Psychological predictors of the use of complementary and alternative medicines during pregnancy within a sample of Swiss women

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Abstract

Past works have witnessed increased prevalence of complementary and alternative medicines (CAM) among women during pregnancy. This study aimed to identify psychological antecedents underlying CAM use through the exploration of various predictors. Drawing upon the literature on the use of CAM in contexts unrelated to pregnancy, this research explored the role of various predictors: perceived stress, beliefs about medicine, health locus of control (HLOC), health literacy, bullshit receptivity, and belief in conspiracy theories (CT). 376 Swiss women were recruited to complete a web-based questionnaire in which the use of different kinds of CAM was investigated. We performed hierarchical regression analyses with backward method to assess the overall variance explained by the predictors, as well as their unique contributions. We measured the number of CAM used during last pregnancy and frequency of use. Analyses showed that CAM use was positively associated with perceived stress, beliefs about medicine, internal HLOC, and belief in CT. In contrast, negative relationships were found with external HLOC, bullshit receptivity, and health literacy. By illuminating such factors, this research contributed to explaining why women may be tempted to choose CAM in place of conventional medicine, which may be of particular interest for health professionals in the planning of communication strategies aimed at limiting risks associated to their use during pregnancy.

Introduction

Complementary and alternative medicines (CAM), commonly defined as a range of diverse health care practices and products that are not considered part of conventional medicine, has recently gained popularity among women during pregnancy (Bishop *et al.*, 2011). For example, in the United States, the prevalence in the use of herbs and dietary supplements in pregnant women has increased from 13.6% to 15.4% between 2002 and 2012 (Chung *et al.*, 2017). Most common CAM include massage therapy, herbal medicines, nutritional supplements, homeopathy, or acupuncture (Adams *et al.*, 2009; Gaffney & Smith, 2004; Steel *et al.*, 2012). Besides, CAM encompass, not only practices and products, but also consultations with CAM practitioners, such as acupuncturists.

Use of CAM in pregnant women raises critical concerns regarding safety and public health. First, despite that CAM are generally perceived to be safe in pregnancy (Gaffney & Smith, 2004; Nordeng & Haven, 2004), some prove to be quite noxious and are known to have negative side-effects on women's health or their children (e.g., dietary supplements), whether they are used in lieu of or in combination with conventional medicine. For example, Chuang *et al.* (2006) have shown that the consumption of herbal medicines during the first semester of pregnancy results in increased risks of congenital malformation of the child's nervous system and musculoskeletal issues. It is especially so because the consequences of a large number of CAM remain either unknown or under-examined by medical research (Hall & Jolly, 2014).

Second, of high concern is that the majority of women use CAM methods based on self-prescription (Frawley *et al.*, 2015) or recommendations provided by non-expert individuals, such as family members or friends (Furlow *et al.*, 2008; Hollyer *et al.*, 2002), and often do not disclose to conventional healthcare providers their CAM use (Hall & Jolly, 2014; Koc *et al.*, 2017). This is likely to strengthen the risk of misuse and cannot help manage pregnancy care and possible complications appropriately. As a result, building a solid knowledge of why some women engage in using CAM during pregnancy increasingly becomes a priority for both researchers and health professionals. To date, extensive research in this domain exists. Nevertheless, it has predominantly focused on evaluating prevalence rates across

different countries and individual characteristics of users (for reviews, see Adams *et al.*, 2009; Hall *et al.*, 2011; Steel *et al.*, 2015). Although informative, this, however, does little to help understand the motivations that drive women's use of CAM. The present research aimed to address this issue by examining links between CAM use and various psychological predictors. In alignment with factors already identified in the literature on CAM use across other contexts (e.g., cancer, HIV, depression), we investigated six predictors: perception of stress, locus of control, beliefs about medicine, health literacy, receptivity to bullshit, and belief in conspiracy theories (CT).

Perception of stress

Pregnancy is a highly challenging experience and period for women who are likely to face significant changes in their lives (e.g., physical changes, work cessation) and feel a profound sense of uncertainty about childbirth, risks of medical interventions, child's health, parenting abilities, or relationship with their partner (Mitchell & McClean, 2014). While these expected changes have the potential to instigate high levels of stress that need controlling, CAM could then be thought to offer appropriate and useful responses. As a result, we predicted that perceived stress could be positively related to CAM use. This is consistent with previous works showing that regulation of stress and anxiety is one of the most determining predictors of CAM use in general (*e.g.*, Clayton *et al.*, 2016; Kessler *et al.*, 2001), as well as in the context of pregnancy (e.g., Frawley *et al.*, 2015).

Health locus of control

During pregnancy, women may feel deprived of their power over decisions affecting their health (Gaffney & Smith, 2004; Nordeng & Haven, 2004). Since CAM are not part of conventional medicine, using them may then represent a means for women to regain control over their health and make their life more predictable and manageable (Mitchell & McClean, 2014). Hence, the more women deem their health should be the result of their actions, the more they will be likely to use freely-chosen alternatives to conventional medicine, such as CAM. Accordingly, we expected CAM use to be negatively associated with external locus of control (ELOC; perception that one's health primarily results from external circumstances such as fate, powerful others, or supernatural phenomena), and positively associated with internal locus of control (ILOC; perception that the causes of one's health are the result of one's actions). Support for this prediction may be found in oncology-related works demonstrating that high scores in ILOC are associated with the increased use of CAM (e.g., Davidson *et al.*, 2005). Similarly, Ono *et al.* (2008) have shown that patients who visited CAM facilities had a higher ILOC than those consulting with traditional doctors.

Beliefs about medicine

A large number of works have documented that women may hold negative beliefs about conventional medicine, such that birth is over-medicalised, or that pharmaceuticals are overused and have strong potential for teratogenicity (Hollyer *et al.*, 2002). Moreover, they may doubt their personal need for conventional prescriptions and the effectiveness of treatments in managing pregnancy. Perceived as more natural and safer (Gaffney & Smith, 2004; Mitchell & Williams, 2007; Shuval & Gross, 2008), CAM then reveal to be relevant alternatives (Mitchell & Risk, 2010; Sirois & Gick, 2002) and may offer women opportunities to express their dissatisfaction with modern medicine and act according to their

belief system (Furnham & Beard, 1995). Consequently, we expected beliefs about medicine to predict CAM use. Consistent with this, some past studies have already demonstrated that beliefs about medicine shape people's attitudes and behaviours toward CAM in general (Bishop *et al.*, 2007; Furnham, 2007).

Health literacy

Health literacy corresponds to people's abilities to access, understand, and process information that is necessary to make appropriate health decisions, such as successfully filling forms, checking health status, or locating appropriate health care services. Although previous studies have shown that people scoring high in health literacy report increased CAM use (*e.g.*, Bains & Egede, 2011), we conversely hypothesized a negative relationship. Indeed, because low health literacy implies that people possess poor health knowledge and hardly make sense of health information (Paasche-Orlow & Wolf, 2007), it follows that conventional medicine would be rejected due to the perception of complexity that it represents. Thus, women low in health literacy would prefer CAM for ease of understanding.

Receptivity to bullshit

Bullshit statements are pseudo-profound statements whose intention is to impress the people receiving them but that are formed with no direct concern for the truth (*e.g.*, "hidden meanings transform unparalleled abstract beauty"). We hypothesized that women perceiving bullshit statements to be profound would be more prone to report high levels of CAM use. This is because preferences for CAM over conventional medicines would reflect a high propensity to think intuitively (*i.e.*, a way of thinking that relies upon intuition, instinctive knowledge and first impressions) and process information in a non-deliberative fashion. Indeed, according to Pennycook *et al.* (2015), perception of profoundness in bullshit statements is underpinned by a tendency to exhibit intuitive cognitive style (vs. analytical thinking) and hold "epistemically suspect beliefs" (*i.e.*, beliefs that contradict and challenge naturalistic conceptions of the world, such that the belief in ghosts) and, as demonstrated in their studies, is strongly related to different kinds of perception, including CAM efficacy.

Belief in conspiracy theories

Beliefs in CT arise as people cast doubt upon the veracity of official reasons advocated by governments or any authorities (e.g., media). In the present research, we hypothesized that women who believe in CT would be likely to report a strong use of CAM. Indeed, CAM use may be related to a tendency to believe that conventional medicines and interventions prescribed during pregnancy would conceal a secret plot organized by powerful organizations (e.g., government or pharmaceutical companies) intending to serve their interests at the expense of population's health. As a support for this prediction, recent research by Lahrach and Furnham (2017) has shown that CAM users are those who display higher scores in "medical conspiracy theories" (see also Linderman, 2011).

Materials and Methods

Participants and procedure

Participants were volunteers approached by a panel company whose function is to recruit people to take part in online studies for

free according to a varied range of personal characteristics. In this case, specific inclusion criteria were in place. The participants had to be women living in Switzerland, had to be 18 or above, and had to have got been pregnant at least once. The research was conducted online between February and March 2016 and introduced to participants as a study on women's health care practices in pregnancy. In total, 507 Swiss women voluntarily took part in this study. However, participants whose last pregnancy was before 2000 were excluded from the final sample (N=131) to minimize any memory biases and homogenize our sample regarding health practices about pregnancy or childbirth, and societal context surrounding conventional medicine and use of CAM. This study considered the year 2000 specifically because the use of CAM in pregnant women, as well as the prevalence of such an issue in public debate, became more widespread in the late 1990s/early 2000s, thereby making the context more similar and comparable to what it is today. This has left a final sample size of 376 women (M_{Age}=40.04, SD_{Age}=7.00; from 26 to 55yo).

After receiving information on the purpose of the study and giving their consent, participants completed a self-report questionnaire assessing their use of CAM during their last pregnancy, perception of stress, locus of control, beliefs about medicine, health literacy, receptivity to bullshit, and belief in CT. Finally, demographics were measured. The completion of the study lasted 20-30 minutes on average. The ethical committee of our faculty approved the study (n°: PSE.20160302.04).

Measures

Unless otherwise stated, the scores for each of the following scales or sub-scales were calculated by averaging responses to all the corresponding items.

Perceived stress and trait-anxiety

We assessed perceived stress by adapting items of the French Perceived Stress Scale to the context of pregnancy (Lesage *et al*., 2012; α=.75). All responses were given on 5-point scales with 1 = "no stressed at all" and 5 = "strongly stressed". In addition, we included the Trait-Anxiety scale from the State-Trait Anxiety Inventory (STAI; Spielberger *et al*., 1983; for the French version, see Gauthier & Bouchard, 1993), which comprises twenty statements (α=.89). All items were rated on 4-point scales (1 = "Almost never", 4 = "Almost always").

Beliefs about medicine

Beliefs about medicine were measured by using the French version of the Beliefs about Medicine Questionnaire (BMQ; Fall *et al*., 2014). This measure includes two subscales: the BMQ-overuse, encompassing four items about how pharmaceuticals are over-prescribed (α=.72) and the 4-items BMQ-harm assessing perception that pharmaceuticals are harmful (α=.77). All responses were given on 4-point scales, going from "not agree" to "agree".

Health locus of control

Health locus of control was measured by using the 18-item Multidimensional HLOC (Wallston *et al*., 1978) translated into French (Bruchon-Schweitzer, 2002), including assessment of three dimensions: ILOC (α=.68), chance ELOC (i.e., perception that health manly derives from chance and fate; α=.65), and powerful others ELOC (i.e., perception that powerful individuals such as doctors command health; α=.71). Three scores were calculated from these measures.

Health literacy

We measured health literacy by adapting the three health literacy screening questions developed and validated by Chew *et al*. (2008). For example, these asked: "Do you feel confident about filling out medical forms by yourself?". All questions were answered on 5-point scales ranging from 1 = "never" to 5 = "always" (α=.66).

Bullshit receptivity

Following Pennycook *et al*. (2015)'s procedure, we presented participants with 9 statements that all have a correct syntactic structure and look profound at first glance, although meaningless and vacuous when taking a deeper look (e.g., "Imagination is inside exponential space time events"). For each of these statements, we asked participants to rate how profound they found they are (α=.88). Answers were provided on 5-point scales, with 1 = "not profound at all" and 5 = "very profound". Anticipating difficulties and time for participants to respond, we also included another possible answer: "I have no opinion".

Belief in CT

We used the tool developed by Lantian *et al*. (2016) which provides participants with a short description telling that official reports of major events (e.g., 9/11 terrorist attacks) may be faked and planned by secret and powerful individuals or organizations prior to asking them, on a single item scale, whether they also think that "the official version of the event given by the authorities very often hides the truth". Answers were given on a 9-point scale going from "completely false" to "completely true".

Demographics

Participants had to provide their age, objective and subjective income (i.e., perception of one's household income compared with the average income of people living in the same area), employment, education, year of last pregnancy, and the number of pregnancies.

Outcomes

As CAM encompass a large number of products and practices, we differentiated between five CAM categories: acupuncture, homeopathy, body therapies, natural substances, and mind-body interventions. [Note: Note that we additionally assessed participants' use of conventional medicine through two questions (i.e., "During your last pregnancy, had you used non-homeopathic medicines, such as pain relief medications, anxiolytics, or antidepressants?", "During your last pregnancy, had you had medical or paramedical assistance, such as epidural, caesarean, physiotherapy, or functional re-education?"). Just like for CAM use, an index of frequency of use was calculated and similar analyses were performed including all the predictors. Findings of these are provided as a supplementary file]. For each of these, participants were requested to report whether they had already used it during their last pregnancy (i.e., as going from the planning of pregnancy to the early post-birth period). Four answers were possible: 1 = "No, never", 2 = "Yes, once", 3 = "Yes, occasionally", 4 = "Yes, regularly". Two outcomes were thus calculated: (1) the number of CAM used (by summing each CAM that women reported having used at least once) and (2) the frequency of use (by averaging responses reported on the 4-point scale across the five CAM categories). [Note:Distinction between these two outcomes was made based on the hypothesis that women's motivations for using a more or less large number of CAM, as testing, can be different from using them on a regular basis].

Results

Analytic strategy

Data were assessed using several statistical analyses. First, bivariate correlations between the variables were performed. Second, we used hierarchical regression analyses to assess the total variance explained by the overall inclusion of predictors and their unique contributions. In Step 1, we entered demographics that correlated with outcomes as covariates. In Step 2, all the predictors were simultaneously entered. Except for variables included in Step 1, the backward regression method was used to retain the best possible model by successively eliminating variables that account the less for variance in outcome until only significant predictors remain ($p<.05$). For concerns with multicollinearity, we mean-centred the covariates beforehand. Results of hierarchical regression analyses are yielded in Table 1.

Sample description

74.7% of participants revealed they had used at least one CAM once. A majority had used one (27%) or two types of CAM (20.5%), while 27.2% reported using three or more. The most used CAM were body therapies (53.2%), homeopathy (35.6%), and natural substances (27.4%), while acupuncture was used by 20.9% of the sample and mind-body interventions by 19.9%. Details about the sample are given in Table 2.

Bivariate correlations

Bivariate correlations between all the variables were explored (Table 3). As regard to demographics, outcome variables only correlated with objective and subjective incomes. Furthermore, the strongest variables that consistently correlated with both outcome variables were BMQ-overuse, ILOC, and belief in CT. Regarding relations between predictors, findings interestingly revealed negative correlations between stress and ILOC, stress and BMQ-overuse, and a positive correlation between stress and powerful others ELOC.

Hierarchical regression analyses

Number of CAM used

As objective and subjective incomes correlated with CAM use, they were entered in Step 1. Collinearity diagnostics indicated that there was no multicollinearity between predictors since VIFs and condition indexes were all below 2 (Hair *et al.*, 1995). Step 1 of the analysis showed that the number of CAM used was negatively related to objective income, $\beta=-.21$, $t=-3.74$, $p<.001$, 95% CI = [-.45, -.14], but positively related to subjective income, $\beta=.23$, $t=4.25$, $p<.001$, 95% CI = [.18, .49]. [Note: Higher scores mean women think their household income is higher than that of people living in the same area as them]. In Step 2, we found positive associations with perceived stress, $\beta=.16$, $t=2.96$, $p=.003$, 95% CI = [.08, .39], ILOC, $\beta=.14$, $t=2.49$, $p=.013$, 95% CI = [.04, .35], BMQ-overuse, $\beta=.17$, $t=3.03$, $p=.003$, 95% CI = [.09, .41], belief in CT, $\beta=.12$, $t=2.18$, $p=.030$, 95% CI = [.02, .32], and negative associations with bullshit receptivity, $\beta=-.13$, $t=-2.41$, $p=.016$, 95% CI = [-.33, -.03] and powerful others ELOC, $\beta=-.10$, $t=-1.93$, $p=.055$, 95% CI = [-.30, .003]. The final model accounted for 17% of the total variance, $F(8, 318) = 8.01$, $p<.001$.

Frequency of use

Mirroring the previous analysis, objective and subjective incomes, as the only demographics correlating with the frequency of use, were included in Step 1. Again, all VIFs and condition indexes were below 2 at each step of the analysis, thereby indicating multicollinearity was unlikely. First, analyses in Step 1 revealed significant effects of objective income, $\beta=-.21$, $t=-3.94$, $p<.001$, 95% CI = [-.22, -.08], and subjective income, $\beta=.21$, $t=3.92$, $p<.001$, 95% CI = [.07, .22]. Then, in Step 2, we found that frequency of use was positively predicted by perceived stress, $\beta=.11$, $t=2.02$, $p=.044$, 95% CI = [.002, .14], BMQ-overuse, $\beta=.20$, $t=3.75$, $p<.001$, 95% CI = [.07, .22], ILOC, $\beta=.10$, $t=1.83$, $p=.068$, 95% CI = [-.01, .14], and beliefs in CT, $\beta=.17$, $t=3.30$, $p=.001$, 95% CI = [.05, .20]. In contrast, negative relations appeared with bullshit receptivity, $\beta=-.12$, $t=-2.42$, $p=.016$, 95% CI = [-.16, -.02], health literacy, $\beta=-.06$, $t=-1.80$, $p=.072$, 95% CI = [-.13, .01], and powerful others ELOC, $\beta=-.16$, $t=-3.10$, $p=.002$, 95% CI = [-.18, -.04]. The final model explained 20% of the total variance, $F(9, 337)=9.12$, $p<.001$.

Table 1. Hierarchical multiple regressions.

	Number of CAM used			Frequency of use		
	β	t	p	β	t	p
Step 1						
Objective income	-.21	-3.74	<.001	-.21	-3.94	<.001
Subjective income	.23	4.25	<.001	.21	3.92	<.001
Step 2						
Objective income	-.17	-2.97	.003	-.20	-3.73	<.001
Subjective income	.16	2.76	.006	.13	2.42	.016
Perceived stress	.16	2.96	.003	.11	2.02	.044
Anxiety-trait	.05	0.96	.336	.05	0.96	.340
BMQ-overuse	.17	3.03	.003	.20	3.75	<.001
BMQ-harmful	.03	0.52	.601	.03	0.39	.694
ILOC	.14	2.49	.013	.10	1.83	.068
Chance-ELOC	.06	0.98	.326	-.07	-1.22	.222
Powerful others-ELOC	-.10	-1.93	.055	-.16	-3.10	.002
Health literacy	-.04	-0.73	.467	-.09	-1.80	.072
Bullshit receptivity	-.13	-2.41	.016	-.12	-2.42	.016
Belief in CT	.12	2.18	.030	.17	3.30	.001

Discussion

According to earlier works, most of the factors already identified as predicting CAM use were found to be also at play in the context of pregnancy. More specifically, analyses showed that stress, ILOC, beliefs about medicine, and belief in CT positively predict increased CAM use. In contrast, bullshit receptivity and powerful others ELOC had a negative impact. Inconsistent with earlier studies (Bains & Egede, 2011), but in line with our predictions, data additionally indicated that the variance in frequency of use (but not in the number of CAM used) was negatively related to health literacy.

Taking these findings as a whole, it follows that three motivations underlie CAM use. The first pertains to stress management. Faced with the uncertainties raised by pregnancy and post-pregnancy periods, women may use CAM as providing remedies to manage and attenuate negative emotions arising. Interestingly, non-significance with the measure of anxiety-trait suggests that stress and anxiety are elicited by pregnancy as a particular situation occurring in women's lives and do not result from individual differences or anxious personality styles. Second motivation refers to personal control. Associations with locus of control show that CAM users are women who locate causes of their health in their own doing rather than from doctors or medical experts. This tendency indicates that women's engagement in CAM reflects a willingness to keep or regain autonomy and personal control over their health. Along with the constraints imposed by pregnancy (e.g., use of pharmaceuticals, restrictions on eating habits), CAM offer women the opportunity to make decisions on their health and choose on their initiative what they deem is the best for managing pregnancy and a child's health. The third motivation is related to women's beliefs and indicates that the use of CAM is a means for women to express consistency with their belief system and, in particular, distrust about conventional medicine. The overall belief in conspiracy theories similarly gives additional support for this conclusion. Thus, CAM use during pregnancy primarily allows for easy management of stress, regaining of personal control over one's health, and acting according to one's beliefs.

Unexpectedly, data indicated that bullshit receptivity affected CAM use negatively, whereas we anticipated the opposite pattern of results to emerge. Following research on bullshit, this might suggest that CAM users are not intuitive thinkers and would rather display reflective and deliberative cognitive style, making them able to discriminate meaningful statements from bullshit (Pennycook *et al.*, 2015). Nevertheless, we believe this conclusion should be treated with caution, given that methodological issues might also have come into play. Indeed, when judging the profoundness of each statement, participants were also left with the possibility not to answer by choosing the option "I have no opinion" instead. It turns out that a high proportion of participants chose this option. Over the total number of responses across the nine statements, 45.1% were "I have no opinion". Perhaps that participants who found no profoundness in statements decided on giving this answer rather than rating on the 5-point scale, which may have biased results.

The current study contains limitations. First, the study sample was only composed of women living in Switzerland and mostly involved women reporting high education and income levels. This imposes limitations in terms of generalization of the present findings to other populations. Given the strong variability in prevalence rates of CAM use across countries, for example (see Hall *et al.*, 2012; Reid *et al.*, 2016), future works should be undertaken in varying study populations. Second, the recruitment of voluntary participants for a web-based study may have been a source of selection bias. Only women with high interest in medical practices during pregnancy may have composed the sample, which may be unrepresentative of overall women's practices and views

during pregnancy. Third, even though we differentiated between different CAM categories, more specifications could be needed. Indeed, participants may have reported being non-users of certain categories of CAM, as they would have only experienced one of the methods or therapies falling into the category. Future studies should consider refining CAM categories and, besides, include some other CAM (*e.g.*, hypnotherapy, tai-chi). Another limitation is that we only used self-reported measures.

Table 2. Sample characteristics.

	Mean (SD)	*n* (%)	N
Employment			
Full-time		19.1	72
Part-time		60.6	228
Unemployed		16.8	63
Education			
College degree		57	214
High school degree		38.8	146
Less than high school degree		3.5	13
Objective income[1]			
More than 200,000		6.7	25
50,000 to 200,000		59.6	224
Less than 50,000		14.4	54
Subjective income			
Better than the average		29.2	106
In the average		46.5	175
Lower than the average		20.2	76
Number of pregnancies	2.14 (1.00)		
Number of CAM used	1.54 (1.43)		
0		23.9	90
1		21.3	80
2		16.5	62
3 and +		19.4	73
Acupuncture			
Never (vs. Yes[2])		66.5 (20.9)	250 (79)
Once		5.3	20
Occasionally		6.6	25
Regularly		9.0	34
Homeopathy			
Never (vs. Yes)		55.9 (35.6)	210 (134)
Once		6.4	24
Occasionally		14.6	55
Regularly		14.6	55
Body therapies			
Never (vs. Yes)		39.6 (53.2)	149 (200)
Once		5.9	22
Occasionally		18.6	70
Regularly		28.7	108
Natural substances			
Never (vs. Yes)		58.5 (27.4)	220 (103)
Once		5.6	21
Occasionally		9.6	36
Regularly		12.2	46
Mind-body interventions			
Never (vs. Yes)		63.6 (19.9)	239 (75)
Once		3.7	14
Occasionally		9.8	37
Regularly		6.4	24

[1]Currency is Swiss Francs, [2]Yes=number of women using CAM, irrespective of frequency.

Table 3. Means, standard deviations, and correlations between predicting and outcome variables.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Objective income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Subjective income	-	-	.34***	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Perceived stress	0.96	0.60	-.01	.05	-	-	-	-	-	-	-	-	-	-	-	-
4. Trait-anxiety	2.37	0.22	-.20***	-.07	-.15**	-	-	-	-	-	-	-	-	-	-	-
5. BMQ-overuse	2.65	0.62	-.13*	.04	-.08	.22***	-	-	-	-	-	-	-	-	-	-
6. BMQ-harmful	1.96	0.63	.05	-.02	-.10	.11*	.57***	-	-	-	-	-	-	-	-	-
7. ILOC	2.89	0.44	.001	.23***	-.12*	.04	.30***	.21***	-	-	-	-	-	-	-	-
8. Chance-ELOC	1.90	0.53	-.17**	-.21***	.07	.15**	-.15**	-.02	-.34***	-	-	-	-	-	-	-
9. Pw. Others-ELOC	1.85	0.50	.07	-.05	.17**	.13*	-.06	-.06	-.15**	.28***	-	-	-	-	-	-
10. Health literacy	1.67	0.66	-.17**	-.14**	.08	.15**	-.08	.12*	-.16**	.20***	-.03	-	-	-	-	-
11. Bullshit recept.	2.86	1.59	.04	.05	.09	-.09	.03	.07	.10	.01	-.09	-.04	-	-	-	-
12. Belief in CT	5.82	2.35	.08	.10	.16**	-.02	.20***	.21***	-.01	-.09	.04	.07	-.06	-	-	-
13. Number of CAM	1.66	1.42	-.14*	.16**	.14*	.08	.26***	.13*	19***	-.06	-.09	-.05	-.09	16**	-	-
14. Frequency of use	1.72	0.70	-.15**	.14**	.06	.07	.29***	.14**	.18**	-.18***	-.15**	-.08	-.09	.18***	.96***	-

*$p<.05$, **$p<.01$, ***$p<.001$; Pw. Others-ELOC=Powerful Others ELOC; Bullshit recept.=bullshit receptivity.

Responses to these may easily vary depending on mood or social desirability. To the extent CAM use is known to be rather poorly viewed, in particular among people working in domains related to conventional medicine, which we, as public health experts, might have represented, perhaps some participants did not want to disclose their CAM use or strategically underestimated frequency of use so as to convey a favourable impression of themselves. Although it may raise some inconveniences, future works could benefit from assessing real-existing behaviours. Collaborations with CAM practitioners might be a solution to bypass this limitation.

Conclusions

The present research provides important contributions. First, we add to the existing knowledge by offering the first work that systematically examined psychological antecedents underlying the use of CAM in the very specific context of pregnancy. Second, although several studies have yet been carried out to explore the influence of certain predictors taken separately, ours is the first to propose comprehensive modelling that tested a large panel of predictors entered simultaneously, thereby making possible to determine the potential for each of them to predict CAM use by controlling others' effects. Confirming findings of past works, this has emphasized pivotal roles of perceived stress, locus of control, and beliefs about medicine and conspiracy theories, which all significantly accounted for why women may add value to CAM over conventional medicines.

References

Adams, J., Lui, C. W., Sibbritt, D., Broom, A., Wardle, J., Homer, C., & Beck, S. (2009). Women's use of complementary and alternative medicine during pregnancy: A critical review of the literature. *Birth, 36*(3), 237-245. doi: 10.1111/j.1523-536X.2009.00328

Bains, S. S., & Egede, L. E. (2011). Association of health literacy with complementary and alternative medicine use: A cross-sectional study in adult primary care patients. *BMC Complementary and Alternative Medicine, 11*:138. doi:10.1186/1472-6882-11-138

Bishop, F. L., Northstone, K., Green, J. R., & Thompson, E. A. (2011). The use of complementary and alternative medicine in pregnancy: Data from the Avon Longitudinal Study of Parents and Children (ALSPAC). *Complementary Therapies in Medicine, 19*(6), 303-310. doi:10.1016/j.ctim.2011.08.005

Bishop, F. L., Yardley, L., & Lewith, G. T. (2007). A systematic review of beliefs involved in the use of complementary and alternative medicine. *Journal of Health Psychology, 12*(6), 851-867. doi:10.1177/1359105307082447

Bruchon-Schweitzer, M. (2002). *La psychologie de la santé : Modèles, concepts et méthodes.* Paris : Dunod.

Chew, L. D., Griffin, J. M., Partin, M. R., Noorbaloochi, S., Grill, J. P., Snyder, A., . . . Vanryn, M. (2008). Validation of screening questions for limited health literacy in a large VA outpatient population. *Journal of General Internal Medicine, 23*(5), 561-566. doi:10.1007/s11606-008-0520-5

Chuang, C. H., Doyle, P., Wang, J. D., Chang, P. J., Lai, J. N., & Chen, P. C. (2006). Herbal medicines used during the first trimester and major congenital malformations: An analysis of data from a pregnancy cohort study. *Drug Safety, 29*(6), 537-548. doi:10.2165/00002018-200629060-00006

Chung, S., Yeh, T., & Wu, C. H. (2017). Trend and pattern of herb and supplement use among pregnant women in the United States: Findings from the 2002, 2007, and 2012 US National Health Interviews Surveys. *American Journal of Obstetrics and Gynecology, 216*(2), 189-190. doi:10.1016/j.ajog.2016.11.1019

Clayton, K., Yoni, L., & Ieva, S. (2016). Self-management of stress with complementary and alternative medicine: Factors that influence and inform decision making: A systematic review of the literature. *Alternative and Complementary Therapies, 22*(2). doi:10.1089/act.2016.29047.kcl

Davidson, R., Geoghegan, L., McLaughlin, L., & Woodward, R. (2005). Psychological characteristics of cancer patients who use complementary therapies. *Psycho-oncology, 14*(3), 187-195. doi:10.1002/pon.834

Fall, E., Gauchet, A., Izaute, M., Horne, R., & Chakroun, N. (2014).

Validation of the French version of the Beliefs about Medicines Questionnaire (BMQ) among diabetes and HIV patients. *European Review of Applied Psychology*, *64*(6), 335-343. doi:10.1016/j.erap.2014.08.005

Frawley, J., Adams, J., Steel, A., Broom, A., Gallois, C., & Sibbritt, D. (2015). Women's use and self-prescription of herbal medicine during pregnancy: An examination of 1,835 pregnant women. *Women's Health Issues*, *25*(4), 396-402. doi:10.1016/j.whi.2015.03.001

Furnham, A. (2007). Are modern health worries, personality and attitudes to science associated with the use of complementary and alternative medicine? *British Journal of Health Psychology, 12*, 229-243. doi:10.1348/135910706X100593

Furnham, A., & Beard, R. (1995). Health, just world beliefs, and coping style preferences in patients of complementary and orthodox medicine. *Social Science & Medicine, 40*(10), 1425-1432. doi:10.1016/0277-9536(94)00263-S

Furlow, M. L., Patel, D. A., Sen, A., & Liu, J. R. (2008). Physician and patient attitudes towards complementary and alternative medicine in obstetrics and gynecology. *BMC Complementary and Alternative Medicine, 8*(35). doi:10.1186/1472-6882-8-35

Gaffney, L., & Smith, C. (2004). The views of pregnant women towards the use of complementary therapies and medicines. *Birth Issues, 13*(2), 43–50.

Gauthier, J., & Bouchard, S. (1993). Adaptation canadienne-française de la forme révisée du State–Trait Anxiety Inventory de Spielberger [A French-Canadian adaptation of the revised version of Spielberger's State–Trait Anxiety Inventory]. *Canadian Journal of Behavioural Science, 25*(4), 559-578. doi:10.1037/h0078881

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate data analysis.* Englewood Cliffs, NJ Prentice-Hall.

Hall, H. R., & Jolly, K. (2014). Women's use of complementary and alternative medicines during pregnancy: A cross-sectional study. *Midwifery, 30*(5), 499-505. doi:10.1016/j.midw.2013.06.001

Hall, H. G., Griffiths, D. L., & McKenna, L. G. (2011). The use of complementary and alternative medicine by pregnant women: A literature review. *Midwifery, 27*(6), 817-824. doi:10.1016/j.midw.2010.08.007

Hollyer, T., Boon, H., Georgousis, A., Smith, M., & Einarson, A. (2002). The use of CAM by women suffering from nausea and vomiting during pregnancy. *BMC Complementary and Alternative Medicine, 2*(5). doi:10.1186/1472-6882-2-5

Kessler, R. C., Soukup, J., Davis, R. B., Foster, D. F., Wilkey, S. A., Van Rompay, M. I., & Eisenberg, D. M. (2001). The use of complementary and alternative therapies to treat anxiety and depression in the United States. *The American Journal of Psychiatry, 158*(2), 289-294. doi:10.1176/appi.ajp.158.2.289

Koc, Z., Saglam, Z., & Topatan, S. (2017). Determination of the usage of complementary and alternative medicine among pregnant women in the Northern Region of Turkey. *Collegian, 24*(6), 533-539. doi:10.1016/j.colegn.2016.11.003

Lahrach, Y., & Furnham, A. (2017). Are modern health worries associated with medical conspiracy theories? *Journal of Psychosomatic Research, 99*, 89-94. doi:10.1016/j.jpsychores.2017.06.004

Lantian, A., Muller, D., Nurra, C., & Douglas, K. M. (2016). Measuring belief in conspiracy theories: Validation of a French and English single-item scale. *International Review of Social Psychology*, *29*(1), 1-14. doi:10.5334/irsp.8

Lesage, F. X., Berjot, S., & Deschamps, F. (2012). Psychometric properties of the French versions of the Perceived Stress Scale. *International Journal of Occupational Medicine, 25*(2), 178-

184. doi:10.2478/S13382-012-0024-8

Linderman, M. (2011). Biases in intuitive reasoning and belief in complementary and alternative medicine. *Psychology & Health, 26*(3), 371-382. doi:10.1080/08870440903440707

Mitchell, M., & McClean, S. (2014). Pregnancy, risk perception and use of complementary and alternative medicine. *Health, Risk and Society*, 16(1), 101-116. doi:10.1080/13698575.2013.867014

Mitchell, M. (2010). Risk, pregnancy and complementary and alternative medicine. *Complement Therapies in Clinical Practice, 16*(2), 109-113. doi:10.1016/j.ctcp.2009.10.005

Mitchell, M., & Williams, J. (2007). The role of midwife-complementary therapists: Data from in depth telephone interviews. *Evidenced Based Midwifery, 5*(3), 93-99.

Nordeng, H., & Havnen, G. C. (2004). Use of herbal drugs in pregnancy: A survey among 400 Norwegian women. *Pharmacoepidemiology and Drug Safety, 13*(6), 371-380. doi:10.1002/pds.945

Ono, R., Higashi, T., Suzukamo, Y., Konno, S., Takahashi, O., Tokuda, Y., … Fukuhara, S. (2008). Higher internality of health locus of control is associated with the use of complementary and alternative medicine providers among patients seeking care for acute low-back pain. *The Clinical Journal of Pain, 24*(8), 725-730. doi:10.1097/AJP.0b013e3181759261

Paasche-Orlow, M. K., & Wolf, M. S. (2007). The causal pathways linking health literacy to health outcomes. *American Journal of Health Behavior. 31*(1), 19-26. doi:10.5555/ajhb.2007.31.supp.S19

Pennycook, G., Cheyne, J. A., Barr, N., Koehler, D. J., & Fugelsang, J. A. (2015). On the reception and detection of pseudo-profound bullshit. *Judgment and Decision Making, 10*(6), 549-563. doi:10.3410/f.725974620.793511899

Reid, R., Steel, A., Wardle, J., Trubody, A., & Adams, J. (2016). Complementary medicine use by the Australian population: A critical mixed studies systematic review of utilisation, perceptions and factors associated with use. *BMC Complementary & Alternative Medicine, 16*(176). doi:10.1186/s12906-016-1143-8

Shuval, J. T., & Gross, S. E. (2008). Midwives practice CAM: Feminism in the delivery room. *Journal of Evidence-Based Integrative Medicine, 13*(1), 46-62. doi:10.1177/1533210107311471

Sirois, F. M., & Gick, M. L. (2002). An investigation of the health beliefs and motivations of complementary medicine clients. *Social Science & Medicine, 55*(6), 1025-1037. doi:10.1016/S0277-9536(01)00229-5

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press, Palo Alto.

Steel, A., Adams, J., Sibbritt, D., & Broom, A. (2015). The outcomes of complementary and alternative medicine use among pregnant and birthing women: Current trends and future directions. *Women's Health, 11*(3), 309-323. doi:10.2217/whe.14.84

Steel, A., Adams, J., Sibbritt, D., Broom, A., Gallois, C., & Frawley, J. (2012). Utilisation of complementary and alternative medicine (CAM) practitioners within maternity care provision: Results from a nationally representative cohort study of 1,835 pregnant women. *BMC Pregnancy and Childbirth, 12*(146). doi:10.1186/1471-2393-12-146

Wallston, K. A., Wallston, B. S., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC). *Health Education & Behavior, 6*(2), 160-170. doi:10.1177/109019817800600107