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1 The effect of acculturation and harm beliefs on medication adherence on Middle Eastern

2 hypertensive refugees and migrants in Australia.

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Abstract

Background. Different populations have different levels of acculturation, and beliefs about medications. Little is known about the differences between refugees and migrants regarding these various beliefs. Adherence to medications is influenced by many factors, including individuals' characteristics, acculturation, and their perceptions about medications. Having a thorough understanding of these beliefs contributes to understanding medication adherence in refugee and migrant populations.

Objectives. To evaluate the differences between Middle Eastern refugees and migrants in Australia regarding acculturation, beliefs about medications, and medication adherence, and to evaluate the association of acculturation and beliefs about medications and natural remedies with medication adherence.

Setting. Participants were recruited from various community groups and English language learning centres in Australia. Arabic Facebook community groups were also used to recruit participants for this study.

Method. A total of 320 Middle Eastern refugees and migrants with hypertension completed Arabic or English versions of the general Beliefs about Medicine Questionnaire (BMQ) - harm scale, a question about beliefs in natural remedies, six items about acculturation and the Medication Adherence Questionnaire. Two models of multiple mediation were applied. The first model examined the role of acculturation, length of residency, beliefs

48 about natural remedies, and harm beliefs as mediators between migration status and medication adherence. The
49 second model identified the role of acculturation, and beliefs about natural remedies as mediators between
50 migration status and medication harm beliefs.

51 **Main outcome measure.** Medication adherence, harm beliefs about medication, acculturation, and beliefs
52 about natural remedies. In addition, the differences between refugees and migrants regarding these beliefs and
53 medication adherence.

54 **Results.** Differences were found between refugees and migrants for medication adherence and medication
55 beliefs. Refugees were likely to have more harm beliefs towards medicine and were less acculturated than migrants
56 ($p=0.0001$). They were also less likely to adhere to medications ($p=0.0001$), and perceived natural remedies to be
57 safer than Western medications ($p=0.0001$).

58 Perceiving medications as harmful substances, and beliefs in natural remedies were mediators in the relationship
59 between migration status and medication adherence. Beliefs in natural remedies and acculturation were mediators
60 in the relationship between migration status and harm beliefs.

61 **Conclusion.** Beliefs about medications and natural remedies, and acculturation in refugees and migrants need to
62 be better understood to enhance medication adherence and potentially overall health outcomes.

63
64 Keywords: natural remedies, Western medications, harm beliefs; acculturation; medication adherence; refugees;
65 migrants

66 67 **Impact on Practice Statements:**

- 68 • Healthcare providers should consider the impact of harm beliefs about medicine, acculturation, and
69 beliefs about natural remedies on medication adherence in hypertensive patients from different cultural
70 background to achieve optimal healthcare.
- 71 • There are differences between Middle Eastern refugees and migrants regarding their acculturation,
72 beliefs about natural remedies and medicines and these should be taken into account to tailor the
73 interventions and communications to each of these populations.

Introduction:

Hypertension is a common risk factor for cardiovascular and renal diseases, including ischemic heart disease, stroke, chronic kidney disease, and heart failure. [1]. In Australia about 1 in 3 people aged 18 and over have high blood pressure [2]. Despite effective drug therapy and lifestyle modification programs targeting hypertension, the AIHW National Health Survey showed that it was uncontrolled in an estimated 40 % of people known to be hypertensive [3].

Medication non-adherence including failure to initiate pharmacotherapy, take medications at the prescribed frequency and persist with therapy long-term, are a well-recognized factor contributing to the poor control of blood pressure [4]. Medication non-adherence also constitutes a significant obstacle to hypertension care worldwide with a prevalence of between 20% and 50% [5]. Medication non-adherence in a Middle Eastern population, the focus of this paper, was addressed in a systematic review, and estimated to be 48% in chronic illnesses, such as hypertension [6].

It has been shown that medication adherence is multi-faceted. Factors contributing to medication adherence include patients' perceptions regarding medication safety, illness, social factors, health literacy, language barriers, and religious and cultural beliefs and values [7].

Cultural influences may have a negative impact on patient's adherence via perceptions of health, disease management and medications. Acculturation has been defined as culture change that results from continuous contact between two distinct cultural groups and occurs as members of a minority group become more involved in the majority group and varies with age, gender, socioeconomic status, education and duration of time in the host country [8]. A recent systematic review that evaluated the impact of cultural beliefs on medication adherence, found that individuals with higher levels of acculturation were more likely to be adherent to medication regimes [7].

Studies aimed at understanding non-adherence from patients' perspectives have highlighted the importance of personal beliefs about medicines [9, 10]. Studies across a range of illnesses have shown that non-adherence is often related to whether patients evaluate prescribed medications as harmful or poisonous substances [11]. These beliefs maybe influenced by cultural background, values, and behaviours [12].

102 Individuals who have negative perceptions about modern medicines often hold the notion that the unnatural origins
103 of medicines are dangerous and that complementary treatments are more ‘natural’ and therefore safer. Such
104 general perceptions may influence treatment preferences, pathways to care, and adherence to medication [12].

105 The meaning of health itself is ambiguous in nature and is influenced by different cultural beliefs and experiences.
106 These different meanings of health along with cultural beliefs, exert significant influence on the health behaviours
107 such as medication adherence in different individuals and different populations [13]. For example, in one study
108 patients from southern Asian cultural backgrounds expressed more negative views about medication than those
109 from European cultural backgrounds. They were significantly more likely to perceive medicines as being
110 intrinsically harmful, addictive substances, that should be avoided [11].

111 The ethnic minority populations in Australia are growing substantially because of continued migration. Australia
112 has consistently ranked as one of the top three resettlement countries in the world [14] including from the Middle
113 Eastern countries [15].

114 In literature, the terms ‘migrant’, and ‘refugee’ are used interchangeably, and they have been treated as a single
115 population [16]. However, each has a legal definition that distinguishes one from the other [17]. A refugee is a
116 person who relocates from their “country of nationality or habitual residence, has a well-founded fear of
117 persecution because of his (sic) race, religion, nationality, membership of a particular social group or political
118 opinion, and is unable or unwilling to avail themselves of the protection of that country, or to return there, for fear
119 of persecution” [14]. Migrants move of their own free-will mainly to improve their lives by finding work, or in
120 some cases for education, family reunion, or other reasons [18]. Unlike refugees, who cannot safely return to their
121 home countries, migrants face no such impediment and may return at any time for visits [19].

122 The higher prevalence of chronic diseases in ethnic minority populations such as refugees leads to co-morbidities
123 and multiple drug therapies and medicine-related problems [20]. In addition, refugee populations are associated
124 with poorer lower education levels, and lower socioeconomic status and resources, in addition to communication
125 and language barriers. Refugees’ different migration experiences needs and expectations in comparison to those
126 of the migrant population may influence their perceptions and beliefs which, in turn, will affect their use and
127 management of medicines [19].

128 Only a limited number of studies have examined cultural beliefs, harm beliefs and medication adherence in Middle
129 Eastern refugees and migrants. A study focusing on Arab migrants in the USA found that those with high levels

130 of acculturation were most likely to be adherent to antihypertensive medications [21]. In another study patients
131 from the Middle East preferred herbal supplements to conventional medicines, perceiving less harm from
132 supplements [22]. Two studies that have examined the relationship between harm beliefs and medication
133 adherence, found a significant negative association between harm beliefs and medication adherence [23, 24].
134 However, neither of these studies examined adherence, cultural beliefs, harm beliefs in hypertension or differences
135 between refugees and migrants.

136 **Aim of the study:**

137 The aim of this study was to explore the relationship between harm beliefs, acculturation, beliefs about natural
138 remedies and medication adherence in Middle Eastern refugees and migrants in Australia, and to assess the
139 differences between both groups with regards to harm beliefs and adherence. In addition, the study also aimed to
140 examine the association between acculturation, and beliefs about natural remedies, with harm beliefs in these two
141 populations.

143 **Ethics Approval**

144 Ethics approval was obtained from the RMIT University Ethics Committee, (SEHAPP 53-18).
145

146 **Method**

147 **2.1 Study design and setting**

148 A cross-sectional design was used in which a sample of 319 Middle Eastern refugees and migrants in Australia
149 completed questionnaires that assessed beliefs about medicines in general, acculturation, the preference of natural
150 remedies over Western medications, medication adherence and demographic characteristics

151 Participants were recruited from September 2018 to July 2019 through community groups and English language
152 learning centres. Arabic Facebook community groups were also used to recruit participants for this study.

153 The questionnaires were translated to Arabic by a bilingual researcher (first language Arabic), and then back-
154 translated to English by another bilingual researcher. The original questionnaires were compared with the back-

155 translated version by two researchers whose first language was English. No significant differences or changes in
156 meaning were detected. Questionnaires in both Arabic and English were available for participants. Questions of
157 the Arabic and English version of the questionnaires are outlined in the Appendix.

158 159 160 **2.2 Study participants**

161 Data from participants meeting the following inclusion criteria: (1) aged 18 years or older; (2) migrated to
162 Australia as refugee or migrant; (3) born in any of the 22 countries of the Middle East; and (4) self-identifying as
163 having been diagnosed with essential hypertension was collected. Participants self-identified their migration
164 status, by answering one question that asked their reasons for coming to Australia. Participants who answered
165 other than “refugee” were considered migrants.

166 167 **2.3 Sample size**

168 The sample size was estimated using Gpower* software (Ver. 3) based on 95% confidence intervals, medium
169 effect size (0.3) and power of 80%. This calculation indicated that a minimum 222 participants were required to
170 complete the survey (111 in each group).

171 172 173 174 **2.4 Measures**

175 **2.4.1 Demographic characteristics**

176 Participants were asked to provide information on their age, gender, educational level, place of birth, year of
177 arrival to Australia, and if they had any comorbidities.

178 179 **2.4.2 Acculturation**

180 To identify acculturation level, participants were asked to complete a six-item scale that assessed adherence to
181 traditional values and attitudes [25]. Responses to each question ranged from 1 (low acculturation) to 5 (high
182 acculturation), and summary scores were calculated as the mean of all six items. The scale showed a high internal
183 reliability ($\alpha=0.88$).

184

185 **2.4.3 Beliefs about Medicines**

186 Beliefs about medicines were assessed using the Beliefs about Medication Questionnaire (BMQ) General scale,
187 which comprises two 4-item sub-scales [26] the General-Harm scale and the Overuse scale. The General-Harm
188 scale assesses individuals' beliefs about the intrinsic properties of medicines and the degree to which medicines
189 in general are perceived to be harmful, addictive poisons [12]. The internal reliability for the General- Harm scale
190 was high ($\alpha=0.88$). In the current study, Overuse scale internal reliability was low ($\alpha=0.50$) compared with the
191 original study where it was developed ($\alpha=0.60$). Therefore, only one item from the Overuse scale was used to
192 determine participants' beliefs about natural remedies. The other items in this scale measured beliefs about
193 whether healthcare providers overprescribed medications, which was beyond the scope of this study.

194 The natural remedies item required participants to answer the following statement; "*Natural remedies are safer*
195 *than medicines*" Respondents indicated their degree of agreement with this statement on a 5-point Likert scale
196 that ranged from 1 (strongly agree) to 5 (strongly disagree).

197

198 **2.4.4 Medication Adherence Questionnaire (MAQ)**

199 To measure medication adherence the four- item MAQ was used. Participants scored 1 point for each "no" and 0
200 points for each "yes". Patients were described as adherent (if the total score was four) or non-adherent (if the total
201 score was less than 4) [27, 28]. This scale was selected because it has been well-validated in identifying adherence
202 behaviour in a number of chronic cardiovascular disease populations and scores have been shown to correlate well
203 with objective adherence measures and clinical outcomes, such as blood pressure, lipid levels and blood glucose
204 control [29].

205

206 **2.5 Data analysis**

207 IBM Statistical Package for the Social Sciences software (Ver. 26) for Windows, was used to analyse the data.
208 The internal reliability of MAQ was assessed using Kuder-Richardson's coefficient (KR20), which measures
209 internal consistency of questionnaires which feature dichotomous items [30] ($\alpha=0.76$). The BMQ- Harm scale
210 internal reliability was assessed using Cronbach's α (0.88). Demographic characteristics and all dependent
211 variables were examined by descriptive statistics including percentages, frequencies, means and standard
212 deviations.

Pearson's correlations (r) were used to examine bivariate associations between dependent variables. Comparisons between the two groups were conducted using Chi-square test or independent-samples t -tests. All statistical analyses were evaluated by using a two-tailed significance level of $p < 0.05$.

Two mediation models were established, the first one to examine whether harm beliefs, acculturation, duration of residence in Australia, and perceived the safety of natural remedies, would mediate the relationship between status of migration and medication adherence in hypertensive refugees and migrants (Figure 1), and the second one to examine whether acculturation and beliefs about natural remedies would mediate the relationship between status of migration and harm beliefs (Figure 2).

Bootstrap (5,000 samples) mediation analysis for multiple mediation through the SPSS PROCESS macro was applied [31]. The indirect effect was statistically significant if the 95% bias-corrected confidence intervals (CIs) for the indirect effect did not include zero.

Confounding factors that were correlated to medication adherence significantly (e.g., education), were entered as covariates in all mediation analyses.

Results:

3.1 Participants demographics and clinical characteristics

A total of 320 participants were recruited: 168 refugees, and 152 migrants. Participants' demographic characteristics are published elsewhere (redacted) and described in Table 1. All participants were born in the Middle East, with the highest proportion of refugees from Iraq and Syria. Migrant participants were significantly younger ($\chi^2 = 20.78, p = 0.001$), significantly more educated ($\chi^2 = 40.57, p = 0.0001$), were significantly more likely to be employed ($\chi^2 = 38.35, p = 0.0001$).

Table 1. Demographics and clinical characteristics for refugees and migrants (n= 319) [19]

Variables	Refugee $n = 168$	Migrant $n = 152$	p
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		<i>n</i> (%)	<i>n</i> (%)	χ (<i>df</i>)	
Age	30 – 40	23 (13.8%)	29 (19.2%)	20.78(3)	0.001
	41-50	35 (21%)	59 (39.1%)		
	Above 50	108 (64.7%)	60 (39.7%)		
	Missing	2 (1.2%)	3 (1.98%)		
Sex	Male	83 (49.4%)	64 (42.4%)	1.58(1)	0.20
	Female	85 (50.6%)	87 (57.6%)		
Education	Lower secondary	88 (53.7%)	42 (28.4%)	40.57(4)	0.0001
	Higher secondary	41 (25 %)	26 (17.6%)		
	Diploma	7 (4.3%)	18 (12.2%)		
	Bachelor	22 (13.4%)	34 (23 %)		
	Higher than bachelor	6 (3.7%)	28 (18.9%)		
	Missing	4 (2.3%)	3 (1.98%)		
Occupation	Home/Not working	139 (84.8%)	84 (55.6%)	38.35(2)	0.001
	Self-employer	4 (2.4%)	31 (20.5%)		
	Governmental/private	21 (12.8%)	36 (23.8%)		
	Missing	4 (2.3%)	-		
Arrival year to Australia	2015-2018	58 (34.7%)	23 (15.4%)	24.35(3)	0.0001
	2010-2015	55 (32.9%)	42 (28.2%)		
	2000-2010	33 (19.8%)	41 (27.5%)		
	Before 2000	21 (12.6%)	43 (28.9%)		
	Missing	1 (0.6%)	2 (1.3%)		
Co- morbidity	Having \geq 2 chronic illnesses	54 (32.1%)	35 (23.2%)	5.5 (1)	0.02
	Diabetes Mellitus	61 (39.4%)	38 (25.7%)	6.44 (1)	0.01
	Mental illness	12 (7.4%)	3 (2%)	4.98 (1)	0.03
	COPD	7 (4.2%)	6 (4%)	0.01 (1)	0.9
	Asthma	16 (10.3%)	14 (9.5%)	0.06 (1)	0.8
	Back pain	57 (35.4%)	42 (28%)	1.96 (1)	0.16
	Arthritis	42 (26.3%)	36 (24.2%)	0.18 (1)	0.67

Country of birth	Iraq	83 (49.4%)	17 (11.2%)	-	-
	Syria	54 (32.1%)	18 (11.8%)	-	-
	Lebanon	17 (10.12%)	45 (29.6%)	-	-
	Egypt	3 (1.8%)	18 (11.8%)	-	-
	Morocco	2 (1.2%)	11 (7.23%)	-	-
	Jordan	NA	13 (8.55%)	-	-
	Algeria	1 (0.6%)	5 (3.3%)	-	-
	Kuwait	NA	9 (6.3%)	-	-
	Emirates	NA	4 (2.8%)	-	-
	Saudi Arabia	NA	4 (2.8%)	-	-
	Other Arab countries	6 (3.6%)	8 (5.3%)	-	-

3.2 Differences between participants regarding cultural factors, harm beliefs and medication adherence

Significant differences were found between refugees and migrants for acculturation, duration of residency in Australia, and the perceived safety of natural remedies in comparison to Western medications. (Table 2). Refugees demonstrated a significantly lower acculturation level than migrants ($p=0.0001$). They also were significantly more likely to have a greater belief that herbal remedies are safer than Western medications ($p=0.0001$). Refugees had settled in Australia for a shorter period than migrants ($p=0.0001$). Refugees were also significantly more likely to have negative beliefs about medications than migrants, demonstrated by their belief that medications are harmful, poisonous or can cause addiction ($p=0.0001$).

Migrants were significantly more adherent to taking medications in comparison to refugees ($p=0.0001$) (Table 2).

Table 2. Comparisons of refugee and migrant illness perceptions, and medication adherence

BIPQ	Refugee	Migrant		
	<i>M(SD)</i>	<i>M(SD)</i>	<i>t(df)</i>	<i>p</i>
Acculturation	12.7(4.4)	17.2(5.9)	6.1 (198)	0.0001
Harm beliefs	14.8 (4.1)	10.3 (4.9)	7.6 (306)	0.0001

Natural remedies	1.97 (1.1)	2.72 (1.4)	5.4 (310)	0.0001
	6.8 (1.13)	10.2 (1.18)	4.8 (314)	0.0001
Duration of residency in Australia				
Medication adherence	1.36 (1.4)	2.5 (1.4)	7.26 (305)	0.0001

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255 **3.3 Correlation of demographics/acclulturation/beliefs about natural remedies and harm beliefs with** 256 **medication adherence**

257 Table 3 shows the results of correlational analyses for both groups. Educational level was correlated weakly but
258 significantly with medication adherence in refugees $p=0.002$, and migrants $p=0.003$.

259 There was a significant correlation between higher acculturation level and better medication adherence ($p=0.007$,
260 0.005) in both refugees and migrants, respectively. Participants who believed that natural remedies are safer than
261 Western medications reported a low level of medication adherence ($p=0.0001$ across both groups). There was no
262 significant correlation between duration of residency in Australia and medication adherence in both groups
263 ($p>0.05$).

264 Negative perceptions about medications, represented by harm beliefs, were found to have a negative influence on
265 medication adherence in refugees, and migrants ($p=0.0001$ for both groups). Table 3 shows the statistical details.

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286 **Table 3. Correlations between medication adherence scores and other variables in refugees and migrants**

	MAQ	Acculturation	Harm	Natural remedies	Arrival Year	Gender	Age	Education	Occupation	Comorbidities
MAQ	1	.26**	-.47**	-.40**	-0.10	0.10	0.06	.24**	-0.04	-0.11
Acculturation	.30**	1	-.35**	-.29**	-0.10	-0.03	-0.05	.21*	-0.02	0.01
Harm	-.38*	.47**	1	.45**	-0.11	-0.002	-0.01	.30**	-0.17	-.18*
Natural meds	-.32**	-.35**	.44**	1	-0.14	0.04	.17*	-.27**	-0.10	-0.006
Arrival year	-0.11	-.30**	-.34**	-.17*	1	.25**	0.08	-.17*	-0.02	-0.10
Gender	-0.02	0.08	-0.08	-0.01	0.15	1	0.07	-0.14	-.26**	0.16
Age	-0.004	-.22*	-.30**	-.25**	.46**	-0.02	1	-.21**	-0.081	.17*
Education	0.26*	.27*	.20*	0.13	-.34**	-0.09	-.35**	1	-0.016	-0.17
Occupation	.19*	0.12	.17*	0.10	-0.05	-0.15	-.18*	.22**	1	-0.13
Comorbidities	0.04	.26*	-0.01	.18*	.18*	0.07	.27**	-.18*	0.02	1

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288 Note: Correlations for refugees above the diagonal; Correlations for migrants below the 283 diagonal (shaded cells); * indicates $p < 0.05$; Comorbidities coded dichotomously.

289

290 **3.4 Harm beliefs and beliefs about natural remedies as mediators between migration status and medication** 291 **adherence**

292 The relationship between the different migration statuses and medication adherence was mediated by harm beliefs
293 and beliefs about natural remedies, after adjusting for educational level. We tested the significance of this indirect
294 effect using bootstrapping procedures. The results showed that the standardized regression coefficient between
295 migration status and harm beliefs, natural remedies, acculturation, and duration of residency were statistically
296 significant ($p=0.0001$ across all variables). The standardized regression coefficient between harm beliefs, natural
297 remedies and medication adherence were significant, $p=0.002$ and $p=0.0006$, respectively. The standardized
298 indirect effect for harm beliefs was 0.08, and the
299 95% *CI* was 0.03-0.15, and that for natural remedies was 0.1, and the 95% *CI* was 0.03-0.18. Thus, the indirect
300 effect was statistically significant for both variables. The direct effect of migration status on medication adherence
301 was not significant ($p=0.15$), indicating there was a mediation effect (Table 5, Fig 1).

302 **3.5 Acculturation and beliefs about natural remedies as mediators between migration status and Harm** 303 **beliefs**

304 To explain the differences between refugees and migrants harm beliefs, another mediation model was
305 conducted. The relationship between different migration status and harm beliefs was mediated by acculturation
306 level, and beliefs in natural remedies after adjusting for educational level (Figure 2). The results showed that the
307 standardized regression coefficient between migration status and both of acculturation, and beliefs in natural
308 remedies were statistically significant $p=0.0001$, as was the standardized regression coefficient between both;
309 acculturation and natural remedies and harm beliefs $p=0.0001$. The significance of this indirect effect was
310 tested using bootstrapping procedures. Standardized indirect effect of acculturation was 0.12, and the 95% *CI*
311 was 0.05-0.21, and for natural remedies was 0.13, and the 95% *CI* was 0.06-0.21. Thus, the indirect effect for
312 both variables was statistically significant. The direct effect of migration status on harm beliefs was not
313 significant $p=0.13$, indicating there 314 was a mediation effect (Table 5, Figure 2).

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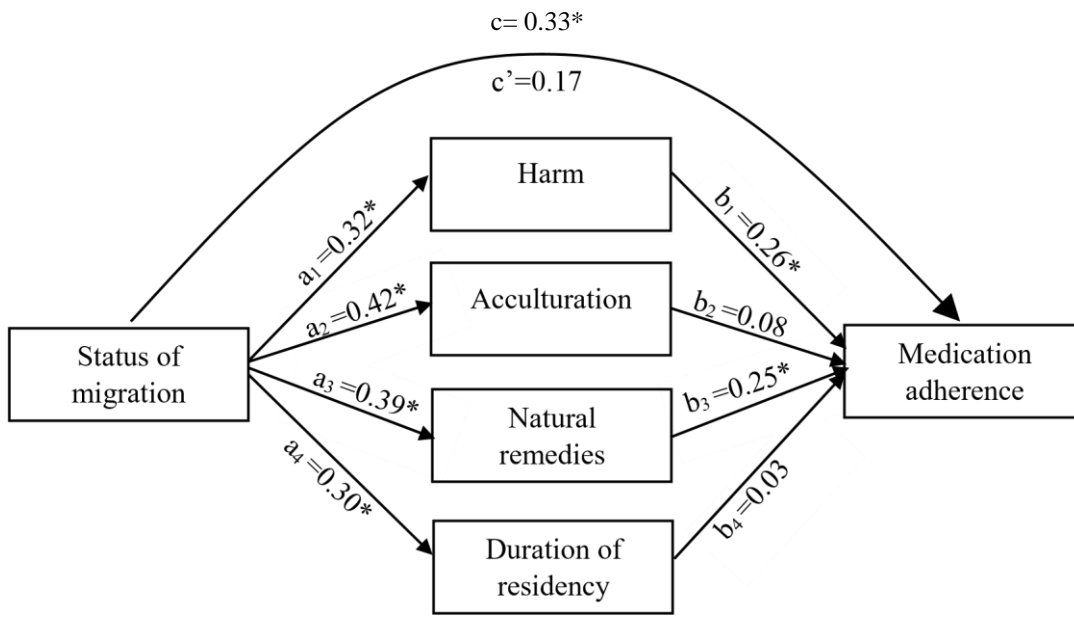
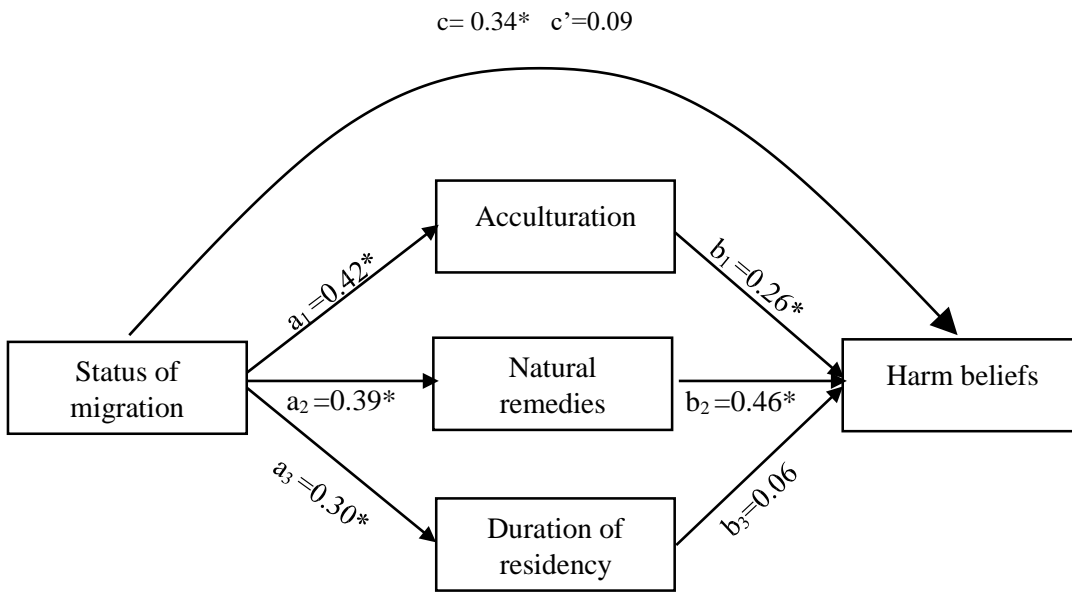


Figure 1: Multiple mediation model for status of migration and medication adherence via harm beliefs, acculturation, duration of residency and natural remedies. Standardized path coefficients indicated above. c = total effect; c' = direct effect. * $p < 0.001$



349 Figure 2: Multiple mediation model for status of migration and harm beliefs via acculturation, duration of residency and
350 natural remedies. Standardized path coefficients indicated above. c = total effect; c' = direct effect. * $p < 0.001$

351 **Table 5. Bootstrap Analyses of the Magnitude and Statistical Significance of Indirect Effect.**

Model	Independent variable	Dependent variable	Mediator variable	B mean indirect effect	95% CI mean indirect effect (lower and upper)
1	Status of migration	Adherence	Harm beliefs	0.08	0.03-0.15
			Natural remedies	0.10	0.03-0.18
			Acculturation	0.04	-0.02-0.11
			Duration of residency	0.008	-0.03-0.06
2	Status of migration	Harm beliefs	Natural remedies	0.13	0.06-0.21
			Acculturation	0.12	0.05-0.21
			Duration of residency	-0.02	-0.07-0.01

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355 **Discussion:**

356 This is the first study to examine the influence of migration status on medication adherence mediated by harm
357 beliefs, acculturation and beliefs about natural remedies in hypertensive Middle Eastern refugees and migrants. In
358 addition, this study quantifies the effect of migration status on harm beliefs mediated by acculturation and beliefs
359 about natural remedies. Understanding medication adherence, beliefs about medications, acculturation, and
360 beliefs about natural remedies of Middle Eastern refugees and migrants living in Australia is important for
361 successfully improving healthcare delivery.

362

363 The findings suggest that refugees and migrants have different medication adherence levels because of the
364 significant difference between them regarding harm beliefs and beliefs about natural remedies. These were the
365 most predictive factors of medication adherence, even when controlling for other potential confounders.

366 The findings also reveal that beliefs about natural remedies as being a safer treatment of hypertension than Western
367 medications, and the acculturation level of both refugees and migrants influenced their views about the intrinsic
368 nature of medicine (potential for harm).

369 The refugees reported suboptimal levels of adherence. They tenaciously held their cultural values, were less likely
370 to integrate into Australian culture, believing that natural remedies are safer than Western medications, and were
371 more likely than migrants to perceive medicines as intrinsically harmful.

372

373 The results of this study are consistent with research in literature. Harm beliefs were found to influence an
374 individual's initial orientation toward medicines adherence behaviour and were likely to be strongly related to
375 personal views about the prescribed medication. When patients decide whether or not to use medicines, they are
376 likely influenced by their beliefs about whether the medicines might do harm or good [12]. Therefore, they might
377 prefer herbal remedies rather than medications prescribed by their doctors. Benefit-risk considerations should be
378 taken into account and accordingly healthcare providers should advise patients that they might be at risk of greater
379 harm if they stop medications [32].

380 In line with previous research, individuals who had fairly negative perceptions of modern medicines, which are
381 often associated with the notion that the chemicals or the unnatural origins of medicines are harmful and that
382 complementary treatments are more 'natural' and therefore safer, had poorer adherence to medications [33].

383 Different factors have been reported in the literature that influence individuals' preference to use natural remedies
384 over prescription medicines. These factors included; older age, having comorbidities, low educational level and
385 low socioeconomic status [34-36]. These factors could explain our results with respect to the differences between
386 refugees and migrants regarding their perceptions about natural remedies. Refugees in our study were older, had
387 lower educational levels, and more comorbidities than migrants.

388 The findings of this study also support previous research, which reported a positive association between high level
389 of acculturation and adherence to medications in U.S. Middle Eastern immigrants [21] although in this study
390 refugees and migrants were considered as a single population, under the same umbrella term "immigrants". The
391 findings also were consistent with a recent systematic review that found medication adherence was negatively
392 associated with beliefs about natural remedies and positively with the level of acculturation [7].

393

394 Several clinical implications exist for understanding the role of acculturation, beliefs about natural remedies, and
395 harm beliefs on medication adherence among Middle Eastern refugees and migrants. Patients are often hesitant to
396 share intentions to take natural remedies instead of their prescribed medications. Therefore, healthcare providers
397 need to create an encouraging, blame-free environment to allow patients to describe their beliefs and medication-
398 taking behaviour [37]. This requires engaging patients actively in the management of hypertension, thus the
399 communications with their healthcare providers helps them to form positive beliefs about treatment options. In
400 addition, healthcare providers should communicate effectively with their patients and exhibit emotional support,
401 by displaying friendliness, warmth, and concern towards them to enhance their medication beliefs and adherence
402 [38]. Healthcare providers should be aware of refugees' preference to use herbal medicine and advise them about
403 the benefits of using prescribed medicines.

404 This study has some limitations including self-report measures used to assess medication adherence, harm beliefs,
405 and acculturation. Participants in this study may potentially have made more socially acceptable answer rather
406 than being truthful, or they may have not been able to assess themselves accurately, thus the adherence level may
407 be lower than what has been reported. However, overestimation was not a major limitation in this study, because
408 more than 50% of participants reported low level of adherence. Response rate was not measured; thus, this may
409 limit the ability to determine the representative nature of the sample. We have not included overuse scales, as
410 these assess beliefs about overprescribed medications by health professionals, and this was not the scope of this
411 study. Also, the internal reliability of this scale was inadequate.

412 Although Belief about Medicine Questionnaire is a validated tool has been used to measure medication beliefs in
413 hypertensive patients, this scale may not be fully accurate to capture individual's beliefs about their condition
414 specific therapies due to the potential mismatch between the terminology used in the scale and refugees' and
415 migrants' perceptions of their condition and the complexity of its management and treatment outcomes [39].
416 The assessment of the validity of the Arabic versions of the questionnaires was beyond the scope of the current
417 study. However, the English versions have been validated [33] and the translation process used in this study
418 showed there was no loss of meaning and the internal consistency of the Arabic version was high (see results
419 section).

420 In terms of external validity, the findings of this study could be generalised to various health conditions that require
421 taking regular medication daily, such as diabetes, heart conditions and depression.

422

423 **Conclusion:**

424 The perception that medications are harmful and poisonous substances is the most predictable factor of medication
425 adherence. Acculturation and beliefs about natural remedies have significant impact on medication adherence
426 directly and indirectly by influencing general beliefs about medications, especially harm beliefs. Healthcare
427 providers need to understand the differences between refugees and migrants regarding their beliefs about
428 medications, and natural remedies, acculturation and adherence to provide targeted and specific interventions.

429

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433

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435 The authors declare no conflict of interest.

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