place. They reported they did not eat pork as it was *haram* and was forbidden by Islam. This was followed by health: 57% of participants thought pork was unhealthy and put this option in the second place. Lastly, 30% of participants reported that they did not eat pork since they were disgusted by the appearance of a pig as an animal. Additionally, two participants added that the prohibition of pork meat was a matter of social pressure. For the final question, learners were asked to match pork with an emotional expression. 75% of the participants matched "pork" with disgust emotion. 25% of the participants linked pork with fear, anger and "no emotion" option.

In sum, participants were unfamiliar with pork regarding both appearance and taste, they showed a negative attitude towards it due to religious restriction and had a potential of feeling disgust.

Learner Reactions towards Pork: Facial Expression Analysis Results

This section aimed to present facial data results obtained while learners watched the recipe video. Mean values for 7 emotions and 3 valences were summarized below in Figure 2:

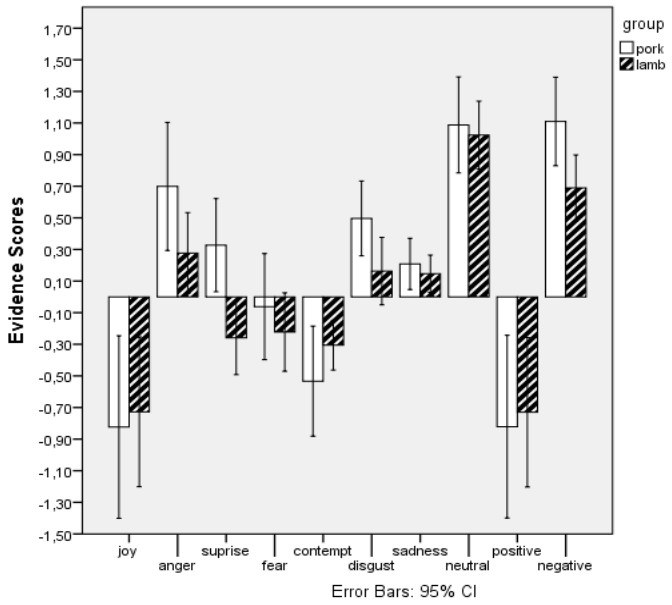

Figure 2 Evidence scores for each emotion and valence

Joy, Fear, Sadness and Contempt

For joy, both groups scored under zero: the PG (M = -.82, SD = 1.23) and the LG joy scores (M = -.72, SD = 1.01) were nearly similar. Members of both groups showed no joyful expression while watching the video. The results also showed that participants in both groups showed no expression of fear: The fear evidence for the PG (M = -.06, SD = .71) was similar to that of the LG (M = -.22, SD = .53). Likewise, for contempt, the PG scores (M = -.53, SD = .74) were nearly identical to the LG scores (M = -.30, SD = .33). Finally, for sadness, the PG (M = .20, SD = .34) and the LG scores (M = .15, SD = .25) were nearly equal. The evidence scores for the PG and LG were close for joy, sadness, fear and contempt and neither group exhibited a remarkable expression of these emotions.

Anger, Disgust and Surprise

For anger, the PG scores were higher (M = .69, SD = .86) than those of the LG (M = .27, SD = .54). Interestingly, the PG seemed more surprised (M = .32, SD = .62) than the LG (M = -.25, SD = .45) while watching the video. Similarly, for disgust, the PG was more likely to show disgust (M = .48, SD = .47) than the LG (M = .13, SD = .45). In sum, PG was found to have slightly greater expression of anger, surprise and disgust than LG group did.

Valence: Negative, Positive and Neutral

For positive valence, the PG (M = -.82, SD = 1.23) and LG scores (M = -.73, SD = 1.01) were close, meaning that the groups were equally negative towards the video. Similarly, the neutral valence scores for PG (M = 1.08, SD = .64) and LG (M = 1.02, SD = .45) showed that both groups had nearly equal neutral expressions. Finally, negative evidence score of the PG (M = 1.10, SD = .59) was higher than that of the LG (M = .68, SD = .44).

Facial data results indicated a negative stance of learners towards pork content covering especially anger, surprise and disgust. Values for joy, fear, sadness and contempt were similar between groups.

Learners' Attitudes versus Facial Expressions: The Case of Disgust Emotion

This section aims to 1) build a link between disgust scale and biometric data results (facial data), 2) whether groups differ significantly in terms of disgust emotion. For this aim, t-test and Pearson correlation were used.

Disgust was chosen as the "criterion emotion" since a majority of learners matched "pork" with "disgust emotion" in the Pork Taboo Survey. Additionally, results of the disgust scale given after watching the video showed that learners found pork significantly more disgusting (M = 4.30, SD = 1.89) than lamb meat, which was favored (M = 7.45, SD = 1.39); $t(38) = 5.988$, p = .000. Moreover, 75% of the learners in the pork condition reported that they would not eat the dish, and 20% were indecisive. In the LG, 80% reported that they would eat the meal and 20% were indecisive.

In sum, preliminary findings revealed a disgust tendency towards pork and disgust scale results indicated that learners were disgusted by the pork content. Results of the facial expression data also confirmed these results: Pearson correlation results indicated a negative relationship between disgust scale results and disgust evidence scores; r = -.388, n = 40, p = .013. Additionally, facial data results revealed a significant difference between groups in terms of disgust emotion expressed while watching the video; $t(38) = 2.323$, p = .026. In this respect, facial expression analysis findings validated the subjective learner attitude towards pork: Learners in the pork condition were ob-

served to have shown more disgust while watching the video, as they had stated in the disgust scale and pork taboo survey.

The Effect of Pork Content on Learning Gains

Learner opinions and facial data results consistently revealed that learners held a negative stance towards pork and they expressed disgust emotion while processing pork visuals in a multi modal language learning environment. Thus, the current research question was aimed to investigate any effect of this negative stance on vocabulary learning gains. The expectation was that learners' disgust of pork would have a negative impact on their vocabulary retention and post-test performance. Contrary to the predictions, learners who watched the pork content scored better in average ($M = 11$; $SD = 6.8$) than the lamb meat group ($M = 8.4$; $SD = 6$). Yet, this difference was not found to be significant; $t(38) = 1.326$; $p = .193$. Post-test consisted of 3 main components; a stimulated recall procedure, a close test and a writing-words section; respectively. For each component, the maximum score was 12. Mean scores for each group regarding 3 components were as follows:

According to Table 2, PG and LG scores were close and no statistically significant difference was found between their performances. Based on these findings, it can be proposed that pork content did not pose a threat to vocabulary learning gains.

Discussion

Attitudes and Facial Reactions Towards Taboo Content

Preliminary findings showed that Muslim learners were naive to pork due to their social milieu and would not consume it as part of their diet, mainly due to religious reasons. A majority of them also linked pork with the feeling of disgust. In this respect, Muslim learners kept their distance to pork and held a negative stance towards it. These findings confirmed some related research arguing that language learners do not relate well to taboo topics (Argungu, 1996; Deckert, 1996; Gobert, 2003; Hudson, 2011; Khuwaileh, 2000; Timina & Butler, 2011). The learners' negative stance towards pork also paralleled facial data analysis results: Muslim learners were disgusted by the pork content while watching the recipe video for language learning purposes.

Muslim learners not only thought pork was disgusting but also felt disgusted while processing the pork content for learning purposes. These confirmatory findings have shown that taboos should be handled with care during language instruction. In addition, results also supported Gray (2002) and Akbari (2008), who

Table 2 *Mean scores for Post-Test components*

	Group	Mean Score	Std. Deviation	Std. Error Mean	Sig.
Stimulated Recall*	pork	5.15	2.85	.63	.386
	lamb	4.40	2.54	.56	
Cloze Test*	pork	3.35	2.08	.46	.62
	lamb	2.10	2.02	.45	
Writing Words*	pork	2.65	2.81	.62	.363
	lamb	1.95	1.90	.42	

Note. *max score was 12 points

warned about taboo topics in ELT with the acronym "PARSNIPS" (politics, alcohol, religion, sex, narcotics, -isms and pork). These results also verified Gobert's work (2015), who emphasized that teachers of English with a Muslim audience (especially in the Gulf Region) should be sensitive to the use of taboo topics, including pork, in their instructional content as there is no legal protection for them.

Effect of Taboo Content on Incidental Vocabulary Learning Gains

Facial expression analysis findings indicated that the pork content invoked more emotional arousal, mostly consisting of negative emotions; especially disgust. Regarding learning gains, learners exposed to taboo content did not perform any worse: Disgusting pork content seemed to have no negative effect on language learning gains and memory performance. Emotionally loaded stimuli are distinct (Talmi & McGary, 2012) and remembered better than neutral stimuli (Cahill & McGaugh, 1995). Research on the relation between memory and emotion has shown that memory mechanisms are positively affected by the intensity of emotion experienced, regardless of the direction of emotional valence (Nielson & Powless, 2007; Talarico, LaBar, & Rubin, 2004). In this respect, emotional salience caused by pork content caused no negative impact on remembering the target words. The results of this study were also consistent with a similar study by Finn and Roediger (2011), who examined the role of emotional priming on vocabulary retention among Swahili learners. Their findings revealed that Swahili learners remembered significantly more word pairs that were primed by negative emotional pictures than the word pairs primed by neutral stimuli or a blank screen. Different from their study, this study found no significant difference between groups.

Taboos do not necessarily lead to poor cognitive performance as emotional intensity provided by taboo content may support memory mechanisms. Hence, the offense caused by the pork content is not related to academic performance but it is solely an emotional state caused primarily by pork taboo determined by cultural norms.

Conclusion

This study explored how taboos might affect learner psychology and language learning processes by blending learner opinions, recall tests and facial expression analysis. The results showed that Muslim learners were sensitive towards the pork taboo and felt disgusted while processing pork content. One clear conclusion is that Muslim EFL learners not only kept their distance to the pork taboo but they also showed negative facial expressions. This conclusion is remarkable since it supports the recent cultural road map of some ELT publishers, who recently excluded pork content in their textbooks for Muslim learners (Flood, 2015; Harley, 2015). Secondarily, the results also provide an insight for language pedagogy in Islamic regions, postulating that inclusion of pork content in language instruction is more likely to cause discomfort among Muslim learners. The level of reactions may fluctuate depending on the depth of Islamic mentality. Thus, western instructors in such regions should handle pork with care.

Another conclusion to draw from this study is that taboos cause emotional reactions, which have no adverse effect on learner cognition. Hence, taboos can be criticized as being psychologically offensive for language learners, however, the current results showed no negative impact on language learning gains and academic performance.

It should be noted that the exclusion of pork topic in language learning contradicts Critical Pedagogy (Freire, 1973; Giroux, 1983) – a term

that emphasizes going beyond arbitrary social constraints in classrooms and pursuing social transformation through education (Akbari, 2008). Censoring pork content in educational settings will surely divert learners to learn "pork" related vocabulary from informal contexts and thus the target culture instruction will be incomplete. Material designers, publishers and instructors should keep this in mind before hiding pork and papering it over the cracks.

Evans, Avery, and Pederson (1999) enlisted a vast range of taboo topics in education, such as abortion and religious restrictions, and stated that "These are issues that can generate great controversy, but they are generally perceived as public issues. They are also issues in the larger society, and several of them may be a step removed from students' lives." In educational settings taboo topics are controversial but avoiding them cannot take them out of students' lives. Indeed, taboos all exist in public life; for Muslim language learners, "pork" and related vocabulary will not disappear from Western culture when it is not taught as a part of language education.

Additionally, strictly avoiding taboo topics obstruct the acculturation process. In second language acquisition, "The Acculturation Model" is a theory created by John Schumann (1986) in order to explain the language acquisition process of immigrants, migrant workers, or the children of such groups (Ellis, 1994, p. 230). The primary argument of this theory is that the acquisition of a second language is directly dependent on the acculturation process and acquisition success is determined by the extent to which learners can orient themselves in the target language culture (VanPatten & Benati, 2015). The problems in cultural orientation lead to severe culture shock, which may result in decreased success in learning the target language. In this regard, avoiding taboos involving pork content makes it harder for students to have a healthy cultural orientation when they go abroad or meet with new people from the target culture.

Finally, this study introduced facial expression analysis technique to the field. The findings were consistent and reasonable, showing that when applied correctly, facial expression analysis as a research technique can give inspiring clues on how language learners process visuals and linguistic input in different learning environments.

Limitations and Further Recommendations

The first limitation of this study was the possible priming effect of Pork Taboo Survey, which was conducted 1 week before the main experiment. Although 1 week is a relatively long time span, learners may have been slightly affected by the priming effect. Secondly, learners found recall tests slightly challenging and thus scored low causing a floor effect. Indeed, words to be remembered were short and recall tasks were done right after the experiment; however, this still stands as a limitation.

Computer assisted facial expression analysis is developing thanks to the rapid growth of software technologies. In this respect, this technique can find an application among researchers in various fields of research. For second language learning and development, a further study may cover facial expressions of learners in language classroom context and its relation to academic performance. With the use of the right equipment, facial expressions of crowds can be analyzed moment by moment, which enables the analysis of several students in language classrooms at the same time.

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The Reliability and Validity of the Lifespan Sibling Relationship Scale in a Turkish Emerging Adult Sample

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The present study examines the reliability and validity of the Turkish version of the Lifespan Sibling Relationship Scale (LSRS; Riggio, 2000). A total of 578 (336 female, 242 male) Turkish emerging adults participated in this study. A Confirmatory Factor Analysis (CFA) was used to test construct validity for the original six-factor model of the scale with 48 items. Results of the CFA indicated a good model fit. Furthermore, the second-order CFA result showed that the scale can be scored for both the subdimensions and the test as a whole. Multi-group CFA result revealed that the measured construct is invariant across the genders. The results suggested that the Turkish version of the LSRS had adequate internal consistency and construct validity, indicating that it can be reliably used to measure attitudes toward sibling relationship in emerging adulthood among a Turkish population.

Key words: sibling relationship, emerging adulthood, the LSRS, reliability, validity

Sibling relationship is one of the most enduring relationships throughout an individual's life, as it begins with the birth of the younger sibling and terminates with one of the siblings' passing away (Noller, 2005). Sibling relationship is defined as one of the most important family subsystems having a great impact on the well-being of individuals (Stormshak, Bullock, & Falkenstein, 2009). Having a positive sibling relationship not only increases the levels of individuals' well-being (Sherman, Lansford, & Volling, 2006), self-esteem (Hsiu-Chen Yeh & Lempers, 2004) and life satisfaction (Milevsky, 2005) but it also helps them develop empathy (Lam, Solmeyer, & McHale, 2012) and conflict resolution strategies (Howe, Rinaldi, Jennings, & Petrakos, 2002). Consequently, having a close and positive sibling relationship can be regarded as a buffer by decreasing the risk of depressive symptoms (Buist, Dekovic, & Prinzie, 2013). On the other hand, having a conflictual and low quality sibling relationship may result in negative outcomes, such as risky behaviors and adjustment problems for the individuals because they mostly involve high levels of conflict and negative attitudes towards each other (e.g., Natsuaki, Ge, Reiss, & Neiderhiser, 2009; Rende, Slomkowski, Lloyd-Richardson, & Niaura, 2005).

Past research on siblings has mostly examined the early years of sibling relationship when sibling relationship is not voluntary (e.g., Downey & Condron, 2004; Howe, Ross, & Recchia, 2011; McHale, Updegraff, &

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Whiteman, 2012; Stoneman, 2001). During childhood, siblings have strong and intense ties. Sibling relationship of children involves intimacy, warmth and conflict. In adolescence, sibling relationship mostly becomes less intense due to relatively less sibling interaction. In a study conducted by Updegraff, McHale, and Crouter (2002), adolescents reported greater intimacy with friends as compared to siblings. Researchers have also focused on sibling relationship during middle and old adulthood (e.g., Fuller-Thomson, 2000; Greif & Woolley, 2015; Khodyakov & Carr, 2009). In middle adulthood, when individuals are engaged with their own family-related commitments such as marriage and parenthood, sibling relationships become less salient (White, 2001). Yet, the interaction among siblings mostly increases again when they have to collaborate in the care of their elderly parents' health. During later adulthood, sibling bonds become stronger again. After specific major life events such as retirement, marriage of children or death of parents, individuals need support from their siblings in order to overcome the feelings of loneliness (Goetting, 1986). That is to say, siblings are an essential source of familial support and remain central in each other's social network throughout the lifespan, even after the loss of parents. Sex composition of a sibling dyad has also been recognized as important in sibling influences. Several research findings have shown that same-sex siblings particularly female-female dyads have a more positive relationship quality and feel closer to each other, compared to male-male or male-female dyads (Jeong, Jeong, Yu, Lyoo, Im, Bae, & Kim, 2013; Riggio, 2000; Riggio, 2006).

Previous research has mostly focused on sibling relationship during childhood. There is limited research on sibling relationship during emerging adulthood when individuals undergo major changes such as leaving parental home, attending college, making career plans (e.g., Conger & Little, 2010; Milevsky & Heerwagen, 2013). Overall, these studies revealed that siblings usually keep their relationship even though they spend less time together and their daily contact decreases distinctly due to the particular changes and life events related to emerging adulthood. These important life events may lead to both excitement and stress in emerging adults' lives. Although emerging adults mostly feel more autonomous and independent during this period, they may still need family support while trying to cope with the particular challenges of emerging adulthood (Aquilino, 2006). Emerging adults might seek help from family members, particularly from their siblings, as they are close in age and have similar history. Higher levels of support from siblings have been reported to predict better adjustment during this period (e.g., Hollifield & Conger, 2015; Milevsky, 2005). According to Cicirelli (1995), siblings have great influence on each other's psychological and behavioral development, not only in their childhood years but also throughout the entire lifespan. As Riggio (2000) acknowledged, "attitudes toward the childhood sibling relationship may be seen as a meaningful component of attitudes toward the sibling relationship in adulthood" (p. 710). In short, sibling relationship is crucial for the well-being of individuals in each stage of life. Sibling support, in particular, helps emerging adults overcome the major life challenges associated with this particular stage of life. However, as there are relatively fewer research findings available focusing on the emerging adult population, more research is needed to understand the nature and consequences of various sibling relationship patterns among emerging adults. Moreover, the majority of existing research findings reported are mostly based on western culture. In order to gain more insight about the issue, an up-to-date, valid, reliable assessment tool, applicable to various emerging adult populations coming from different cultural background is needed.

The related literature reveals that there are only a few widely used instruments developed to measure sibling relationship quality. The Sibling Relationship Questionnaire (SRQ) was developed by Furman and Buhrmester (1985) to measure the sibling relationship of children. The Adult Sibling Relationship Questionnaire (ASRQ) was developed by Stocker, Lanthier, and Furman (1997) to measure the sibling relationship of adults. However, the ASRQ was designed to measure the current relationship among adult siblings. The Lifespan Sibling Relationship Scale, which is a relatively new scale, differs from the other instruments developed to measure sibling relationship quality because it has an important advantage of measuring the quality of sibling relationship across the lifespan. The Lifespan Sibling Relationship Scale (LSRS, 2000) was developed by Riggio to measure individual attitudes toward sibling relationship both in childhood and in adulthood. The LSRS was developed from the "tri-componential" view of attitudes (Eagly & Chaiken, 1998). According to this conceptualization, attitudes are composed of affective, cognitive, and behavioral components. Moreover, the LSRS was designed to measure the attitudes toward not only adult sibling relationship but also childhood sibling relationship because attitudes developed in childhood were described as being a profound component of attitudes toward adulthood sibling relationship. Based on these two perspectives, the LSRS was designed as a measure composed of six subscales that assess affect, beliefs and cognitions both in childhood and adulthood sibling relationship. In the original validity and reliability study, the LSRS was found to have good psychometric properties including discriminant validity, internal consistency and test-retest reliability (Riggio, 2000). Since then, the LSRS has been used in English speaking countries such as the USA and Canada (Burbidge & Minnes, 2014; Frank, 2007; Frank; 2008; Portner & Riggs, 2016). These studies revealed that the LSRS has adequate psychometric properties. It has also been adapted and translated into other languages, such as Korean and Italian (Jeong et al., 2013; Sommantico, Donizzetti, De Rosa, & Parrello, 2017). Both studies confirmed the validity and reliability of the scale across different cultures with good psychometric properties. The LSRS was also translated into Turkish language by Öz (2015). In her study, the scale was tested for an adolescent sample, but the confirmatory factor analysis did not reveal acceptable results. Öz Soysal, Yurdabakan, Uz Baş, and Aysan (2016) conducted another study in order to explore the validity and reliability of the LSRS in a sample of young adults and revealed acceptable results. However, neither of these studies attempted to perform the second-order confirmatory factor analysis and they did not report whether the scale factor structure varies for each gender, either. Therefore, this present study aimed to examine the basic psychometric properties of the Lifespan Sibling Relationship Scale (Riggio, 2000) and expand the state of knowledge concerning psychometric properties of the Turkish version of the Lifespan Sibling Relationship Scale (LSRS) with an emerging adult sample by performing the second order CFA and investigating gender differences of the sibling dyads.

Method

Data Collection Procedure and Participants

The data for the current study were gathered from 601 emerging adults studying at different Turkish universities using a convenient sampling method. After getting required permissions from METU, Human Subjects Ethics Committee (HSEC), four different campuses were visited by the researcher to gather data. Privacy and confidentiality issues were shared with all participants and they were informed

about their right to withdrawal. The instrument took approximately 10-15 minutes to complete. Out of 601 participants, 18 were removed since they had an excess of missing data over 10% (Little & Rubin, 1987). When all cases with missing data were excluded, 583 cases remained. Since SEM is a multivariate analysis, multivariate outliers had to be identified as well. Multivariate outliers of the current study were checked by using Mahalanobis Distance (*Mahalanobis* D^2). As a result, 5 outliers, were removed from the data set. After the elimination of all missing cases and influential outliers, the study was conducted with a sample of 578 Turkish university students. The number of female participants was 336 (58%) and the number of male participants was 242 (42%). The age of the participants ranged between 18 and 26 (M = 20.86, Mdn = 21, Mo = 21, SD = 2.11). The mean age was found to be 20.89 (SD = 2.01) for female participants and 21.08 (SD = 2.24) for male participants.

Instruments

Lifespan Sibling Relationship Scale (LSRS: Riggio, 2000). The Lifespan Sibling Relationship Scale (LSRS) was developed by Riggio (2000) to measure individual attitudes toward adult sibling relationship. The LSRS has 48 self-report items that are scored on a 5-point Likert scale indicating the degree to which respondents agreed or disagreed with the statement concerning their sibling relationship (1 = *Strongly Disagree, 2 = Disagree, 3 = Neither agree nor Disagree,* 4 = *Agree and 5 = Strongly Agree).* The LSRS is composed of six subscales that assess emotions concerning the sibling and the sibling relationship as a child (Child Affect; CA; e.g., "I was proud of my sibling when I was a child") and as an adult (Adult Affect; AA; e.g., "I am proud of my sibling"); beliefs about the sibling and the sibling relationship as a child (Child Cognitions; CC; e.g., "My sibling and I had a lot in common as children") and as an adult (Adult Cognitions; AC; e.g., "My sibling and I have a lot in common"); and behavioral interactions with the sibling and the positivity of those interactions as a child (Child Behavior; CB; e.g., "My sibling and I spent time together after school as children") and as an adult (Adult Behavior; AB; e.g., "I presently spend a lot of time with my sibling"). In the original validity and reliability study of the LSRS, 711 undergraduate and graduate students, with a mean age of 23.5 years, completed the LSRS (Riggio, 2000). Coefficient alphas for the six subscales were found to be from .84 to .91. Coefficient alpha for the total LSRS was found to be .96. Test-retest reliability correlations were all greater than .80. The present study was conducted to adapt the LSRS into Turkish with an emerging adult sample as it was done in the original validity and reliability study (Riggio, 2000).

Translation Process of the LSRS. After getting the approval letter from Riggio, the developer of the Lifespan Sibling Relationship Scale, the original scale including 48 items was translated from English into Turkish by two English language teachers working at a university level and an English/Turkish interpreter. After comparing all translations, an expert counselor who is advanced in English agreed on the final version by selecting the best alternative for each item. Afterwards, the Turkish version of the LSRS was back-translated into the original language by another English language teacher who had no access to the original scale. The back translation showed that the scale was accurately translated. Subsequently, a Turkish literature teacher checked the Turkish version of the LSRS in order to ensure the accuracy of Turkish wording and grammar of the final Turkish version.

Demographic Information Form. The demographic information form involves various questions concerning the participants' age, gender, and their siblings' age, gender. Participants were

asked to choose the sibling that had the greatest impact on their lives and respond to all items in regard to that chosen sibling.

Statistical Procedures

Confirmatory factor analysis (CFA) and Second order CFA were used to examine construct validity of the scale. In addition, Factor Intercorrelations were reported to show correlations among sub-factors. A multi-group CFA was performed to investigate four versions of measurement invariance of the scale. The internal consistency coefficient (Cronbach's α) was calculated to test the reliability of the scale. Lastly, multivariate analysis of variance (MANOVA) was conducted to examine sex differences in LSRS subscales. Analysis of Moment Structures (AMOS) Version 18.0 software (Arbuckle, 2009) and SPSS version 23 were used to analyze the current data.

Results

Descriptive Statistics of the Turkish Version of LSRS

Descriptive statistics including means, standard deviations of all measured subscales of the LSRS and independent measures *t*-test results are presented by gender in Table 1 below.

Confirmatory Factor Analysis

First, the original six-factor structure of CRSQ with 48 items proposed by Riggio (2000) was evaluated. Results of the CFA model on the item level showed an inadequate model fit [χ^2 (1068) = 4517.79, p = .00; $\chi^2/df\text{-}ratio$ = 4.23; *GFI* = .70, *CFI* = .74 and *RMSEA* =.07, *SRMR* =.14]. Goodness-of-fit indexes were beyond the expected critical values, suggesting that the model fit is insufficient.

Next, CFA was used with item parceling techniques because of some empirical pros of parcels. First, models tested by item parceling techniques are more parsimonious. Besides, in the models, it is less likely that residuals will be correlated or that dual loadings will emerge. Lastly, because of item parceling techniques, various sources of sampling error can be decreased (MacCallum et al., 1999). To sum up, the technique of parceling items was used to reduce the number of indicators of lengthy scales, in order to obtain more continuous and normally distributed data and to improve the fit of the CFA model (Bandalos & Finney, 2001).

Therefore, the original six-factor structure suggested by Riggio (2000) was tested to examine the goodness of fit to the data with the technique of item parceling. Each factor consists of 2-item parcels and each item parcel in-

Table 1 *Descriptive statistics for the Lifespan Sibling Relationship Scale (LSRS)*

	Total Sample (n = 578)		Female (n = 336)		Male (n = 242)			
LSRS Subscales	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t* (576)	*p*
Child Affect	31.81	4.62	31.88	4.71	31.71	4.49	.43	.670
Child Behavior	29.61	5.14	29.92	5.24	29.18	4.98	1.72	.086
Child Cognitions	30.74	5.13	31.04	5.27	30.33	4.92	1.64	.102
Adult Affect	33.58	4.15	34.12	4.09	32.84	4.13	3.69	< .001
Adult Behavior	29.97	5.07	30.80	5.19	28.82	4.68	4.73	< .001
Adult Cognitions	33.72	4.56	34.07	4.51	33.23	4.61	2.21	.028

cludes 4 items, which were selected based on their skewness and kurtosis values. The skewness and kurtosis values of the item parcels ranged from -.009 to -.819, indicating the normal distribution of the item parcels. That is, all item parcels were normally distributed. Their skewness and kurtosis values are presented in Table 2.

Table 2 *Item parcels of the LSRS and their skewness and kurtosis values*

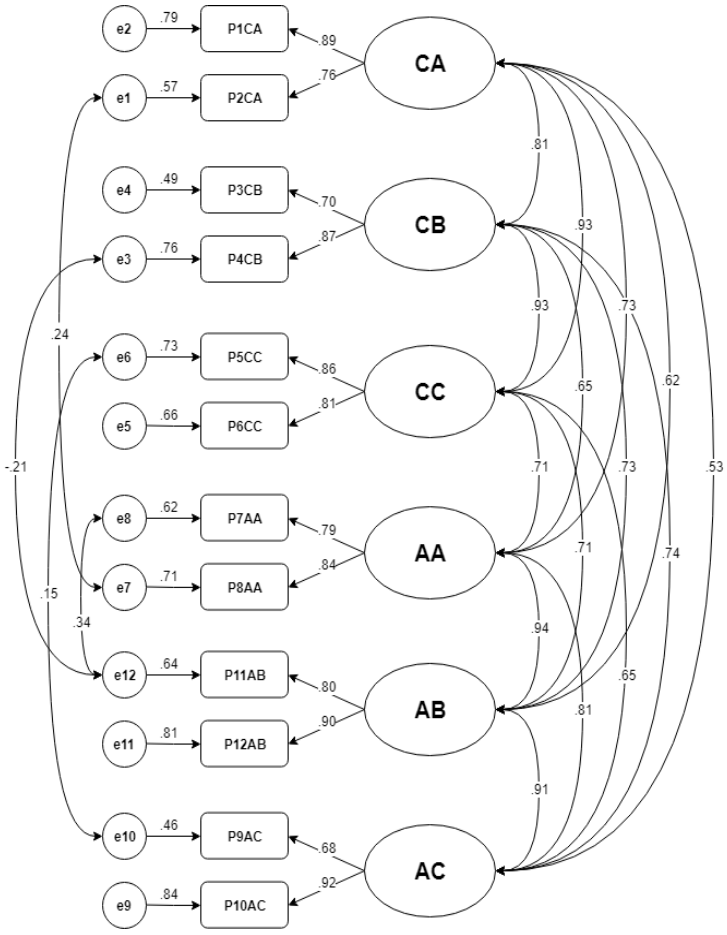
Item Parcels	*Skewness*	*Kurtosis*
P1CA	-.217	-.681
P2CA	-.462	-.524
P3CB	-.060	-.436
P4CB	-.017	-.727
P5CC	-.231	-.696
P6CC	-.009	-.703
P7AA	-.557	-.825
P8AA	-.187	-.667
P11AB	-.015	-.615
P12AB	-.196	-.819
P9AC	-.677	-.453
P10AC	-.346	-.714

Table 3 *Parameter estimates of the* LSRS

			Standardized Regression Weight	*S.E.*	*C.R.*	*p*
Parcel 1 CA	<---	CA	.889	.056	20.808	.001
Parcel 2 CA	<---	CA	.758			
Parcel 3 CB	<---	CB	.700	.040	19.170	.001
Parcel 4 CB	<---	CB	.871			
Parcel 5 CC	<---	CC	.856	.038	24.543	.001
Parcel 6 CC	<---	CC	.814			
Parcel 7 AA	<---	AA	.787	.033	21.523	.001
Parcel 8 AA	<---	AA	.844			
Parcel 11 AB	<---	AB	.799	.027	24.598	.001
Parcel 12 AB	<---	AB	.898			
Parcel 9 AC	<---	AC	.679	.035	18.112	.001
Parcel 10 AC	<---	AC	.916			

Note. CA – Child Affect; CB – Child Behavior; CC – Child Cognitions; AA – Adult Affect; AB – Adult Behavior; AC – Adult Cognitions.

Running the confirmatory factor analysis, each item parcel was allowed to load on its suggested factor and all six factors were considered as related to each other. The results indicated a good model fit for the data [χ^2 (39) = 224.700, $p < .01$; $\chi^2/df = 5.76$; $TLI = .94$, $CFI = .96$ and $RMSEA = .09$, $SRMR = .04$]. The goodness-of-fit indices (TLI, CFI, and SRMR) suggested that the six-factor model fit is adequate. Compared with item-level data, model based on parceled data indicated better fit for the current data. Yet, the modification indexes were exam-



Note. CA – Child Affect; CB – Child Behavior; CC – Child Cognitions; AA – Adult Affect; AB – Adult Behavior; AC – Adult Cognitions.

Figure 1 Path diagram for six-factor model of the confirmatory factor analysis with standardized regression weights

ined and modifications suggested by the program were checked. According to these suggestions, the error covariance of parcel P2CA-P8AA; parcel P7AA-P11AB; parcel P4CB-P11AB and parcel P5CC-P9AC were freely estimated, since they measure the similar affects, cognitions or behaviors.

New results indicated a good model fit for the data [χ^2 (35) = 139.534, $p < .01$; χ^2/df=3.99; *TLI* = .96, *CFI* = .98 and *RMSEA* = .07, *SRMR* = .03]. The chi-square difference test, χ^2diff (4) = 85, 166, $p < .001$, indicated that the conducted modification improved the model significantly. Figure 1 represents the confirmatory factor analysis result. Since the modified CFA result was better, a second order CFA and Multi-group CFA were conducted with modification indices.

Overall, model fit indices showed that the six-factor structure became a better fit with particular modifications. Each parameter's estimated value (column 1), standard error (column 2), and critical ratio (column 3) are listed in Table 3.

Factor Intercorrelations for the First-Order Model

The factor intercorrelations for the six first-order factors are presented in Table 4. All six factors of the scale were found to be moderately to highly correlated. Particularly, the three adult subscales and the three child subscales were found to be more strongly correlated among each other. From the theoretical point of view, the correlations were expected**.**

Second order CFA

Second order CFA was performed to assess whether or not Lifespan Sibling Relationship construct loads into six underlying sub-constructs (CA, AA, CC, AC, CB, and AB). The result showed good model fit for the data [χ^2 (43) = 199.633, $p < .01$; χ^2/df = 4.64; *TLI* = .95, *CFI* = .97 and *RMSEA* = .07, *SRMR* = .03]. The findings confirmed that the six sub-constructs are the component of the Lifespan Sibling Relationship construct. Therefore, the result indicated that the scale can be scored for both the sub-dimensions and the test as a whole.

Measurement Invariance Using Multi-group CFA

A multi-group CFA was performed to have evidence of measurement invariance to assure that the construct identities are the same across the genders. Specifically, four models (Unconstrained, Measurement weights, Structural covariances, and Measurement residuals) comparisons were used to assess four forms of measurement invariance.

Specifically, configural invariance, metric (factorial) invariance, scalar invariance, and strict factorial invariance were evaluated by compar-

Table 4 *Factor intercorrelations among the subscales of LSRS for the first-order model*

Factor	AB	AC	CA	CB	CC
AA	.94	.81	.73	.65	.71
AB	-	.91	.62	.73	.71
AC	-	-	.53	.74	.65
CA	-	-	-	.81	.93
CB	-	-	-	-	.98

Note. AA – Adult Affect; AB – Adult Behavior; AC – Adult Cognitions; CA – Child Affect; CB – Child Behavior; CC – Child Cognitions. All coefficients are significant at $p < .001$

ing models according to *ΔCFI*. Since *ΔCFI*'s were found be smaller than 0.01, multi-group CFA result showed excellent model fit for the data to submit the equivalent of the group (see Table 5). Therefore, the measurement model is invariant and the same model can be used across the gender.

Reliability of LSRS

The reliability of the scale was calculated from the internal consistency coefficient (Cronbach's α). Item-total correlation ranged from .32 – .67. The LSRS had adequate internal consistency for both subscales (for CA α = .80, for CB α = .77, for CC α = .81, for AA α = .80, for AB α = .74, for AC α = .83) and the total scores (α = .95). Item-total correlation ranged from .32 – .67. Since all values have been found to be greater than .70, internal consistency values of the scale can be considered as adequate (Nunnally & Bernstein, 1995).

Gender Differences

As it can be seen in the descriptive statistics table (Table 1) above, female participants had higher scores than male participants for each subscale. Furthermore, a two-way (participant sex by chosen sibling sex) multivariate analysis of variance (MANOVA) was conducted to examine sex differences in LSRS subscales. Using Wilks's lambda, results showed a significant multivariate effect of participant sex Λ = 0.94, $F(6,569) = 6.18$, $p < .001$, $\eta^2 = .061$; a significant multivariate effect of sibling sex $\Lambda = 0.97$, $F(6,569) = 3.19$, $p = .004$, $\eta^2 = .033$ and a significant multivariate effect of the interaction between the participant sex and chosen sibling sex $\Lambda = 0.96$, $F(6,569) = 4.50$, $p < .001$, $\eta^2 = .045$. All results of multivariate and univariate analyses of variance (MANOVA and ANOVAs) for the effects of participant's sex, his/her chosen sibling sex and the interactions between them are presented in Table 6.

For childhood subscales, univariate tests showed that Child Affect and Child Cognition subscales did not differ significantly according to participant sex, sibling sex and the interaction between them. Univariate tests also indicated that among childhood subscales only Child Behavior subscale differed significantly according to participant sex by sibling sex interaction ($F(1,574) = 7.21$, $p = .007$, $\eta^2 = .012$), but it did not differ significantly according to the sibling sex. On the other hand, for adult subscales univariate tests demonstrated that female participants reported significantly

Table 5 *Fit statistics of the LSRS Multi-group CFA*

Multi-group comparison factor analysis	χ^2	*df*	χ^2/df	*p*	*GFI*	*CFI*	*RMSEA*	*ΔCFI*
Configural invariance	175.636	82	2.14	< .001	.952	.981	.045	-
Metric (factorial) invariance	175.636	82	2.14	< .001	.952	.981	.045	-
Scalar invariance	195.002	97	2.01	< .001	.947	.981	.042	-
Strict factorial invariance	214.968	113	1.90	< .001	.942	.980	.040	.01

Note. χ^2 – Chi-Square; GFI – Goodness of Fit Index; CFI – Comparative Fit Index; RMSEA – Root Mean Square Error of Approximation

higher scores on Adult Affect (F (1,574) = 13.01, $p < .001$, $\eta^2 = .022$), on Adult Behavior (F (1,574) = 20.68, $p = .001$, $\eta^2 = .035$) and on Adult Cognition (F (1,574) = 4.41, $p = .036$, $\eta^2 = .008$) than male participants. Furthermore, univariate tests also demonstrated that Adult Behavior and Adult Cognition subscales differed significantly according to participant sex by sibling sex interaction, but only Adult Behavior subscale differed significantly according to participant sex, sibling sex and the interaction between them. All significant interactions are demonstrated in Figure 2, Figure 3, Figure 4 and Figure 5.

Table 6 *Multivariate and univariate analyses of variance F ratios for the effects of participant sex and chosen sibling sex*

		ANOVA F (1,574)					
Variable	MANOVA F (6, 569)	CA	CB	CC	AA	AB	AC
Participant Sex	6.18^{***}	.43	3.35	3.19	13.01^{***}	20.68^{***}	4.41^{*}
Sibling Sex	3.19^{**}	2.03	.03	.68	.56	8.22^{**}	2.35
P. Sex x S. Sex	4.50^{***}	.67	7.21^{**}	1.73	3.16	20.05^{***}	9.69^{**}

Note. F ratios are Wilks's approximation of F; ANOVA – univariate analysis of variance; MANOVA – multivariate analysis of variance; CA – Child Affect; CB – Child Behavior; CC – Child Cognitions AA – Adult Affect; AB – Adult Behavior; AC – Adult Cognitions; $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

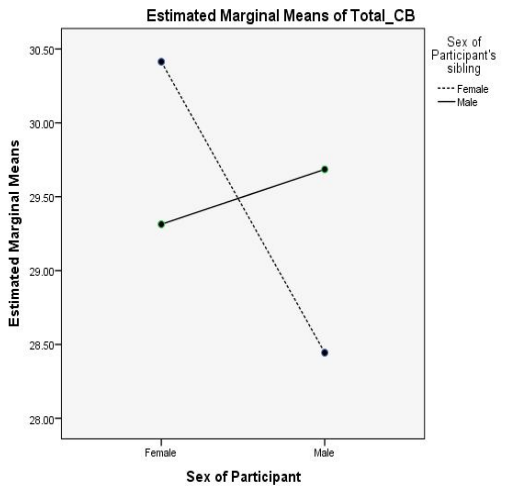


Figure 2 Interaction between sex of participant and sex of participant's sibling on Child Behavior subscale

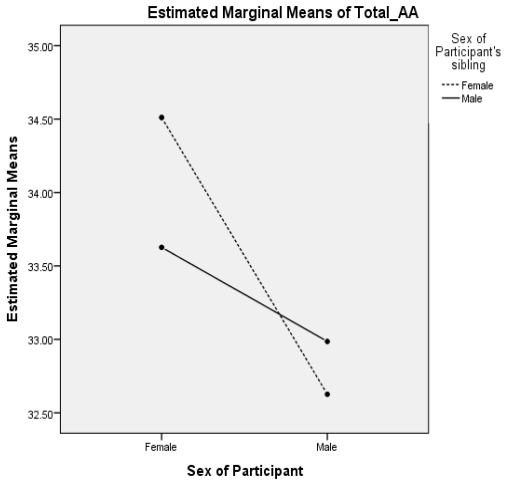


Figure 3 Interaction between sex of participant and sex of participant's sibling on Adult Affect subscale

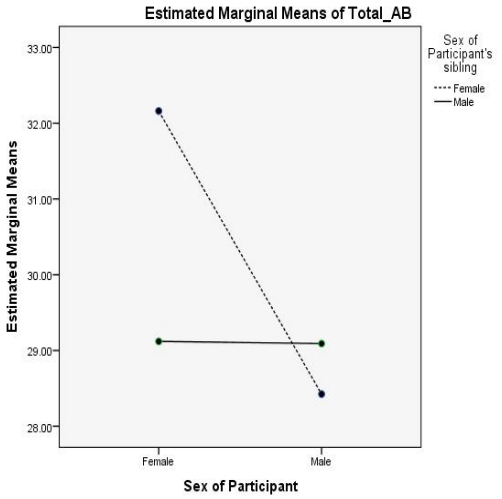


Figure 4 Interaction between sex of participant and sex of participant's sibling on Adult Behavior subscale

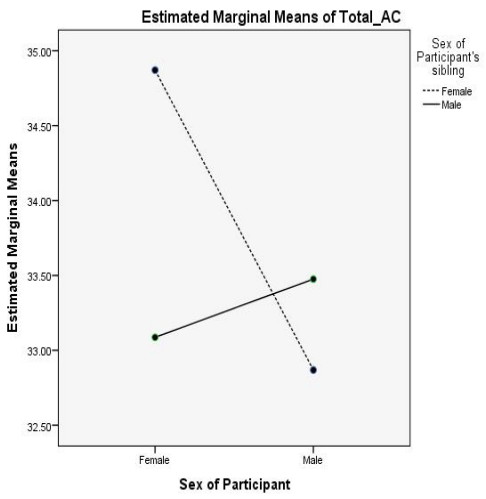


Figure 5 Interaction between sex of participant and sex of participant's sibling on Adult Cognition subscale

Discussion

The aim of the current study was to examine the reliability and validity of the Lifespan Sibling Relationship Scale (LSRS) with a sample of Turkish emerging adults. In order to test the factor structure of the LSRS, the six-factor model suggested by Riggio (2000) was evaluated by testing the first-order model. The results indicated that the original six factor model fits the scores obtained from current sample of the study. Based on the factor intercorrelations for the six first-order factors, moderate correlations between factors were revealed. These results supported the theoretical view that the Lifespan Sibling Relationship (as measured by the LSRS) consists of six separate, yet related constructs. Even though all intercorrelations were found to be significant, three adult subscales (adult affect, adult behavior, adult cognitions) and three child subscales (child affect, child behavior, child cognitions) were found to be more closely correlated with each other. Furthermore, adult affect and child affect; adult behavior and child behavior; adult cognition and child cognition subscales were also found to have high correlations. In other words, attitudes toward sibling relationship in adulthood were found to be similar to attitudes toward sibling relationship in childhood.

Furthermore, second-order CFA was conducted during scale validation of multidimensional constructs. Although the original study conducted by Riggio (2000) recommended using total score of the scale, it provided no concrete evidence for the use of the total score. In the current study, second-order CFA was performed on the six underlying sub-constructs (CA, AA, CC, AC, CB, and AB), the goodness-of-fit of the model was found to be adequate. The result verified that the six sub-constructs are the component of the Lifespan Sibling Relationship construct. Thus, the scale can be

scored for both the sub-dimensions and the test as a whole. Neither the original study nor the previous Turkish adaptation studies of the LSRS (Öz, 2015; Öz Soysal et al., 2016) attempted to test for a higher-order factor in order to compute a score for the entire scale.

Moreover, multi-group CFA provided further validity evidence for the scale. The result indicated that the measurement model is invariant and the construct identities are the same across the genders. In addition, the reliability of test scores for all subscales and total score revealed good internal consistency reliability, which is consistent with previous studies (Jeong et al., 2013; Riggio, 2000; Sommantico et al., 2017).

Past research has shown that sibling relationships of young women are closer and more intimate than sibling relationships of young men (Connidis, 2001; Dolgin & Lindsay, 1999; Jeong et al., 2013; Pulakos, 1989; Riggio, 2000; Riggio, 2006). In the current study, female emerging adults also reported significantly higher scores than Turkish male emerging adults in Adult subscales, suggesting that female participants have closer and more satisfying relations with their siblings than male participants do. This finding is in line with the results of Riggio (2000) and Sommantico et al. (2017). The current study also revealed that female participants reported significantly higher scores than male participants, particularly on Adult Affect and Adult Behavior subscales. On the other hand, neither the participant's sex nor sibling's sex were found to have a significant effect on the responses to childhood subscales of the LSRS.

As a conclusion, these findings provided evidence about properties of the Turkish version of the scale. In order to enable international researchers to compare their results and explore universal aspects of sibling relationships, it is necessary to test whether the scale is invariant across nations. Then, the Turkish version scale can be applicable to diverse samples for comparison of LSRS across cultures. However, some of the caveats of the study call for future study to confirm the results. Firstly, during the application of the instruments, participants were asked to choose one sibling who had the greatest influence on them. Future research can also investigate other siblings' influence and role. Moreover, there are a number of factors that affect the sibling relationship quality. In this current study, sex composition of sibling dyads and gender differences were reported. It has been revealed that gender differences were only found in the attitudes toward adult sibling relationship, not in childhood sibling relationship. In other words, as siblings age, gender differences emerge. Future studies can investigate the underlying reasons for this finding. Designing longitudinal studies might reveal the possible causes of gender differences in adulthood. Moreover, further replication studies are required to make definite inferences, since the present study is the first research that investigated gender differences with a Turkish emerging adult sample within the context of sibling relationship. Future researchers may also investigate other structural features of a sibling dyad such as birth order, age difference, and family size.

The present study was designed as a cross-sectional one, so the data was collected at one time point. However, the relationship between the participants and their siblings may change and show variety over time. In this case, gathering data at multiple time points is needed in order to make casual inferences by comparing the results of each time point. Another recommendation for future research is to conduct mixed method studies by integrating the quantitative and qualitative data in order to provide a better insight and deeper understanding of the sibling relationship quality. Gathering data through questionnaires and conducting interviews with both sides of a sibling dyad might also contribute to future sibling relationship research.

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Mindfulness and Cognitive Depletion Shape the Relationship between Moral Conviction and Intolerance of Dissimilar Others

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When people vest a position with moral conviction, that is, a sense that the position is grounded in fundamental right or wrong, good or bad, they tend to be particularly intolerant of those who disagree. Psychological states that mitigate or augment the effect of moral conviction on tolerance are lesser known. The present research investigated the immediate consequences of mindfulness and mindlessness (cognitive depletion) on the relationship between moral conviction and preferred social distance. Consistent with hypotheses, moral conviction did not predict preferred social distance in a mindfulness condition (mindfulness meditation), predicted greater preferred social distance in a mindlessness condition (cognitive depletion), and predicted marginally greater preferred social distance in a control condition (no manipulation). Findings suggest that adopting a mindful orientation toward people with different moral views may foster acceptance, while adopting a mindless orientation may foster greater intolerance.

Key words: moral conviction, mindfulness, social distance, intolerance, cognitive depletion

Popular discourse suggests that society is becoming increasingly polarized along ideological and moral lines (Doherty, Kiley, & Jameson, 2016). Psychological literature has documented people's intolerance of those with whom they disagree (see Brandt, Reyna, Chambers, Crawford, & Wetherell, 2014). People tend to be especially intolerant of those who disagree with them on issues that they vest with moral conviction – positions experienced as grounded in fundamental right and wrong, good and bad (Skitka, Bauman, & Sargis, 2005; Wright, Cullum, & Schwab, 2008). The present research investigated states that may modulate this effect, and in particular, whether mindfulness ameliorates and mindlessness amplifies the tendency to be intolerant of moral disagreement.

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Moral Conviction

A robust body of work shows that attitudes vested with moral conviction – known as moral mandates – differ from non-moral attitudes in a number of ways (for a review, see Skitka & Morgan, 2014). Moral mandates are associated with stronger emotions than non-moral attitudes (Skitka & Wisneski, 2010). Moral mandates are also authority independent. When people vest an attitude with moral conviction, they are more likely to believe that related duties and rights follow from moral principles rather than rules, procedures, or authority dictates (e.g., Skitka, Bauman, & Lytle, 2009). Furthermore, moral mandates inoculate people against peer influence. The stronger a person's moral conviction, the less likely that person will conform to others with a contrary position (Skitka, Aramovich,

Lytle, & Sargis, 2010). Additionally, moral mandates are a barrier to conflict resolution. Moral disagreement fosters less cooperation, less goodwill, and greater difficulty in reaching a consensus (Skitka et al., 2005). Finally, greater moral conviction predicts attitude-consistent behaviors such as voting or political protest (Morgan, Skitka, & Wisneski, 2010; van Zomeren, Postmes, & Spears, 2012).

Of importance to the current research, moral mandates are characterized by greater social intolerance and discrimination toward attitudinally dissimilar others (Skitka et al., 2005; Wright et al., 2008). Altogether, the differences between moral mandates and non-moral attitudes beg the question: what factors impact the effect of moral conviction on intolerance? Specifically, what factors exacerbate the tendency to be intolerant of those with whom one disagrees on deeply held moral views? Moreover, what factors weaken or undo intolerance of moral disagreement? The present research seeks to provide insight into these timely questions.

Mindfulness

One state that may weaken or undo the effect of moral conviction on intolerance is mindfulness. A relatively early and social psychologically situated conceptualization of mindfulness describes it as a state of "active and fluid information processing, sensitivity to context and multiple perspectives, and an ability to draw novel distinctions" (Langer, 1989, p. 138). However, other conceptualizations of mindfulness, indeed the focus of the current investigation, define mindfulness as a broad construct involving states and processes that enhance attention to and awareness of moment-to-moment sensory experience without judgment or reactivity (Brown & Ryan, 2003; Kabat-Zinn, 1990; Lutz, Jha, Dunne, & Saron, 2015). Importantly, a theme that seems to crosscut definitions is a certain phenomenology whereby experience is broadened, and stimuli are attended to and processed in an enhanced manner.

Mindfulness has been shown to shape interpersonal relationships. One study found that modified mindfulness-based stress reduction (MBSR) increased reports of empathy in premedical and medical students compared to the controls (Shapiro, Schwartz, & Bonner, 1998). Beyond subjective ratings, mindfulness and compassion meditation increased actual helping behavior toward suffering individuals (Condon, Desbordes, Miller, & DeSteno, 2013). Brief mindfulness meditation interventions also have interpersonal consequences. Compared to active and relaxation control groups, five (Tan, Yo, & Macrae, 2014) and eight minute (Berry et al., 2018) inductions of mindfulness increased empathetic responses toward ostensibly ostracized strangers. However, it is unknown whether the prosocial benefits of mindfulness extend to those with whom a person morally disagrees.

There are reasons to suggest that mindfulness may facilitate tolerance of morally dissimilar others. One could reasonably construe responses to those who oppose their moral mandates as a form of moral judgment – one that is intuitive and automatic (Haidt, 2001; but see Wisneski & Skitka, 2017). Conversely, research suggests that automatic cognitive processes can be brought under control through mindfulness. Experienced mindfulness meditators compared to novices exhibited greater inhibitory control and cognitive flexibility during executive control tasks (Moore & Malinowski, 2009). Similarly, participants who received MBSR training demonstrated superior attention orienting, compared to untrained participants (Jha, Krompinger, & Baime, 2007). An emphasis on the core processes of mindfulness, that is, on nonjudgement and nonreactivity, warrant consideration here (Bishop et al., 2004; Kabat-Zinn, 2003). We suspect that these are the "active

ingredients" that should cultivate a mental stance where no single viewpoint, conviction, or emotion is privileged over another. Collectively, the enhanced control of automatic processes, coupled with greater acceptance should foster openness and receptivity of others despite potential opposing convictions.

Mindlessness

Mindfulness and so-called "mindlessness" can be considered opposing constructs with respects to attentional engagement and information processing (Brown & Ryan, 2003; Langer, 1989), and thus may affect tolerance in different ways. Whereas mindfulness represents a state of open and fluid information processing, mindlessness represents *depletion* of attentional control and information processing (Langer, 1989). During mindlessness, thought and behavior occur in an automatic fashion without much participation of the individual to override impulsive or inappropriate actions. As a result, people are susceptible to over reliance on established categories, simple decision-making errors (Pohl, Erdfelder, Hilbig, Liebke, & Stahlberg, 2013), and, critical to the present investigation, prejudice toward outgroup members (Muraven, 2008).

Research also suggests that social processes are impacted by mindlessness. A cognitive depletion manipulation reduced rating of empathetic concern and diminished neural responses in brain regions associated with empathy (Morelli & Lieberman, 2013). Interestingly, other research suggests mindlessness influences moral judgments. Participants instructed to perform a number identification task while reading moral dilemmas had increased decision making time for utilitarian moral judgments compared to non-utilitarian judgments (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008). This suggests that some aspects of moral judgments depend on controlled cognitive processes. It is possible that depletion of cognitive resources through mindlessness promotes greater intolerance, while control of cognitive resources through mindfulness promotes tolerance.

The Present Research

Integrating across the diverse literatures, we examined the influence of mindfulness and mindlessness on the interpersonal consequences of moral conviction. We hypothesized that moral conviction would have a weak or non-significant effect on preferred social distance for participants in the mindfulness condition (mindfulness meditation), and would predict increased social distance for participants in the mindlessness (cognitive depletion) and control (no manipulation) conditions.

Method

Participants

Ninety-seven undergraduate students (age $M = 19.24$, $SD = 1.40$) from a large and diverse, public Midwestern university participated in exchange for partial course credit. The majority were male ($n = 52$). Most participants reported being Asian ($n = 33$), followed by Hispanic ($n = 25$), Caucasian ($n = 20$), African American ($n = 13$), and other ($n = 6$).

Demographic information by experimental conditions (mindfulness, mindlessness, and control) is displayed in Table 1. Age was evenly distributed across groups, $F(2, 97) = .31$, $p = .74$, as was gender, $\chi^2(2) = .21$, $p = .90$, and ethnicity, $\chi^2(82) = 76.09$, $p = .66$, indicating successful randomization.

Procedure

Twenty-four hours before the experimental session, participants reported their position on

Table 1 *Demographic characteristics by mindfulness, mindlessness, and control conditions*

	Mindfulness	Mindlessness	Control
Age in years (*M, SD*)	19.26 (1.48)	19.35 (1.63)	19.07 (.98)
Sex (% female)	47%	47%	43%
Ethnicity (% Caucasian)	25%	20%	20%

legalized abortion. Abortion was selected as the issue-at-hand because it is a particularly polarizing topic in the American context, and was a focus of previous research on the link between moral conviction and intolerance (Skitka et al., 2005). Participants completed a measure of attitude strength and moral conviction regarding their position. Five participants at a time reported to the laboratory and were randomly assigned to one of the three conditions: mindfulness, mindlessness, or no-intervention control (see Experimental Conditions). Then, participants reported their preferred social distance from those who disagreed with their position on abortion. Participants were fully debriefed and thanked for their time. All experimental procedures were approved by the local ethics review board.

Experimental Conditions

Mindfulness. Participants assigned to the mindfulness condition ($n = 34$) received written instructions and guided focused attention mindfulness meditation from an experienced meditator (adapted from Kabat-Zinn, 1990). While seated in a chair, participants were instructed to voluntarily and without judgment sustain their attention on breath sensation for 15 minutes to evoke a state of present moment awareness. They were told that if their mind began to wander, they should take notice of the wandering, and gently, without judgment, bring their attention back to the breath. Thus, this mindfulness manipulation was oriented toward focused attention on the dynamics of inner experience (Lutz et al., 2015).

The majority of participants ($n = 24$, 71%) assigned to the mindfulness condition were meditation novices, that is, reported no prior experience with meditation practices. Only two participants (5%) reported having "moderate" meditation experience. The majority of participants ($n = 20$, 60%) reported dedicating "much" effort to the mindfulness exercise, thought the exercise was "very interesting" ($n = 22$, 63%), and felt "very relaxed" during the exercise ($n = 15$, 43%).

Mindlessness (cognitive depletion). Participants assigned to the mindlessness condition ($n = 35$) completed a modified version of the Attention Network Test (Fan, McCandliss, Sommer, Raz, & Posner, 2002), which is a computerized measure of attention. This modified task was used to evoke cognitive depletion, and has been used for this purpose in past research (Apfelbaum & Sommers, 2009). Participants were presented with strings of five congruent or incongruent arrows and were asked to determine the direction the center arrow was pointing relative to the other four arrows. Correct responses to incongruent arrows require executive control to override the automatic tendency to follow the direction of the arrows, thus evoking depletion over consecutive trials. As with the meditation condition, participants performed this task for 15 minutes.

No-intervention control. Participants assigned to the control condition ($n = 28$) completed self-report assessments, but did not experience either state induction.

Pre-Measures

Position. Participants reported their position on legalized abortion by responding to the question, "What is your stance on abortion?" using a 3-point scale with the point labels of *support*, *oppose*, and *other/neither support nor oppose*. Position was coded as 1 = support, -1 = oppose, and 0 = other/neither support nor oppose.

Attitude importance. Participants reported the extent to which their position on abortion was "important to you", "something you care about", and "important to you compared to other issues" using a 5-point scale ranging from *not at all* to *very much* (Skitka et al., 2005). Responses were averaged into a single score (α = .90).

Moral conviction. Participants reported the extent to which their position on abortion was "connected to your beliefs about fundamental right or wrong", "a reflection of your core moral beliefs or convictions, 'a moral stance', and based on a moral principle" using a 5-point scale ranging from *not at all* to *very much* (Skitka et al., 2005). Responses were averaged into a single score (α = .96).

Although it would be possible to measure abortion attitudes using a bipolar scale that ranged from *very much opposed* to *very much support* (with *neither oppose nor support* as the midpoint), we elected to separately measure the valence of each participant's position and the strength of their position (attitude importance is a common measure of attitude strength; Petty & Krosnick, 1995). This approach is consistent with that used in other moral conviction research (Skitka et al., 2005; Skitka et al., 2012), and allows a) for position and strength to be entered as separate variables in the analyses, and b) for more direct comparisons of the effects of attitude strength and moral conviction (both of which are measured on 5-point scales). In short, this approach allows us to more effectively test whether moral conviction's effects on intolerance are due to morality and not attitude strength.

Post-Measures

Preferred social distance. Participants reported the extent to which they would be happy to have someone who did not share their views on abortion as "President", "Governor", "my neighbor", "a coworker", "a roommate", "to marry into my family", "someone I would date", "my personal physician", "a close friend", "the owner of a store or restaurant I frequent", "the teacher of my children", and "my spiritual advisor" (Skitka et al., 2005) using a 5-point scale ranging from *not at all* to *very much*. Responses were reversed scored and then averaged into a single score (α = .89).

Results

Study variables were normally distributed as indicated by skewness and kurtosis values. Bivariate correlations are presented in Table 2. Briefly, reporting strong moral conviction about abortion was positively correlated with attitude importance (r = .58, p < .01). Moral conviction was also positively correlated with preferred social distance (r = .28, p < .01).

Before conducting primary analyses, we ensured the assumptions for multiple regression were met. Tolerance and VIF values were within an acceptable range, indicting there was no multicollinearity among predictors. The Durbin-Watson statistic indicated that residuals were independent, and lastly, an examination of the residuals indicated there was no problematic variation.

Multiple linear regression tested hypotheses that psychological state would modulate the relationship between moral conviction and preferred social distance. Gender, age, position on abortion, condition, importance, moral convic-

tion, followed by the interaction of importance and moral conviction with condition were entered as independent variables. Moral conviction and importance were mean centered before computing the interaction terms, and because both variables were highly correlated ($r = .58$). Preferred social distance was entered as the dependent variable. Conditions were dummy coded as 1 = mindfulness, -1 = mindlessness, and 0 = control.

The overall model was significant, $F(8, 96) = 2.20$, $p < .05$, $\eta^2 = .167$, accounting for 16.7% of the variance in preferred social distance. As seen in Table 3, moral conviction predicted marginally greater preferred social distance ($\beta = -16$, $p = .08$, 95% CI [-.02, .34]). This effect was qualified by a moral conviction by condition interaction ($\beta = -.23$, $p < .05$, 95% CI [-.44. -.01]). As seen in Table 4, follow-up regression analyses revealed that moral conviction was unre-

Table 2 *Descriptive statistics and bivariate correlations among study variables*

	M	*SD*	*1*	*2*	*3*	*4*	*5*
1. Age	19.24	1.40	_				
2. Position	.00	.80	-.04	_			
3. Importance	2.98	.96	.15	-.28**	_		
4. Moral conviction	3.44	1.11	.11	-.47**	.58**	_	
5. Condition	.01	.85	-.03	-.06	-.00	.05	_
6. Preferred social distance	3.41	.74	-.08	-.28**	.15	.28**	-.01

Note. Position on abortion was coded as 1 = support, -1 = oppose, and 0 = other/neither support nor oppose.
Conditions were coded as 1 = mindfulness, -1 = mindlessness, and 0 = control.
*$p < .05$, **$p < .01$.

Table 3 *Unstandardized regression coefficients of predictors of preferred social distance*

	B	*SE*	*t*	*p*
Gender	.01	.16	.07	.95
Age	-.06	.05	-1.13	.26
Position	-.17	.10	-1.63	.12
Condition	-.03	.09	-.37	.71
Importance (imp)	-.02	.10	-.21	.84
Moral conviction (MC)	.16	.09	1.80	.08†
Condition x Imp	.12	.12	.98	.33
Condition x MC	-.23	.11	-2.11	.04*

Note. Gender was coded as 1 = male and 2 = female.
Position on abortion was coded as 1 = support, -1 = oppose, and 0 = other/neither support nor oppose.
Conditions were coded as 1 = mindfulness, -1 = mindlessness, and 0 = control.
*$p < .05$, †$p < .10$.

Table 4 *Standardized regression coefficients of predictors of preferred social distance by experimental conditions*

	Mindfulness				*Mindlessness*				*Control*			
	B	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*
Gender	.01	.16	.07	.95	.01	.16	.07	.95	.01	.16	.07	.95
Age	-.06	.05	-1.13	.26	-.06	.05	-1.13	.26	-.06	.05	-1.13	.26
Position	-.17	.10	-1.63	.11	-.17	.10	-1.63	.11	-.17	.10	-1.63	.11
condition	-.03	.09	-.37	.71	-.03	.09	-.37	.71	-.03	.09	-.37	.71
Importance (Imp)	.10	.15	.66	.51	-.14	.17	-.83	.41	-.02	.10	-.21	.84
Moral Conv. (MC)	**-.07**	**.13**	**-.51**	**.61**	**.39**	**.15**	**2.67**	**.01***	**.16**	**.09**	**1.80**	**.08**
Condition x Imp	-.12	.12	.98	.33	.12	.12	.98	.33	.12	.12	.98	.33
Condition x MC	-.23	.11	-2.11	.04*	.23	.11	-2.11	.04	-.23	.11	-2.11	.04*

Note. Moral conviction (MC) is bolded because it is the effect of greatest interest.

Gender was coded as 1 = male and 2 = female.

Position was coded as 1 = support, -1 = oppose, and 0 = other/neither support nor oppose.

Conditions were coded as 1 = mindfulness, -1 = mindlessness, and 0 = control.

$^{*}p < .05$, $^{**}p < .01$.

lated to preferred social distance in the mindfulness condition (β = -.07, p = .61, 95% CI [-.34, .20]), predicted greater preferred social distance in the mindlessness condition (β = .39, p < .01, 95% CI [.10, .68]), and predicted marginally greater preferred social distance in the control condition (β = .08, p = .08, 95% CI [-.02, .34]), which were consistent with the hypotheses.

Discussion

Under typical conditions, people are intolerant of others who disagree with them on issues they vest with moral conviction. The present research documents factors that modulate this effect. A brief induction of mindfulness facilitated a more neutral, equanimous stance toward morally dissimilar others, whereas a brief induction of mindlessness facilitated greater intolerance.

There may be a number of reasons for the mitigating effect of mindfulness on the relationship between moral conviction and preferred social distance. One of the more robust outcomes of mindfulness is in the domain of emotion regulation (Chambers, Gullone, & Allen, 2009; Lutz, Slagter, Dunne, & Davidson, 2008; Sedlmeier et al., 2012). The brief induction of mindfulness may have influenced reactions or appraisals of potentially intense affective signals normally experienced when discerning moral judgment. Indeed, the domain theory of attitudes suggests that moral reactions facilitate more intense emotions than emotions experienced as a consequence of non-moral attitudes (Skitka, 2014). Consistent with this theory, participants who rated a vignette of incest as immoral experienced more intense negative affective than those who thought the vignette was less immoral (Royzman, Leeman, & Sabini, 2008). Conversely, and by its definition, mindfulness promotes non-reactivity to discursive sensory experiences (Kabat-Zinn, 1990). Supporting this, mindfulness training reduces the frequency and intensity of negative affect (Brown & Ryan, 2003) and increases positive affect (Teasdale et al., 2000). Taken together, the induction of mindfulness may have neutralized or downregulated affective signals typically experienced as a result of moral reactions, allowing one to engage in more careful and accepting moral judgments.

A surprising finding from the current research is the potency of mindlessness on preferred social distance. Our findings indicate that depletion of cognitive resources make people more extreme in their intolerance of morally dissimilar others. This extends past research showing that certain cognitive states can make people more intolerant of others. Participants who experienced disgust due to a dirty laboratory made harsher moral judgments compared to judgments made in a clean laboratory (Schnall, Haidt, Clore, & Jordan, 2008). Furthermore, our findings provide the interpersonal consequences to the effect that sustained attentional demands consume executive resources, leading to a decline in subsequent performance (see Beilock, Carr, MacMahon, & Starkes, 2002; Zanesco, King, MacLean, & Saron, 2013). Thus, it appears that the relationship between moral conviction and intolerance depends, at least partially, on the ability to regulate cognitive and affective systems in a momentary fashion, with depletion making people more extreme in their desire for disconnection.

In addition to the theoretical implications of this work, our findings also have some practical implications. Political polarization in the United States is now greater than at any point in the last several decades (Pew Research, 2014) and has been described as "alarmingly high" (Westfall, Van Boven, Chambers, & Judd, 2015). Furthermore, across the political spectrum, people are intolerant of those with whom they disagree (Brandt et al., 2014; Crawford, 2012; 2014). Thus, any research that suggests strategies to reduce intolerance provides po-

tentially useful information in our contentious sociopolitical climate. The strategy at the center of this research – mindfulness training – has already been shown to have a number of pro-social benefits (for a review, see Condon, 2018) and the current research suggests an additional benefit: decreased intolerance toward those across the political aisle. Although there are clear obstacles when it comes to reaping the political benefits of mindfulness training, one could imagine that some practical pieces of advice, notably, schools, organizations, and institutions (perhaps even government institutions), could implement short-term mindfulness training when preparing people to discuss contentious issues. On a grander level, an open question is whether wide-spread mindfulness training (perhaps implemented in the education system) could help build a more tolerant society.

The present research has some limitations and provides avenues for future inquiry. Mindfulness research has fallen under scrutiny by the lack of active control groups (see Davidson & Kaszniak, 2015). Because the present research used a no intervention control group, it is possible that findings may not be due to mindfulness specifically, but to other nonspecific factors such as general relaxation. Future research should investigate the role of mindfulness and mindlessness on intolerance using time and attention-matched control groups. Future research would also benefit from shifting from a state approach to a trait approach in order to examine whether long-term or intensive meditation training impacts tolerance. Lastly, mindfulness was not measured in the current study, and can only be inferred from the brief mindfulness induction. Therefore, we cannot ascertain conclusively that mindfulness was the precise mechanism of change.

Taken together, the present research aimed to provide the first inquiry into the effect of moral conviction on social distance after adopting a mindful or mindless orientation. In daily life, moral conviction predicts greater social distance from attitudinally dissimilar others. However, this effect can be reduced while in a mindful state or greatly augmented while in a mindless state. This study provides insight in ways to dissolve intolerance toward others who perceive their world in morally different terms – findings that are critical for navigating a complex and polarized social world.

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Role of Anxiety in Radicalizing Political Attitudes: Experimental Evidence from Slovakia

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Proliferation of populist policies and strengthening of political populism in several liberal democracies has been accompanied by campaigns full of public anger, anxiety and fear. Our research contributes to understanding how negative emotions shape selected political attitudes. We designed an experiment with 72 participants randomly assigned to three groups. The aim was to impose anxiety by using a stimulus that is incidental, i.e. having unrelated content to the attitudes under study. In addition to self-reported emotional state measured by post-test survey, we also measured the heart rate activity. Regarding political attitudes, next to attitudes towards immigrants we measured attitudes towards marijuana decriminalization as well. Findings indicate that while imposed anxiety leads to more negative attitudes towards immigrants, there seems to be no such effect on attitudes towards marijuana. We explain the difference by presence/absence of the in-group/out-group division in the types of political attitudes under study.

Key words: anxiety, immigration, attitude change, attitude formation

Introduction

Political development in recent years has brought about an unprecedented intensity in political campaigns: intensive abuse of negative emotions in combination with misleading, often false information. Admittedly, these tactics have been present in politics throughout the World (particularly blaming minorities for the country's misfortune, as in former Yugoslavia, Germany, and many more in the history). On the other hand, the level of prevalence and intensity of emotionally spun political campaign has recently increased (Trump's campaign in 2016, Leave campaign in Brexit referendum 2016, French elections 2017, Matteo Salvini in Italian election 2018, various parliamentary election in the post-communist part of the EU, and others). Populist-driven politics is also present in the region of Central and Eastern Europe, leaving Hungary and Poland accused of an illiberal turn and Czech and Slovak Republics facing massive increase of politicians, who claim not to be politicians (for example the 2016 billboard campaign of Boris Kollár; see Baboš, Világi & Oravcová, 2016, p. 58) or, to be non-politicians (Babiš, 2013). Regardless of ideological (left-

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right) rooting of such populist leaders, their common mobilizing appeal lies in an antagonistic (in-group/out-group) wedge, treating "the people" as morally pure in-group and more or less specific "dishonest" out-group(s) (usually minorities) as a threat. As Mudde and Kaltwasser (2012) emphasized, populism is in essence based on moral politics. The implication is that the role of populist leaders is to construct in-group/out-group distinction using anxiety, fear and anger as main mobilizing tools for the campaign. On the other hand, positive emotions as pride, justice and purity help to construct in-group identity assumingly typical of "the people". Therefore, emotions have gained their significance not only in political campaigning but also in social sciences studying and explaining social reality. What connects modern populists in Western and Eastern Europe (and USA) is the issue of immigration they use to polarize societies. Whether it is labor migration as part of the EU's single market or illegal immigration highlighted by the 2015 refugee crisis, negative emotional campaigns attacking immigrants became one of the dominant parts of populists' electoral campaigns. Therefore, this study examines the influence of emotions on political attitudes, with particular focus on immigration attitudes. Specifically, we were interested in the role played by anxiety. We define anxiety as undirected aversive arousal, which is distinguished from similar emotions (such as anger or fear) by lacking a clear object (Ohman, 2000; Renshon et al., 2015).

In addition to the immigration issues, we tested also the relationship between anxiety and attitudes in another political issue that has been debated in western democracies – legalization of marijuana. We chose the marijuana issue because it does not have the element of in-group/ out-group division and thus is not a subset of issues easily abused by modern populists, who need the in-group/out-group division for their mobilization strategies.

Our findings contribute to the debate on the explanations provided by the affective intelligence theory (Marcus, Neumann, & MacKuen, 2000). We argue that the role of emotions is not only an indirect one, blocking uncomfortable information out of the system, but their role is rather inhibiting the extremist attitudes. However, we find the effect to be dependent on issue characteristic. While anxiety played a significant role inhibiting extreme positions on the topic with an in-group/ out-group division (immigration), the effect was less visible in a topic without the clear in-group/out-group representation (marijuana legalization).

Our contribution to the literature on emotions and politics is twofold. First, we provide experimental evidence for the influence of emotions in political attitudes formation, even with a stimulus irrelevant to politics (Small & Lerner, 2008; Renshon, Lee, & Tingley, 2015). We use an experimental manipulation that is completely incidental to the political attitudes we measure. Even Renshon et al. (2015), despite using the same video to trigger anxiety, administered a text stimulus related to immigration issues.

Second, our study provides evidence for emotional influence on immigrant attitudes in a context different from the US. Particularly, the low level of experience with immigrants makes Slovakia rather different from the United States or other multicultural societies. The main argument here is that context plays an important role in attitudes formation, as the higher share of immigrants in society may significantly increase the intensity of direct inter-ethnic contacts.

Theoretical Background

Attitudes towards Immigrants

Attitudes towards immigrants and immigration have been the subject of social science research for several decades, although predomi-

nantly in the American context. Hainmueller and Hopkins thus considered this area of study "ripe for comparative research" (2014, p. 234). Therefore, our study uses culturally different context to focus on attitudes towards immigrants. Slovakia, unlike the United States, is a typical emigrant rather than immigrant society. Limited (if any) experiences with immigrant minorities provide significantly different background for studying attitudes towards immigrants.

Although economy-based explanations dominated for a long time, recently the focus of political scientists includes psychological factors into the explanatory frames of immigration attitudes. Hainmueller and Hopkins (2014) provide a review of various approaches to studying and explaining attitudes towards immigrants and immigration policies. They highlight that the strand of research linking emotions to immigration attitudes is relatively new, with the first empirical study bringing anxiety into the picture being Brader, Valentino and Suhay (2008). Xenophobic tendencies of Slovak society has been explained from socio-economic perspective for long time (Haerpfer & Wallace, 1998), however the psychological explanatory frames of immigration attitudes are less explored.

Effects of Anxiety on Political Behavior

Anxiety has caught the attention of political scientists because of its relatively well proved effects on voting behavior (e.g., Huddy et al., 2005; Ladd & Lenz, 2008) and because the manipulation of this emotion in modern political campaigning is so prominent (Jerit, 2004; Brader, 2005). Anxiety as an emotion characterized by feelings of tension, uncertainty and lack of control is less targeted than for example fear or anger. The source of anxiety has not been precisely stated and thus, the usability of anxiety in political discourse is broader than that of fear, for instance. This is also a reason why immigration-related anxiety might be present even in a country with limited (if any) experience with massive immigration like Slovakia.

Brader et al. (2008) claim to be not only the first to experimentally test the role of anxiety, but also the first to combine anxiety and perception of threat or harm as an alternative causal explanation. Change of belief or perception of consequences was a dominant explanatory route in the previous literature on immigration attitudes. The assumption was that a stimulus, e.g. newspaper article, affects the way people view immigration in regard to the size of the threat it constitutes or consequences it may bring about (Gilens, 1999; Mendelberg, 2001; Nelson & Kinder, 1996; Valentino, Hutchings, & White, 2002; Eagly & Chaiken, 1993). Brader et al. (2008) depart from the Affective Intelligence Theory (AIT; Marcus, Neuman, & MacKuen, 2000) and argue that people in an increased state of anxiety are not only more open to new information, but also more vulnerable to the information that is available, which may often be skewed, untrue or manipulated. Therefore, increased anxiety might lead to more negative attitudes towards immigration. Brader et al. (2008) conducted two experiments and proved that it is the anxiety, and not the perceived threat that mediates the relationship between group cues in immigration discourse and attitudes towards immigration.

Affective Intelligence Theory

Ladd and Lenz (2008) offered a reassessment of the Affective Intelligence Theory. The authors acknowledge the role anxiety plays in the political choices people make, especially vote choices. However, they question whether the decision-making model of AIT explains the anxiety's role better than its alternative: the Affect Transfer (AT) and Endogenous Affect (EA) hypotheses. The difference is that while AIT acknowledges only indirect role of anxiety,

mainly in decreasing the heuristic importance in information processing, the latter two suggest a direct link between anxiety and vote choice. Ladd and Lenz performed several replications of Brader's models, with some extensions. In addition, they used panel data in their replications. Their findings support the AT and EA approach for influence of enthusiasm as a positive emotion, and strong evidence for the EA in case of anxiety. Therefore, they argue there is more evidence to support EA than AIT.

Marcus, MacKuen, and Neuman (2011) replied to Ladd and Lenz claiming that there are three important mistakes in the Ladd and Lenz replications. The first one is the choice of dependent variable. Ladd and Lenz replaced vote intention with feeling thermometers. The second one is assuming one-dimensionality of emotions, which they argue is a long-time proven wrong. The third mistake is the measurement error of anxiety, in combining feelings for both candidates into a single indicator. The authors argue that the right way is to use only one measure of feelings towards the candidate who is associated with the respondent's political affiliation. Marcus et al. (2011) performed several tests and ran various statistical models to show that even after extending additional survey waves and controlling for thermometer feelings the AIT still holds. In addition, the authors showed that the feeling thermometer and vote intention are distinct measures and should not be freely interchanged.

Renshon et al. (2015) contributed with another piece of puzzle to better understanding of emotions in political attitudes. The authors argue that the stimulus content is important, as the content related to politics might trigger causal paths other than emotions (e.g., ideology). Therefore, as Renshon et al. highlights, it is important to use non-political stimulus in experimental research. In their experiment, they showed that even the emotion that is incidental (unrelated) to political judgment can influence political attitudes. Another novelty Renshon et al. presented was in coupling the self-reported measurement of emotional state with psychophysiological measurement – skin-conductance reactivity. They found that the elevated skin-conductance reactivity was successfully predicting the negative attitudes towards immigrants even after controlling for self-reported emotional state.

We argue that the findings of Renshon et al. (2015) open the discussion of the AIT explanatory power. The reason is that AIT claims that increased anxiety has only indirect influence on immigration attitudes in that it suppress the importance of heuristics and allows new information to be more influential (Marcus et al., 2011). Renshon et al. showed that increased anxiety led to more negative attitudes towards immigrants even if the experimental, anxiety-triggering video stimulus was incidental. However, Renshon et al. provided participants with stories on immigration as a part of the experimental design.

We do not claim that findings of Renshon et al. (2015) are against the AIT, rather we argue that the causal mechanism described by the AIT may not be necessarily the only one that links anxiety to immigration attitudes. The question whether anxiety may represent a direct link to change in immigration attitudes thus remains.

Although indirectly, Hatemi et al. (2013) also contributed to the discussion of emotion's role in immigration attitudes. The authors, focusing on the phobic-fear dispositions, brought a new element into studying the role of emotions and attitudes, which is a highlighted role of a stable, personality trait-based disposition, which is genetically informed. In other words, the authors focused on a stable, personal tendency to experience fear instead of the actual state of fear or anxiety. Hatemi et al. argue that the genetic influence lies in "regulating the level of anxiety and sensitivity to the out-group threat" (2013; p. 283). Their results show that fear and

anxiety is related to immigrants and segregation attitudes, but not to liberal-conservative attitudes. The reason is that fear-induced anxiety works only with the political attitudes that involve in-group versus out-group relationships. Other empirical works also highlight the role of emotion in prejudicial attitudes, particularly when the attitudes regard in-group vs. out-group division (Butz & Yogeeswaran, 2011; Stephan et al., 2006; DeSteno et al., 2004; Voci & Hewstone, 2003).

The Aim of this Study

In this study, we aim to investigate the relation between anxiety and selected political attitudes. Based on the researched above, we draw two hypotheses. The first hypothesis regards the relationship between anxiety feelings and political attitudes. We expect higher anxiety to lead to radicalized, more negative political attitudes, under the circumstances of experimentally imposed anxiety feelings by a stimulus that has no information value or content relation to the issue at hand. Second hypothesis places in a relationship the type of issue on the one hand, and the strength of anxiety's effect on the other hand. We expect the anxiety effect to be stronger in an issue involving the in-group/out-group division (such as immigration) than in an issue with no such division (marijuana legalization).

Should the effect of anxiety be confirmed, this could mean that the political discourse based dominantly on negative emotions could lead to further polarization of society.

Method

Participants

We recruited 71 university students (47 females, 24 males) from the Faculty of Arts, Comenius University in Bratislava. The decision to participate was completely voluntary, i.e. the participation was not enforced by teachers in any way. Students were offered 3 ECTS credits for participating in the experiment, and they were from various departments and study fields within the faculty. Participants were randomly assigned to three groups (17 females and 8 males in the experimental group, 16 females and 8 males in the relax condition group, 14 females and 8 males in the control group). As all the participants were regular, internal students at both bachelor (excluding the first year) and master level, we did not record their age. We estimate the age of participants to range from 19 to 23.

Procedure

The experiments were conducted in small classrooms. Experimental procedure is depicted in Diagram 1.

After the subjects' arrival, we welcomed them and explained that they were going to complete three short, unrelated surveys and watch two short video clips in between the surveys. First, participants were applied sensors to measure psychophysiological reactivity. To measure heart rate two electrodes were attached to participants' bodies. Heart rate was measured by ECG monitoring system (described below) during the whole time the experiment was conducted.

Subsequently, participants were given further instructions. Following verbal instructions, participants filled out the pre-test questionnaire. Pre-test questionnaire contained items measuring the selected political attitudes under study, and several additional items so that the purpose of the experiment was not evident. Between the first (pre-test) and the second (personality traits) survey they watched a short video (2 min 57 sec) full of relaxing images of lakes, trees or turtles slowly swimming in the sea, with calm music played as part of the video.

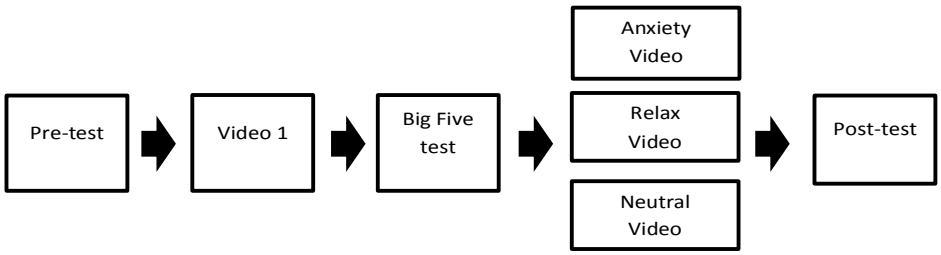

Diagram 1 Experimental design

The aim was to measure the bioelectrical activity of the heart at the baseline. After the relax video (same for all groups), participants filled out the second survey measuring personality traits, using the 60-item NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992; Slovak version Ruisel & Halama, 2007). Between the second and the third survey, the participants watched the second, stimulus video.

The experimental group watched a short clip from the film Cliffhanger. We chose this film clip because it has been proved to trigger anxiety (Fredrickson & Branigan, 2003; Renshon et al., 2015). By anxiety we mean undirected aversive arousal, which is distinguished from similar emotions (such as anger or fear) by lacking a clear object (Ohman, 2000; Renshon et al., 2015). The video clip is 2 min 32 sec long and it shows a scene where a male mountain climber attempts to save a female climber, who is hanging above a rocky gorge, attached to a rope by a metal shackle that is slowly opening up and the female climber is about to fall. Although the woman character in the film eventually falls to her death, the clip shown to the experimental group ends before that time and the participants do not know the outcome.

The control group watched a neutral video with up to 20 various daily life objects with no sound (mostly simple pieces of furniture and means of transportation in black and white). Third group watched a relaxing video with relaxing music played over visuals of abstract shapes and colors (4 min 15 sec). The purpose of this was to control the extent to which heart activity changes when going from the first relaxing video to neutral, compared to the relax-relax condition.

After the manipulation video, we administered the post-test survey that included several sets of items. First, the post-test survey asked participants about the emotions they felt while watching the stimulus video. Second, we included items pertaining to the selected political attitudes under investigations. In addition to that, we included a set of items related to the video content, and other social issues. Again, the reason was to blur the main aim of the study.

Measures

Anxiety Feeling

We chose to measure physiological arousal as a change in heart rate activity. We admit that this measurement is, to a certain extent, less precise in sensitivity and speed of the subject's reaction to stimulus, when compared to skin conductance (EDA). However, both measures are equally well designed to capture the subject's activation. Measuring HR has another advantage; it is applicable in non-laboratory

setting (Watson & Gatchel, 1979; Li, Scott, & Walters, 2015).

The heart rate was measured by the sensor eMotion Faros 90 (Mega Electronics Ltd., Finland), which is a non-invasive ECG monitoring system. The ECG frequency was set at 250 Hz and the HRV monitoring frequency at 1000 Hz. Two electrodes were applied in the Lead II. position (negative pole under participant's right collar-bone and positive pole on participant's chest, left side in the area around the 13th rib). We used the Kubios HRV 2.2 software to analyze the data.

We also measured self-reported feeling of anxiety as a part of post-test questionnaire. The question read: "Consider the short film clip you have just watched. To what extent did you feel the following emotions: anxiety?" The answers were recorded on a 7-point Likert scale, where the answer 0 read "I have not felt this emotion at all" and answer 6 read "I have felt this emotion very strongly".

Neuroticism

To measure neuroticism, we employed the Big Five personality test using the 60-item NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992, Slovak version Ruisel & Halama, 2007). This measure has proved rather reliable (Gosling, Rentfrow, & Swann, 2003) and takes relatively little time to administer. In our sample, the reliability of the subscale was tested as Cronbach's alpha resulting in $\alpha = 0.762$.

Political Attitudes

In both the pre-test and post-test surveys we measured several attitudes towards various social issues so that participants could not easily find out the main point of interest of our research. The questionnaire included items on healthy lifestyle, environmental issues, healthcare issues. The item measuring attitudes towards immigrants asked to what degree participants agree with the following statement: "Slovakia should adopt such measures that would allow immigrants to get only the jobs that Slovak nationals do not want". This type of question is frequently used in public surveys to measure preferences towards immigration policies (Hainmueller, Hiscox, & Margalit, 2015; Vašečka, 2009) and is regularly part of the World Value Survey. The item on marijuana legalization read: "Use of marijuana and other soft drugs should be legalized". Respondents were to state to what extent they agree with the statement on a 5-point Likert scale. Asking about attitudes towards marijuana legalization is not unusual in survey research (Eurobarometer 66, or surveys sponsored by the European Monitoring Centre for Drugs and Drug Addiction, carried out by national centers). In social, and particularly political science research, attitudes towards marijuana legalization are perceived as an indicator of social liberal thinking and are often used in relation to intelligence (Carl, 2014), literacy (Carl, Cofnas, & Menie, 2016), and other concepts. The operationalization of dependent variable makes it clear that we focus on the *preference* rather than *feelings*, as part of attitudes (Zajonc, 1980; Hatemi et al., 2013).

Data Analysis

We use linear regression models to test the relationship between anxiety and neuroticism on the one hand and the change in policy attitudes on the other hand. Although 'difference in means' methods, such as ANOVA, have traditionally dominated in assessing experimental effects, several authors have recently advocated multivariate regression techniques to evaluate experimental results (Maxwell & Delaney, 2004; Blair & Imai, 2012). The main argument in favor of regression is that the statistical efficiency is much higher, resulting in considerably more precise estimates. Multivariate

regression techniques, particularly in case of confounding control variables, are considered a standard technique (Morton & Williams, 2010). Before running the regression analysis we checked that the necessary assumptions (linearity, normal distribution, absence of outliers, absence of multicollinearity and heteroscedasticity) were met.

We are aware of the rather small sample size, which is not a rare problem in experimental research. In order to ensure that model estimates are robust, we decided to use bootstrapping (Mooney & Duval, 1993; Kline, 2011; Yung & Bentler, 1996). In addition to robustness, "a greater degree of accuracy" is also an argument for bootstrapping with models of smaller sample size (Byrne, 2016, p. 369). For regression results without bootstrapping see Appendix.

Results

Feeling of Anxiety

First, we look at the possible effect the video manipulation had on our participants. Figure 1, the left-hand side shows the boxplots of self-reported anxiety feelings measured after the video stimulus. The figure indicates that while there is considerable difference in the level of self-reported anxiety feelings between the experimental group on the one hand, and the two other groups on the other hand, the change in ECG level is very similar in all three groups. Statistical tests confirm these findings. On the one hand, difference in self-reported anxiety between the experimental and control group is statistically significant ($t(45) = 4.623, p < 0.001$), as well as between the experimental group and the relax group ($t(48) = 7.681, p < 0.001$). Looking at the self-reported anxiety, the expected difference between the neutral and relax group is also significant ($t(45) = 1.821, p = 0.038$). Tests of differences in ECG levels between the groups revealed no statistical difference in any of the combination (cliffhanger/neutral/relax).

Effects of Anxiety on Attitudes towards Immigrants and Marijuana

We test the effects of induced emotions by running several regression models. Table 1 shows the results. Model 1a (M1a) and 1b (M1b) focus on change in attitudes towards immigrants as the dependent variable. The difference between them is that for the assessment of the effect size of emotions, Model 1a uses

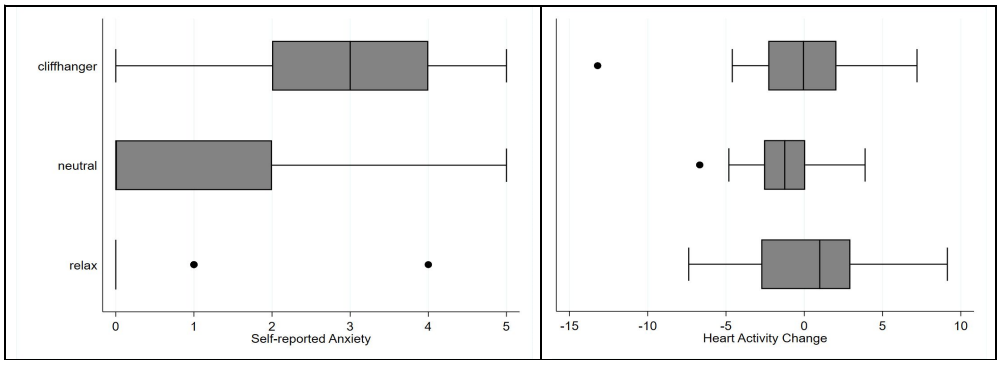

Figure 1 Change in anxiety between experimental and control group

group assignment as a categorical variable, while Model 1b uses self-reported anxiety measure. Models 2a (M2a) and 2b (M2b) focus on attitudes towards marijuana legalization as the dependent variable. Analogically, the difference between them is that Model 2a uses groups as a categorical variable, while Model 2b uses self-reported anxiety measure.

Model 1a reveals that participants in the experimental group changed their position towards immigrants, on average, by 0.726 on a 5-point scale. The change in attitudes was calculated in a way so that higher difference means higher degree of rejection, i.e. more radicalized attitude. Therefore, we can state that a switch from neutral to experimental group is associated with radicalized attitude towards immigrants. Model 1b confirms this relationship by revealing that higher self-reported anxiety increases the change in attitudes by 0.139. As we measured anxiety on a 7-point Likert scale, the maximum influence of anxiety (change from hypothetical minimum to hypothetical maximum) is thus 0.834. Considering that the attitudes towards immigrants are measured on a 5-point scale, we argue that the influence of induced anxiety is rather strong.

Models 2a and 2b show that the experimental manipulation had no effect on the change of attitudes towards the legalization of marijuana, whether measured as experimental/control group membership or self-reported anxiety feelings. Despite no significant relationship in the "marijuana" models, this finding is substantial and relevant.

Findings regarding both dependent variables, attitudes towards immigrants and marijuana, are only partially in line with our expectations. Participants in the experimental group showed, on average, more radical attitudes towards immigrants than the control group (M1a). In addition, no difference was found between the control and relax group. Self-reported anxiety also led to radicalized attitudes (M1b). On the other hand, we found no effects of imposed anxiety feelings on attitude change towards marijuana

Table 1 *Regression models (bootstrapped)*

	M1a: Change of attitudes towards immigrants	M1b: Change of attitudes towards immigrants	M2a: Change of attitudes towards marijuana legalization	M2b: Change of attitudes towards marijuana legalization
Experimental group (b = control group)	0.726*		0.047	
Relax group	0.284		0.066	
Anxiety		0.139*		0.115
Neuroticism	-0.020	-0.022	-0.000	-0.002
ECG change	-0.026	-0.023	0.051	0.046
constant	-0.214	-0.017	-0.046	-0.123
Wald statistic	6.76 (0.149)	4.09 (0.252)	1.36 (0.851)	3.99 (0.262)
df	4	3	4	3
R^2	*0.111*	*0.081*	*0.024*	*0.050*
N	*58*	*58*	*58*	*58*

Note: * $p < 0.05$

legalization. Based on the evidence we consider the first hypothesis only partially confirmed.

As expected in the second hypothesis, shifting from attitudes in the area with a clear in-group versus out-group division to an area with no such clear division would decrease the effect of induced emotions. Our models show the effect size going down from relatively strong in the former case to non-existent in the latter case. Technically, we found the change of relationship in the expected direction, and thus we could argue the second hypothesis to be confirmed. However, we have to admit we did not expect the effect size in case of marijuana attitudes to diminish completely.

Discussion

Effects of Anxiety on Radicalizing Political Attitudes

Our results indicate that emotional arousal, particularly the feeling of anxiety, can influence anti-immigration attitudes in terms of radicalizing them. Such result is in accordance with previous research findings (Renshon et al., 2015). On the other hand, we found no evidence to support the hypothesized relationship between anxiety and marijuana attitudes.

On the one hand, the present study provides empirical evidence that emotional stimulus can have an effect on selected political attitudes formation, even if it is incidental to the decision-making process. As Bower (1981) has already pointed out, emotional arousal makes people recall experiences and information that are "affectively congruent". Thus, imposed anxiety as a negative emotion would cause people to recall similarly negative images or facts on immigrants. Consequently, this would translate into negative, anti-immigration attitudes. This is in line with previous research that linked variety of negative emotions (anger, disgust, fear and anxiety) to prejudicial attitudes towards outgroup members (Butz & Yogeeswaran, 2011; Stephan et al., 2006; DeSteno et al., 2004; Voci & Hewstone, 2003).

On the other hand, we admit that we investigated the effect of anxiety on attitudes change in just two, rather specific policy issues. Therefore, our findings should be taken as the first indication rather than confirmation of the negative effect of content-unrelated emotions on political attitudes. Further research including various policy attitudes is needed in this direction.

Additional to other research, we empirically demonstrated the direct effect, not only a mediated role of anxiety (e.g., Renshon et al., 2015). If future research also proves it to be true, imposing anxiety and anger by modern populists can have a long-lasting polarizing impact on societies. Realizing that the out-group/in-group division seems to be important, it is predominantly the relationship between the majoritarian part of society and various minorities that can suffer the most.

The fact that we did not find any evidence for an effect of anxiety on political attitudes towards legalization of marijuana may be explained by different nature of the problem. On the one hand, the immigration issues provide the potential for in-group/out-group identification. Moreover, the experiment was conducted about a month after the 2016 parliamentary election. The electoral campaign has intensely abused the issue of migration crisis that the whole EU suffered from. Strongly negative and intense public discourse could have imprinted a negative image of immigrants in society even after the election. Therefore, participants could have easily imagined a stereotyped, black, Muslim refugee despite the fact that the item in the questionnaire asked about labor migration from third countries. This could potentially bias the results as well. Future replication of this study could shed more light on the potential contextual bias of electoral campaign.

On the other hand, marijuana legalization is an issue that is not based on identity divide but rather on social norms and values that dominate in society. This opens several avenues for the interpretation of our findings. First, in line with the hypothesized role of the out-group/in-group divide, the role of anxiety may be weaker. Alternatively, experience with marijuana consumption could bias the results indirectly, although randomization should serve the purpose of controlling for unmeasured influences. However, if there were many participants with previous experience of marijuana use in all groups, the memory recollection at the time of reading the question may have brought associations that pre-determined the participants' attitudes and, thus, prevented the stimulus to exert influence. Lastly, there is also a statistical reason that potentially explains the insignificant effect of anxiety on attitudes towards marijuana decriminalization. The reason is that our study is working with relatively small sample size (72 participants), although not unusually small in this type of research (a sample size below 100 participants is most often used in psychological studies, as shown by Kühberger, Fritz, & Scherndl, 2014). Increasing the sample size should strengthen the statistical significance of the results, although it should not automatically change the size of anxiety effects on political attitudes.

As there is a fair amount of literature highlighting the role of genetic predisposition in anxiety feelings (see review i.e., in Clément, Calatayud, & Belzung, 2002), we included a personality feature of neuroticism as a control variable in our models. Despite having no hypothesis regarding neuroticism directly, we will touch upon it at least minimally here. The effects of neuroticism were not statistically significant, thus indicating no role for this personality trait in affecting political attitudes. On the other hand, it is important to note that the actual level of anxiety feelings was part of the regression model. Although the Variance Inflation Factor (VIF) indicated no multicollinearity problem, lack of statistical significance for a measure of tendency to anxiety feelings may be partially explained by capturing the actual state of anxiety feelings.

Study Limitations

Our study was not without limitations. While the self-reported anxiety among participants proved to rise after being exposed to the stimulus, the measures of ECG levels between the groups revealed no statistically relevant differences among the groups. Thus, we have to admit: subjectively reported emotions were not objectively supported by physiological arousal measured by ECG. One possible explanation for such discrepancy might point to the environmental set up of the experiment. Experimental treatment carried out in a classroom, as opposed to individually performed tests in a laboratory setting might influence the intensity of the experience of the imposed anxiety (Frijda, 1988), which can subsequently impact the psychophysiological emotional demonstrations causing insignificance of ECG change between groups. In addition, there may have been several other minor distractions during the experiment that may have caused the heart activity to increase without the researchers' intentions (i.e., possible group effect, minor audio disturbances in the environment, gender of the administrators…). If this had happened, particularly in the relax or control group, it would have led to insignificant differences in the measurements.

Second, our research design does not bring us certainty in terms of the extent to which the findings based on immigration attitudes can be generalized to other issues, even if limited to areas including in-group/out-group divide. On the one hand, it seems natural that the effect of anxiety on change of attitudes towards immigrants should be, to a certain degree, transferable to issues related to other minorities, in-

cluding not only ethnic, but also sexual and religious minorities. However, due to the unprecedented migration wave of 2015 and the way it was abused in the public discourse in Slovakia (a rather radicalized discourse itself), it is possible that the attitudes towards immigration cannot be representative of other types of political attitudes and should be kept in a strictly separate category. Future research will have to decide on this.

Finally, our research design has a limitation in regard to time dimension of the attitude change caused by imposed anxiety. As our post-test questionnaire was administered shortly after the stimulus, our models can only estimate a short-time change in attitudes. On the one hand, it is possible that without any further emotional manipulation the attitudes towards immigration become less negative again, and reach the original level. However, in reality there is perpetual abuse of negative emotions in populist politics, which can have long-term impact on further radicalization of political attitudes.

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Appendix

Regression results without bootstrapping

	M1a: Change of attitudes towards immigrants	M1b: Change of attitudes towards immigrants	M2a: Change of attitudes towards marijuana legalization	M2b: Change of attitudes towards marijuana legalization
Experimental group (b = control group)	0.726*		0.047	
Relax group	0.284		0.066	
Anxiety		0.139[(a)]		0.115
Neuroticism	-0.020	-0.022	-0.000	-0.002
ECG change	-0.026	-0.023	0.051	0.046
constant	-0.214	-0.017	-0.046	-0.123
F (p-value)	1.66 (0.174)	1.59 (0.201)	0.32 (0.860)	0.95 (0.422)
df	4	3	4	3
R^2	*0.111*	*0.081*	*0.024*	*0.050*
N	*58*	*58*	*58*	*58*

Note: * – coefficient is significant at 0.05 level
(a) – coefficient is significant at 0.01 level

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A Discriminant Analysis to Predict the Impact of Personality Traits, Self-esteem, and Time Spent Online on Different Levels of Internet Addiction Risk among University Students

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The aim of the current study is to evaluate the predictive influence of Big Five personality traits, self-esteem, and time spent online in discriminating among a sample of university students classified as normal, mildly, and moderately addicted Internet users. Self-report measures were administered to 207 Italian university students aged 19 to 41 years. Results indicated no severe Internet addiction among the participants, but only a mild and moderate risk. Correlation analysis revealed a significant negative association between Internet addiction score and self-esteem. The discriminant analysis indicated two main functions that allow discrimination in terms of the influence of personality traits, self-esteem, and time spent online in three groups of participants. These results may have valid implications in assessing students engaged in intensive online activities, indicating that tailored approaches to their problems are particularly important in preventing the risk of Internet addiction disorder.

Key words: Big Five personality, self-esteem, Internet addiction, university students, discriminant analysis

Introduction

The classification of Internet addiction as a behavioral disorder remains a controversial matter. It has been described as an individual's uncontrollable and compulsive use of the Internet, which negatively affects academic and job performances, reduces sleep and hygiene quality, and leads to reduced interpersonal social relationships (Lyvers, Karantonis, Edwards, & Thorberg, 2016; Sahraian, Hedayati, Mani, & Hedayati, 2016; Young, 2015; Zhang et al., 2015). Furthermore, the conceptual model of Internet addiction incorporates tolerance, withdrawal, relapse, salience, conflict and mood modification as the core criteria for symptoms of addictive behavior (McNicol & Thorsteinsson, 2017). On the basis of the current literature, the conceptualization of Internet addiction has been identified as an umbrella term, which includes a wide range of problematic online behavior (e.g., online gaming, online gambling, online sex, and social networking) and is characterized by extreme preoccupation with connecting to the Internet, with poor behavior control of online activities resulting in a negative impact on personal well-being and quality of life (Monacis, Sinatra, Griffiths, & de Palo, 2018). Social media addiction is another recent kind of Internet addiction, which can be described as the inability to control oneself in the use of social networking sites (Andreassen, Pallesen, &

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Griffiths, 2017; Błachnio et al., 2018). The adverse consequences of social media addiction, as a sub-type of behavioral addiction, includes distress in interpersonal relationships, as well as mental and problematic social behavior in several daily-life activities (Nie et al., 2019).

Recently, the new Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association (APA, 2013)) has so far underlined the importance of including only Internet Gaming Disorder as a kind of emerging disturbance. It has been included in 'Section 3: Emerging Measures and Models' in order to better understand the nature of Internet addiction, and to possibly include it as a distinctive disorder in the next publication of DSM (Kuss, Griffiths, Karila, & Billieux, 2014).

From the time Internet addiction was first described almost 20 years ago as a clinical disorder (Young, 1998), many studies – also done with university students – have subsequently been conducted on several psychological correlates (Al-Gamal, Alzayyat, & Ahmad, 2016; Burnay, Billieux, Blairy, & Larøi, 2015; Chou et al., 2015; Monacis, de Palo, Griffiths, & Sinatra, 2017). On the other hand, other studies have focused, in relation to Internet addiction, on the following topics: personality traits and other risk factors (Kayiş et al., 2016; Li et al., 2017; Öztürk, Bektas, Ayar, Özgüven Öztornacı, & Yağcı, 2015; Sahraian et al., 2016; Servidio, 2014); and overweight socially stigmatized adolescents (Gentile, Servidio, Caci, & Boca, 2018).

Focusing on personality traits, the Big Five represents the classical theoretical model for categorizing a subject's individuality (Caprara, Barbaranelli, & Borgogni, 2005; Costa & McCrae, 1992). Concisely, this model identifies five dimensions in human personality traits: extraversion (reflecting expansiveness and energy), agreeableness (reflecting concern and politeness), conscientiousness (reflecting orderliness and precision), emotional stability (reflecting the capacity to cope with anxiety and emotionality), and openness (reflecting openness to novelty and interest towards different people and cultures).

A recent meta-analysis has examined 12 studies, which have found that all the Big Five personality traits are involved in Internet addiction (Kayiş et al., 2016). In particular, traits such as openness, conscientiousness, extraversion, and agreeableness were negatively associated with Internet addiction, whereas a positive correlation was observed with emotional stability. Apparently, the relationship between neuroticism and Internet addiction is stable, but one study indicated no statistical significance (Öztürk et al., 2015). In addition, the association between extraversion and Internet addiction is still controversial. Results from some studies demonstrated a positive relationship (Kuss, Shorter, van Rooij, van de Mheen, & Griffiths, 2014; Zhou, Li, Li, Wang, & Zhao, 2017), while another study reported a negative link (Yan, Li, & Sui, 2014). Furthermore, a recent study revealed some significant relationships (Chwaszcz, Lelonek-Kuleta, Wiechetek, Niewiadomska, & Palacz-Chrisidis, 2018). Similar incoherence has been found for openness to experiences. Servidio (2014) found a negative association between openness to experiences and Internet addiction, while another study reported a positive relationship (Hwang et al., 2014).

Results from a prior study specified conflicting findings regarding the effects of the Big Five personality traits on Internet addiction (Randler, Horzum, & Vollmer, 2014). Specifically, the study found that agreeable and conscientious students reported lower level of Internet addiction, but no consistent relationship was observed between students addicted to Internet and openness to experiences, extraversion, and neuroticism.

Due to the limited number of such studies, the reasons for the inconsistent findings are not clear (Zhou et al., 2017). These results, how-

ever, could be influenced by several factors. For example, the use of different instruments to measure personality traits (e.g., full instrument version *vs* brief measure), the properties of the sample (e.g., cross-sectional *vs* clinical, experimental), and the different methods used to analyze the data (correlational *vs* multivariate techniques). Thus, these conflicting outcomes seem to suggest that studying the relation between personality traits and Internet addiction remains a meaningful topic. Additionally, the continuous release of new social networking and Internet applications, as well as the increasing use of simplified computer user-interface require studying their effects on many aspects of individual daily life.

The relationship between self-esteem, considered as a psychological strength that reflects one's overall evaluation of oneself, and Internet addiction has been examined over the past decades (Andreassen et al., 2017; Bleidorn et al., 2016; Hahn, Reuter, Spinath, & Montag, 2017). In this regard, there is a common view among researchers, which suggests that individuals with lower self-esteem are more predisposed to Internet addiction (Servidio, Gentile, & Boca, 2018; Yao, He, Ko, & Pang, 2014). Individuals with low self-esteem, compared to those with higher levels of self-esteem, also tend to spend more time on the Internet using social networking websites. Moreover, this corpus of investigations has found that individuals who score lower on the Big Five personality traits and self-esteem may have greater risks of developing Internet addiction disorder.

Additionally, other studies have been conducted to examine the connection between Internet addiction and other risk factors such as gender, time spent online by the subjects, self-diagnosis of the perceived disorder, and social networking usage (Błachnio et al., 2018; Servidio, 2014; Wang, Ho, Chan, & Tse, 2015; Widyanto, Griffiths, & Brunsden, 2011). As discussed earlier, a large and consistent body of research suggests that Internet addiction is a social problem because it is associated with several psychosocial and psychological factors. In this theoretical framework, a recent Italian study (Monacis et al., 2018) has validated the English version (Pontes & Griffiths, 2015) of the Internet Disorder Scale (IDS). The IDS was designed and developed by modifying the nine criteria for the clinical diagnosis of the Internet Game Disorder (such as salience, mood modification, tolerance, withdrawal symptoms, conflict and relapse) and to adjust them to assess the risk of Internet addiction. The rationale of the IDS is to measure the severity of Internet addiction and its negative impact by only focusing upon a user's online leisure behavior, excluding, for example, academic and/or occupational Internet usage. The validated IDS Italian scale showed adequate psychometric properties, as well as high and positive associations between Internet disorder, Internet gaming disorder, and social media addiction, supporting the idea that Internet addiction works as an umbrella to cover a wide range of online social activities (Monacis et al., 2018).

To the best of our knowledge, the area of creating subgroups of individuals based on Internet usage and personality traits still has to be further studied. The current study seeks to provide empirical evidence relating to this question by exploring the influence of personality factors and psychosocial variables in order to discriminate between the use and abuse of the Internet by specific users.

The results of this investigation may be applied in assessing the prevalence and the nature of Internet addiction disorder among university students, who are often considered a high risk-group (Frangos, Frangos, & Sotiropoulos, 2011). In addition, the current results may be useful for supporting counselors in developing intervention programs for students with identified Internet addiction risks at the early stage of the disorder. Finally, our find-

ings contribute to the debate in present literature as to which specific personality traits, or absence thereof, including self-esteem and other variables, may increase Internet addiction risk in university students.

Aim and Research Hypothesis of the Study

The main aim of the current study is to empirically discriminate the influence of Big Five personality traits, self-esteem, personal experience with Internet usage and well-being at different levels of Internet addiction risk. This study tries to expand the body of knowledge on Internet addiction, by assessing the relative importance of specific predictor variables that could be useful in identifying university students who may be addicted, from those who use the Internet within the norm. According to the above, when information about personality traits, self-esteem, well-being, and time spent online is available, our research hypothesis is to explore which among these are the discriminant predictors that may classify a student as being within the Internet addiction group or not.

Method

Participants and Procedure

We recruited a convenience sample of 207 Italian undergraduate university students. The current sample consists of 45 males (21.7%) and 162 females (78.3%). The participants' ages ranged from 19 to 41 ($M = 25.34$, $SD = 4.39$) and they majored in three different subject areas (37.2% scientific, 35.7% humanistic, and 27.1% economic). Although the sample is on the smaller side, a previous study, however, has also used similar sample sizes (Kayiş et al., 2016). Additionally, as previous studies have shown, the current study interviewed university students because they are considered at greater risk in developing Internet addiction disorder (Al-Gamal et al., 2016; Kitazawa et al., 2018; Servidio, 2014; Tian, Bian, Han, Gao, & Wang, 2017). Before collecting the data, we randomized the order of the instruments to minimize the risk of order bias.

Study participants were recruited during the regular didactic activities, during a break, and while they were at the University library. After we obtained their permission to participate in the study, we informed all participants of the study's anonymity, strict confidentiality, and solely scientific use of all the answers to the questionnaire. Completion of the paper-pencil questionnaire, which was in Italian, took approximately 20 minutes. All the research materials and study procedures were designed according to the Ethics in Human Research (AIP, 2015).

We found that 151 participants (73%) affirmed staying connected daily to the Internet for 1 to 3 hours, whereas only 56 participants declared using the Internet between 5 and 10 hours per day (27%). The majority of the participants (64.3%) declared using their own smartphone to establish an Internet connection. Most of them, a good 56.5%, accessed the Internet in order to use Facebook.

Measures

The *Internet Addiction Test* (IAT) is a self-report screener for measuring Internet usage (Young, 1998). We used the translated Italian version of the IAT (Servidio, 2017), which consists of 20 items measured on a 5-point Likert scale ranging from 1 (rarely) to 5 (always). A representative item was: "How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?" According to Young (2015), the questionnaire measures the extent of an individual's involvement with Internet usage and classifies addictive behavior in terms of an impairment index that ranges from a minimum of 20 to a maximum of

100. The total score is the sum of the score for each participant's answer. Specifically, the scores indicate the following range of values, with higher scores indicating higher severity of Internet addiction: 0 to 30 = normal level of Internet usage; 31 to 49 = mild level of Internet addiction; 50 to 79 = moderate symptoms, with subjects experiencing occasional or frequent problems with Internet use; and 80 to 100 indicate severe symptoms, where Internet use is causing significant problems in the subject's life (Young, 2015). The Cronbach's alpha score for the internal reliability of the scale for this study was good (α = .863), indicating high consistency.

The *Big Five Questionnaire* (BFQ) is a 132-item self-report measure that aims to examine personality traits identified as extraversion, emotional stability, openness, conscientiousness, and agreeableness (Costa & McCrae, 1992). The full validated Italian version of the BFQ was used for this study (Caprara et al., 2005). Answers to items are scored on a 5-point Likert scale, ranging from "1 = absolutely false for me", to "5 = absolutely true for me". The score of each Big Five trait was calculated following the procedures described in the BFQ test manual with all the final scores standardized. In the present study, the internal reliability of each Big Five trait was satisfactory (extraversion, α = .66; emotional stability, α = .69; openness, α = 0.74; conscientiousness, α = .70 and agreeableness, α = .65).

The *Italian Rosenberg Self-Esteem Scale* (Prezza, Trombaccia, & Armento, 1997) was used to measure the subjective feelings of self-value and self-acceptance. Participants rated their answers with 10 statements on the following scale, with higher scores indicating higher self-esteem: 1 (strongly disagree), to 4 (strongly agree). A sample item was: "I feel that I have a number of good qualities". The internal consistency in the sample of this present study was good (α = .83).

Demographic information as well as self-reports regarding, gender, age, degree course, number of hours spent online per day, well-being in terms of social relationships, and other relevant variables were collected. However, this form was designed by the author, taking into account the previous studies carried out in the field of Internet addiction disorder (Burnay et al., 2015; Monacis et al., 2018; Servidio, 2014; Servidio, 2017).

Data Analysis

Before conducting the statistical analyses as well the univariate normality assumptions, we checked the data set. As suggested by Kline (2016), all the variables considered for the current analysis had absolute values of skewness (< 3.0) and kurtosis (< 8.0), thus the assumption of normality was satisfied.

We ran descriptive statistics and Pearson correlation analyses to test the relationship between the variables. Furthermore, we carried out a *t*-test for independent sample to explore the differences between gender, Internet addiction, and self-esteem. Finally, we computed the Cohen's *d* effect size.

Subsequently, we performed a discriminant analysis in order to determine the best combination of predictor variables for discovering group membership among normal users, mildly impaired users, and users with moderate impairment risk of being addicted to the Internet. The variables entered in the model included the following: time spent online per day, personal and social well-being, Internet addiction, self-esteem, and the Big Five personality traits (extraversion, agreeableness, conscientiousness, emotional stability and openness). For the discriminant analysis, we checked the result of the Box's M test. Finally, as suggested by Field (2013), in order to better validate the results, we conducted a MANOVA with both univariate test and discriminant analysis. All

the statistical analyses were conducted using SPSS 23.0.

Results

The IAT's impairment index indicated that 46 (14.9%) participants reported no Internet addiction symptoms, 130 (63.2%) participants reported mild symptoms, but they still had control over their Internet usage, and 31 (21.9%) showed occasional or frequent problems with the Internet (moderate symptoms). For this study, we found no participant affected by severe Internet addiction disorder. The independent *t*-test indicated a significant difference in the scores of Internet addiction and gender $t(205) = 3.67, p = .000, d = .63$. The mean values were higher for males ($M = 43.58$, $SD = 9.68$) than for females ($M = 37.39$, $SD = 10.08$). This difference $t(205) = 2.54$, $p = .012$, $d = .41$ was also confirmed by analyzing the time (hours per day) the participants spent online, where males preferred to stay connected to Internet longer ($M = 3.11$, $SD = 1.23$) than females ($M = 2.61$, $SD = 1.15$). However, no significant gender differences were found in self-esteem $t(205) = .90$, $p = .369$, $d = .14$. There was no statistically significant difference among normal, mildly impaired, and moderately impaired Internet users' index as regards age, $F(2,204) = .14$, $p = .870$.

The association between the main variables of the current study was investigated using Pearson's correlation, as shown in supplementary Table A.1 (Appendix). Students who had high scores on the Internet addiction questionnaire reported low levels of self-esteem $r(207) = -.28$, $p = .000$, of conscientiousness $r(207) = -.15$, $p = .032$, and well-being $r(207) = -.18$, $p = .011$.

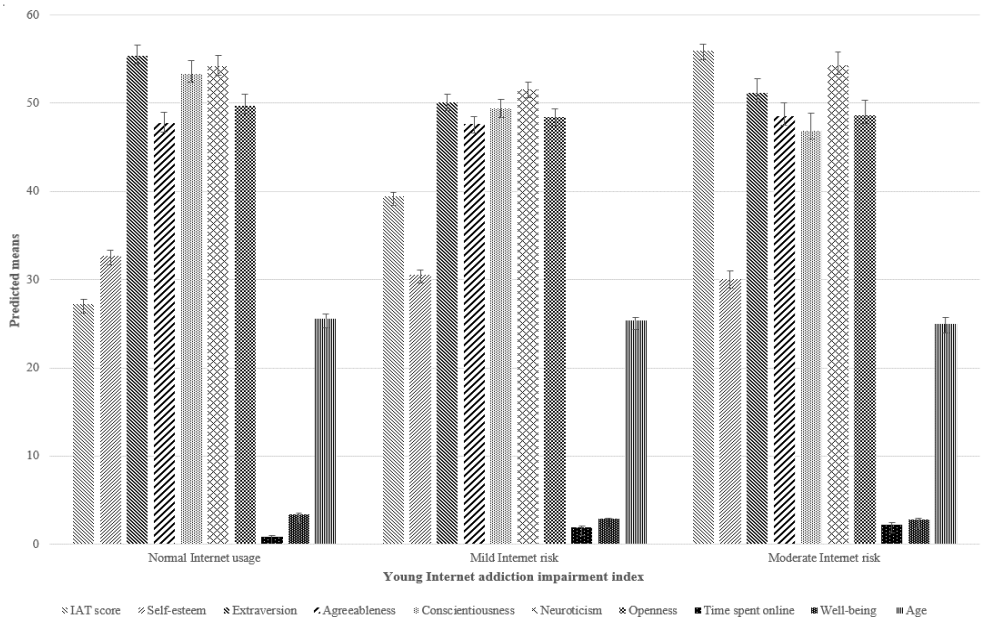

Figure 1 Description of the predicted means across the three distinct categories of Internet users. Bars represent the standard error.

A between-subjects MANOVA using a Bonferroni-correction yielded a statistically significant difference between the three impairment groups, Pillai's trace = .976, $F(20, 392.000) = 18.699$, $p = .000$, $\eta^2 = .488$, except for the following variables: agreeableness, emotional stability, openness, and age where the differences between the three groups did not reach statistical significance. For a better illustration of this effect, Figure 1 shows a graphic representation of the predicted mean scores across the three Internet users' groups.

Following the Internet addiction impairment index, we performed a three-group discriminant analysis on the normal user (reflecting a normal level of Internet usage), the mildly impaired user (indicates the presence of a mild level of Internet addiction), and the moderately impaired user (reflects the presence of a moderate level of Internet addiction). We used the Big Five personality traits, time spent online, well-being, and age as discriminant independent variables (predictor), whereas we used the three main Internet impairment indexes as dependent variables. The results obtained displayed two statistically significant discriminant functions, which indicate that the variables included in the model were able to discriminate among the three groups (Table 1).

The result of the Box's M test indicated that the final value of 151.34 was associated with an alpha level of .05. As a result, there was no violation of the assumption of equality of covariance (Ho, 2014). Table 2 presents the discriminant coefficients for the raw and the standardized form of the variables for each function. The first discriminant function relates to participants, who are in greater risk of being addicted to the Internet, exhibiting lower levels of conscien-

Table 1 *Summary of the discriminant functions*

Function	Eigenvalue	% of variance	Canonical correlation	Canonical R^2	Wilks' Lambda	Chi-square	*df*	*p*
1	4.326	97.7	.901	.811	.170	353.372	20	.000
2	.104	2.3	.307	.094	.906	19.696	9	.020

Table 2 *Raw and standardized discriminant function coefficients*

Measured variable	Raw score coefficient		Standardized coefficient	
	Function 1	Function 2	Function 1	Function 2
IAT score	.225	.048	1.047	.225
Self-esteem	.042	.055	.211	.276
Extraversion	-.015	.038	-.139	.359
Agreeableness	.003	.002	.024	.016
Conscientiousness	-.009	.010	-.104	.116
Emotional stability	.002	.062	.020	.563
Openness	.017	.016	.173	.162
Time spent online per day	.001	-.571	.001	-.614
Well-being	-.030	.249	-.032	.268
Age	-.030	-.024	-.133	-.104
Constant	-9.033	-9.374		

tiousness and extraversion, and having moderate values of self-esteem, openness, and age. This dimension accounts for the largest percentage of explained variance in the canonical correlate (97.7% of the total).

The second dimension relates to cases with a weak risk of being addicted to the Internet, where heavy Internet usage is not a priority, exhibiting lower time spent online per day; emotional stability, extraversion, self-esteem and age were the most strongly weighted variables, whereas conscientiousness, openness and well-being were also important discriminant factors. This dimension accounts for 2.3% of the total explained canonical correlate variance.

The two latent constructs represented by the discriminant functions can be interpreted with respect to the structure coefficients as shown in Table 3. For the first function, higher levels of the latent variable are indicated by a higher Internet addiction score and more time spent online per day. This factor appears to represent an Internet use/abuse. The second latent construct is indicated primarily by greater emotional stability, extraversion, self-esteem, openness, well-being, agreeableness, and conscientiousness, and by lower levels of time spent online per day, Internet addiction score and age. It appears to represent the area of personality functioning related to Internet use.

Figure 2a shows the difference in centroids values, which are relatively substantial along the first function (Internet use/abuse), where the three groups are differentiated. Those who use Internet within the norm reported a better behavioral strategy toward the Internet, whereas those with a moderate level of impairment showed a relatively unhealthy adaptation to the Internet with higher risk of becoming addicted. Then, those with mild impairment reported a midrange adaptation toward Internet usage.

Looking at the second function (personality functioning related to Internet), the differences in centroids values are much more modest. Participants who are normal Internet users appear to have a stable personality functioning, compared to those who have a moderate level of Internet addiction; whereas, those who are in the midrange group appear to care somewhat less about Internet addiction. The midrange position can be interpreted as being sort of separated from the other two groups. Figure 2b offers a visual representation of the centroids to better discriminate the groups' membership.

Table 3 *Structure coefficients (structural matrix)*

Measured variable	Structure coefficient	
	Function 1	Function 2
IAT score	.953	-.043
Emotional stability	-.018	.525
Time spent online per day	.210	-.523
Extraversion	-.053	.449
Self-esteem	-.083	.344
Openness	-.013	.279
Well-being	-.087	.277
Agreeableness	.006	.256
Conscientiousness	-.089	.152
Age	-.020	.038

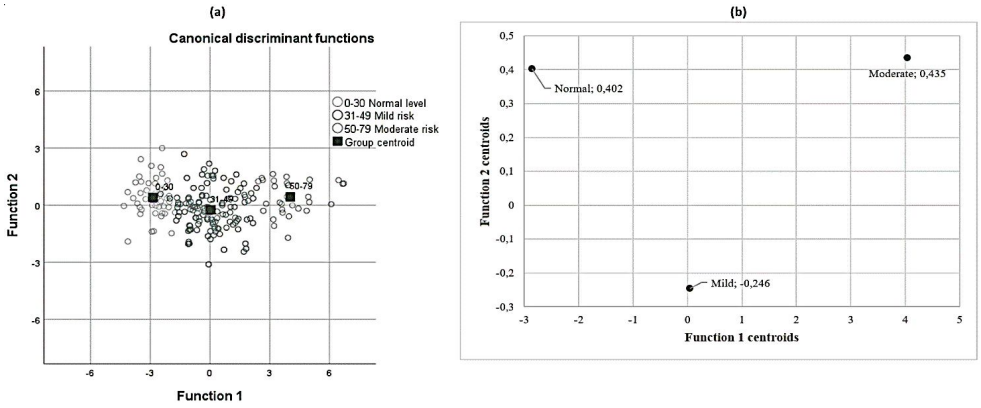

Figure 2 Combined discriminant group plot (a) and simplified axis scaled combined group plot (b)

It is also important to consider the correctness of the model classifying the participants in their group. In that sense, the prediction made by the model had a good percentage of success, with 92.80% of all cases classified correctly. This value ranges from 22.22% (46 of 46 cases) for those who are not addicted to Internet, to 55.55% (115 of 130 cases) for those who have a mild risk of Internet addiction and 14.97% (31 of 31 cases) for those who were classified as addicted to Internet moderately.

Discussion

The current study has explored the role of personality traits of some empirically-discriminate groups of Internet risk users, categorized as normal, mildly addicted, and moderately addicted to the Internet. Current studies in this field tend to replicate statistical analysis methods such as correlational, linear, and multiple regression analyses. We adopted the discriminant analysis method with the aim of generating membership from a set of predictors.

Correlation analysis showed that self-esteem, conscientiousness, well-being, and gender were negatively associated with Internet addiction test, whereas time spent online per day was positively linked. This pattern was similar in other studies as well (Kuss et al., 2014; Servidio, 2014). It was evident that the risk of being addicted to the Internet is associated with lower levels of planning, organizing, and discipline in the user's behavior, as well as lower levels of self-esteem and well-being.

The predictor variables that contributed in the discriminant analysis model were items related to the Big Five personality traits, self-esteem, well-being, and age. The resulting analysis yielded two canonical dimensions. The first profile explained more variance and included participants with lower levels of extraversion, conscientiousness and age, and moderate values of self-esteem. The second profile included participants who reported less involvement with Internet activities in general and greater emotional stability, extraversion, self-esteem, and well-being. It can be argued that personality traits influence and predispose a person's behavior in the social and virtual context. From this perspective, personality factors are important because they can be used to understand

the complexity of human behavior. This knowledge is particularly important in current society where people use Internet technologies every day.

The results show that a decrease in the involvement of each personality trait, self-esteem, and well-being, leads to a rise in the time spent online, and increases the risk of Internet addiction. In explaining these results, it can be affirmed that emotional stability, openness, and extraversion showed a higher discriminant effect, while conscientiousness and self-esteem, as well as agreeableness and well-being, were moderately involved. With the exception of openness, the results of the Big Five personality traits are consistent with the outcomes of a recent literature review (Kayiş et al., 2016).

For the purpose of the current study, however, it is important to underline that emotional stability, extraversion and self-esteem appear to be important dimensions that protect people against Internet addiction. In other words, individuals with higher levels of emotional stability, extraversion and self-esteem are more predisposed to establishing face-to-face communication with others in real-life contexts because they have good self-control, lower anxiety, and show confident levels of self-awareness. Other previous studies are in line with these findings (Kayiş et al., 2016, for a review). According to the Big Five personality model, people with low emotional stability tend to experience increased levels of stress and interpersonal conflicts, and are also unable to cope with stressful events. Extraversion represents an important trait because it relates to an individual's enthusiastic attitude towards social situations involving characteristics such as sociability, activeness, decisiveness, and positive emotionality. On the contrary, people with low levels of extraversion use the Internet more frequently, thus increasing the risk of becoming addicted. Thus, introverted people prefer to use the Internet because they find it easier to establish satisfying and close interpersonal relationships in the virtual arena.

Self-esteem is another relevant predictor of Internet addiction and has been identified as a risk factor. People with lower levels of self-esteem scored higher on Internet addiction risks (Hahn et al., 2017; Servidio et al., 2018). The current findings corroborate the role of self-esteem, which can serve as a buffer to Internet addiction in the sense that people with lower self-esteem could use the Internet as a strategy in the attempt to improve their self-esteem (Zhang et al., 2015).

Finally, time spent online per day was negatively related to Internet addiction and appears to be another important variable for predicting the risk of Internet addiction. In the current study, we found that limiting the number of hours spent online per day by individuals reduces the risk of Internet addiction. This result is consistent with other previous outcomes, which stress the importance of monitoring the time spent online to avoid long Internet sessions (Servidio, 2014; Wang et al., 2015). Although the majority of the studies are cross-sectional, time spent online could be an indicator of increasing tolerance, which is a criterion for substance dependence. Moreover, the fact that people spend more of their time online means that they opt out of engaging in alternative social activities with friends and significant others, and this could be an impairment symptom (Kuss et al., 2014).

By considering the discriminant plot, it is important to note that the first function shows a good discriminant profile (Internet use/abuse) among the three impairments risks, whereas the second function (personality functioning related to Internet) indicates that the three groups are relatively close to each other. This result could be interpreted that any one risk factor depends on other aspects related to personal and social factors. According to Li et al. (2017), it is uncommon to find that two latent profiles

have identical levels in one dimension but different levels of some indicators in another dimension. In the present study, although users with moderate profiles have higher risks of becoming addicted to the Internet, compared to those with normal profiles, the difference in their level of impairment is modest along the second function, which is related to personality traits, self-esteem, and well-being. The normal and moderate profiles appear to be separated by a mild risk profile. These findings may suggest that all three profiles are relatively related to each other. However, if adolescents experience the moderate (vs. normal and mild) influence of multiple risk factors, their level of Internet addiction could increase.

To sum up, the current results suggest that the discriminant analysis allows the discrimination of the influence of specific personality traits, the role of self-esteem, and time spent online on the three groups of Internet users. It is evident that the question regarding the positive or negative psychological effects of Internet use, particularly on adolescents, needs further research. Identifying the grouping of Internet users may support researchers in making comparisons among Internet users and could be useful in defining psychosocial profiles, to avoid having to classify people as good or bad Internet users.

Limitations and Future Research

The current study has some limitations. First, the study is based on a sample of undergraduate students, who are not fully representative of the whole population of Internet users. Future research should consider the importance of designing longitudinal studies to examine the effects of how personality traits can also vary in relation to the development of new and advanced technological applications. Further studies could also explore the differences in Internet risks among participants with different educational backgrounds. Second, we collected data via participants' self-report methodology, whose results may be affected by social desirability. Future studies could replicate the current discriminant model to test the validity of the current findings. In addition, it would also be interesting to explore the possibility of applying other similar statistical methods, such as cluster analysis, which is an interdependence technique and is based on a posteriori grouping, where a set of variables may be optimally grouped. The results would be useful to differentiate the types of normal/addicted users in relation to specific variables. Third, the variable that measured the time spent online was built by asking participants about the time spent daily on the Internet. They could have had inaccurate time-perceptions of the time spent using social media technologies (Wolniewicz, Tiamiyu, Weeks, & Elhai, 2018). Fourth, we found no severe Internet addicts among the participants, but only those with mild and moderate risks. This result is common among university students. From this perspective, a larger sample of participants as well as a balance in the presence of males and females should reduce this limitation.

Conclusion

Our findings indicate two distinct dimensions, which are useful in predicting whether a person can be classified as addicted to Internet, demonstrating that different persons can share and exhibit the same behavior, indicating the importance of carefully analyzing psychosocial problems. These results advance our understanding of the association between Internet addiction, demographic factors, and personality traits, insofar as these factors could be areas for prevention. A clear understanding of this association may provide precise measures that could help prevent Internet addiction. Despite the limitations mentioned, the results of the current

study can provide important implications for policy for counselors, individuals, and researchers, and suggest some possible intervention programs aimed at preventing the risk of Internet addiction. From this perspective, a possible strategy for preventing the risk of Internet addiction could be important in the creation of educational programs devoted to supporting Internet users so that they become more self-confident and emotionally stable in specific areas of their personal life.

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Appendix

Table A.1 *Means, standard deviations and correlations between study variables*

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. IAT score	38.73	10.292	-											
2. Self-esteem	31.10	5.128	-.279**	-										
3. Extraversion	51.78	9.527	-.073	.141*	-									
4. Agreeableness	47.82	9.096	-.006	.092	.143*	-								
5. Conscientiousness	50.10	11.613	-.149*	-.032	.447**	.283**	-							
6. Emotional stability	52.76	9.160	-.103	.356**	-.127	.178*	-.307**	-						
7. Openness	48.82	9.943	-.047	.112	.430**	.523**	.586**	-.048	-					
8. Time spent online	1.72	1.182	.427**	.042	-.005	.031	-.008	-.007	.085	-				
9. Self-diagnostic item	1.73	0.445	-.379**	.076	.077	.062	.204**	-.051	.166*	-.394**	-			
10. Well-being	3.02	1.095	-.157*	-.003	.181**	.008	.238**	-.038	.085	-.051	.193**	-		
11. Age	25.34	4.388	-.002	.107	.164*	.293**	.267**	-.014	.345**	.104	.032	.161*	-	
12. Gender	.78	.413	-.249**	-.063	.073	-.142*	.118	-.039	-.021	-.175*	.048	.173*	-.106	-

Note. $N = 207$

*$p < 0.05$, **$p < 0.001$