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Psychometric properties of the Expected/Experienced Emotions related to Menarche Scale

Sandra Nakić Radoš

Department of Psychology, Catholic University of Croatia, Zagreb, Croatia

Zrinka Mužinić Bikić

Primary school Srinjine, Srinjine, Croatia

Ines Roso Perić

High School for Health Professions, Split, Croatia

Abstract

The first period or menarche indicates the beginning of puberty in girls. The experience of menarche is important because it is related to the experience of menstruation later in life. The goal of the study was to develop a new questionnaire of emotional reactions to menarche and to examine its psychometric properties.

In a cross-sectional study, 108 premenarcheal (M=12.0 years) and 246 postmenarcheal girls (M=15.1 years) filled out the Pubertal Development Scale, Preparedness for the Menarche, and new Expected/Experienced Emotions related to Menarche Scale (Emo-M) constructed for the purpose of this study. The Emo-M consists of 27 pleasant and unpleasant emotions that participants need to rate on a 5-point scale on how they expect they would feel (premenarcheal girls) or how they felt when they got menarche (postmenarcheal girls).

Using exploratory factor analysis, 5 items with unsatisfying factor loadings were excluded and two factors were extracted in both premenarcheal and postmenarcheal girls. Emo-M consists of Pleasant Emotions (11 items) and Unpleasant Emotions subscales (11 items). High reliability (Cronbach α for subscales from .86 to .92), divergent, and discriminant validity of Emo-M scale were demonstrated. Both premenarcheal and postmenarcheal girls reported a higher level of pleasant than unpleasant emotions.

The Emo-M questionnaire (22 items) is a reliable and valid instrument for assessment of emotions related to menarche in the adolescent girls. Future studies should focus on establishing the predictive validity of the Emo-M.

Keywords: *menarche, menstruation, emotions, scale, questionnaire, validation*

The first period or menarche indicates the beginning of puberty in girls and represents the transition from girl to woman. It occurs about two years after the first signs of puberty, usually between the ages of 11 and 15 (Bralić et al., 2012). The average age at menarche in Croatian girls is 12 years and four months (Kerestes, Brković, & Kuterovac Jagodić, 2010), but it depends on life circumstances, nutrition quality, and socioeconomic changes (Argnani, Toselli, & Gualdi-Russo, 2004; Khanna & Kapoor, 2004; Rebacz, 2009).

Previous studies show that experience of menarche is relevant for the subsequent menstrual experience. A prospective study that followed adolescent girls from 11 to 15 years old at several stages revealed that both expectations and initial menarcheal experience were related to long-term menstrual experience-related somatic, emotional, and behavioural changes (Koff & Rierdan, 1996). In a retrospective study among college women, based on their beliefs, expectations, feelings, and preparedness for menarche, two extreme groups were selected: women who reported extremely negative menarcheal experience and inadequate preparation for menarche and women who reported extremely positive menarcheal experience and proper preparation. It was shown that women who reported extremely negative menarcheal experience had a more negative attitude toward menstruation and experienced more negative premenstrual mood changes than women who had reported extremely positive menarcheal experience. They also had lower levels of satisfaction with body image (McPherson & Korfine, 2004).

A qualitative retrospective study with young and middle-aged women in Brazil showed that women had vivid memories about their menarche, like other significant events in woman's life such as weddings and childbirth. The first experience of menarche may affect different aspects of women's life, as well as a woman's attitude towards her own body and reproductive health (do Amaral, Hardy, & Hebling, 2011). Another qualitative study pointed out that in Western culture menstruation has been a source of shame and secrecy and attitudes towards menstruation have been rarely examined in relation to birth experience. The findings suggested that menstrual experience have a great impact on women's self-perception, which in turn can play a significant role in the experience of childbirth later in life. If women experience fear at menarche, they will alienate from their own body processes which will be reflected later on with childbirth experience (Moloney, 2010).

Although menarche is a normative event in the life of adolescent girls, a minority of adolescent girls feel ready for menarche (Marván & Molina-Abolnik, 2012; Marván & Alcalá-Herrera, 2014; Tang, Yeung, & Lee, 2003). Studies showed cultural differences in reactions to menarche. The first reaction to menarche among Chinese adolescent girls has been mostly negative, including feelings of embarrassment, worry, and fear (Tang et al., 2003). The most common reaction to menarche among Mexican girls has been worry, feeling odd, and confused (Marván & Alcalá-Herrera, 2014; Marván, Morales, & Cortés-Iniestra, 2006). Young and middle-aged women in Brazil reported feelings of shame and discomfort at menarche, despite the fact that they had heard about it in school (do Amaral et al., 2011). Among positive reactions to menarche were feelings of being more grown up and more feminine (Tang et al., 2003). Emotional reactions to menarche are related to the age of maturation. Adolescent girls with early maturation (menarche before 11 years) felt more scared and worried compared to girls with average maturation (12 or 13 years at menarche) or late maturation (13 years or more at menarche). In contrast, girls who had late menarche felt more excited and happy than girls who had early or average maturation (Marván & Alcalá-Herrera, 2014).

Given that negative menarcheal experience can have adverse effects on different aspects of a woman's life, it is important to focus on these early experiences. So far there have been developed and validated structured questionnaires for menstrual attitudes (Marvan & Molina, 2002; Marván, Galvanovskis, & Vacio, 2001; Morse, Kieren, & Bottorff, 1993), but there is a lack of such instruments for measuring emotional reactions to menarche. Only three studies measuring emotional reactions by scales were found (Marván & Alcalá-Herrera, 2014; Marván et al., 2006; Tang et al., 2003). Marván et al. (2006) used a checklist of 10 items with a yes/no answer format where each emotion was analysed separately, without providing any psychometric characteristics. Based on that list, (Marván & Alcalá-Herrera, 2014) used a similar checklist of 9 items. Tang et al. (2003) used a 13-item list on a 4-point scale where a higher number indicates the higher intensity of particular emotion. Reliability was provided for positive and negative emotional responses subscales separately, but the other psychometric characteristics were not further analysed, nor was this distinction of two subscales empirically tested. Moreover, these lists of emotions are not complete lists of possible emotional response one can experience about menarche. Also, these scales were applicable for postmenarcheal girls only. Given that previous studies showed the importance of expectations of menarcheal experience for long-term menstrual-related changes (Koff & Rierdan, 1996), there is a need for a questionnaire of emotional reactions to menarche that would encompass a broad set of emotions which should assess them not only as experience but as expectancy as

well. Therefore, the goal of the study was to develop a new questionnaire of emotional reactions to menarche and to examine its psychometric properties.

Material and Methods

Procedure and Participants

The data for this study were collected as a part of a larger study on menstruation in adolescent girls. Six primary and secondary schools from urban and rural areas of Croatia participated in the study by convenience sampling (*High School for Health Professions,* Split; *Primary School Ljudevita Gaja,* Osijek; *Primary School Kamešnica,* Otok; *Primary School Petra Zoranića,* Jasenice; *Primary School Starigrad,* Starigrad, *Primary School Novigrad,* Novigrad). The school council and headmaster of each school approved the study, after which informed consent forms were distributed to the students and their parents. In total, 224 students from primary schools (aged 10 to 14 years) and 130 students from secondary level (aged 14 to 18 years) presented both their own and their parents' consent (N=354). During a class master lesson, the boys in the class were asked to leave the classroom, and the school psychologist distributed the questionnaires to the female participants. The participation was anonymous. The research was conducted at the beginning of the school year 2014/15.

Of the total sample, 55% lived in a rural area and 45% lived in an urban area. The majority of the participants lived with both parents (91.5%), 6.7% lived with their mother, 0.9% lived with their father, and 0.9% lived with neither of the parents but lived with the grandparents. In respect to the parents' education, 8.5% of the sample said that their mothers graduated from the primary school, 71.5% from high school, and 20.0% from the university. Similarly, 10.2% of the sample indicated that their fathers graduated from the primary school, 70.3% from high school, and 19.5% from the university. Almost half of the participants reported that both of their parents were employed (48.0%), 30.2% reported that only their father was employed, 13.6% reported that only their mother was employed, and 8.2% reported that both parents were unemployed. In respect to the perceived socioeconomic level, 3.7% of the sample reported that they lived worse, 86.4% said the same, and 9.9% better than their peers.

According to the menarcheal status, the sample was divided into the premenarcheal girls who still had not had their first period at the moment of participating in the study (*n*=108, average age 12.0 years) and the postmenarcheal girls who had already had their first period (*n*=246, mean age 15.1 years). The postmenarcheal girls had menarche on average at 12 years and five months (*SD*=1.15; range from 9 years and two months to 16 years and six months), which was on average 2 years and nine months before participating in the study (range from 0 months to 8 years).

Instruments

The *Expected/Experienced Emotional Reactions related to Menarche Scale* (Emo-M) was the authors' designed 27-item scale constructed for the purpose of the study. It consisted of both pleasant and unpleasant emotional reactions that girls can experience when expecting menarche or as an experience of menarche (e.g. *excited, ashamed, mature*). Ten emotions were identified in the study by Marván et al. (2006): *excited, ashamed, mature, scared, happy, sad, nervous, worried, confused,* and *calm.* Marván and Alcalá-Herrera (2014) used a checklist of nine emotions from which additionally *odd* was identified. Tang et al. (2003) used a list of 13 emotions from which additionally *proud, more feminine, more grown up, angry, surprised, sick,* and *annoyed* were identified. However, there was a need to combine these lists (18 items altogether) and to broaden them further to gain a wide list of possible emotional reactions one could expect or experience in relation to menarche. Therefore, this list was further extended by the authors based on the general literature on menarcheal experience, common knowledge, and personal experience as school psychologists working with adolescents (second and third author). Additional nine items were added: *natural, unpleasant, shocked, pleased, important, healthy, disgusted, indifferently,* and *relieved*. The premenarcheal girls were instructed to respond how they expected they would feel when they get menarche, while the postmenarcheal girls were instructed to respond how they felt when they got menarche. The participants' task was to rate each emotion on a 5-point scale from 1 (*not at all*) to 5 (*completely*). The complete scale is provided in the Appendix.

The *Pubertal Development Scale* (PDS; Petersen, Crockett, Richards, & Boxer, 1988) is a 5-item self-report scale on physical changes characteristic for puberty. The scale had been previously translated and validated for the Croatian language with the coefficient of internal consistency Cronbach α=.79 in a sample of girls (Kerasteš et al., 2010). For this study, only the item on menarcheal status (answer options: 'not yet menstruating' and 'menstruating') and the age at menarche were used.

The Preparedness for the Menarche (PM; Rodriguez White, 2013) has 7 items assessing the feeling preparedness for the start of menstruation, knowing what to do and expect. Each item is rated on a five-point scale, from 1 (*strongly disagree*) to 5 (*strongly agree*). Total score ranges from 7 to 35 where the higher score indicates the higher level of preparedness for menstruation. The Cronbach's α was at the acceptable level of .72. The original scale was constructed for postmenarcheal girls only. However, in the current study both premenarcheal and postmenarcheal girls filled out the questionnaire, and the postmenarcheal girls responded how prepared they had felt when they got the menarche, the premenarcheal girls had to report their level of preparedness for the upcoming menarche (e.g. item 'I felt ready when I got my first period' was modified into 'I feel ready for my first period'). In the current study, Cronbach's α were .86 and .87 in pre- and postmenarcheal girls, respectively.

The *Demographic Questionnaire* assessed the age (in years and months), grade, place of residence, household members, parental education level, employment status, and perceived socioeconomic status, which was assessed by the item: "How does your family live compared to your peers' families?" with answer options *worse, the same*, or *better.*

Statistical Analyses

To examine the factor structure of the new questionnaire, the exploratory factor analysis by Principal Axis Factoring with oblique rotation (Direct Oblimin) was performed. We wanted to examine the factor structure in both the premenarcheal and postmenarcheal subsamples, separately. There was some concern given that the premenarcheal subsample was somewhat smaller and included 108 participants (subjects-to-variable ratio 4:1). However, this (or even smaller) sample size is suitable (a) when commonalities are high (MacCallum, Widaman, Preacher, & Hong, 2001) and we obtained moderate mean commonalities of .61; (b) when there is a high degree of overdetermination with three to seven variables per factor, or preferably more (MacCallum, Widaman, Zhang, & Hong, 1999) and we had 11 variables per factor; and (c) when there are at least 5 strongly loading items with factor loadings of .50 or higher (Costello & Osborne, 2005) which we reasonably overcame.

A mixed-design ANOVA was used to test the differences in the level of pleasant and unpleasant emotions between groups according to menarcheal status (premenarcheal, postmenarcheal) or pubertal timing (early, average, late). To assess reliability, internal consistency Cronbach α coefficient, split-half reliability, and inter-item correlations were analysed. Pearson correlation coefficients were analysed to examine the relationship between the results of the Emo-M subscale scores and the scores on Preparedness for the Menarche scale.

Results

Item analysis

As can be seen from the results presented in Table 1, similar emotions were ranked as the most prominent in both premenarcheal and postmenarcheal girls. The premenarcheal girls reported that they expected to feel mature, more adult, natural, healthy, and surprised once they experienced the first menstruation. Similarly, the postmenarcheal girls reported that they experienced feeling natural, healthy, mature, more adult, and weird when they got their first menstruation. All items had a full range of scores from 1 to 5 in both groups.

Table 1

Descriptive results for items of the Expected/Experienced Emotional Reactions to Menarche Scale(Emo-M) in premenarcheal and postmenarcheal girls

Items		Premenarcheal girls (*n*=108)		Postmenarcheal girls (*n*=246)	
		M	*SD*	*M*	*SD*
1.	excited	2.91	1.47	2.75	1.46
2.	ashamed	2.56	1.49	2.21	1.33
3.	mature	3.65 (1.)	1.32	3.46 (3.)	1.16
4.	scared	2.88	1.56	2.70	1.50
5.	happy	2.67	1.45	2.60	1.34
6.	sad	2.13	1.35	2.17	1.27
7.	nervous	2.92	1.47	3.11	1.34
8.	worried	2.72	1.49	2.51	1.33
9.	confused	2.97	1.54	2.63	1.42
10.	calm	3.12	1.48	2.92	1.41
11.	weird	3.03	1.44	3.30 (5.)	1.36
12.	proud	2.42	1.43	2.49	1.37
13.	feminine	3.09	1.51	3.11	1.44
14.	more adult	3.62 (2.)	1.41	3.43 (4.)	1.37
15.	sick	1.42	0.98	1.63	1.07
16.	surprised	3.35 (5.)	1.55	3.25	1.48
17.	natural	3.56 (3.)	1.55	3.68 (1.)	1.39
18.	angry	1.68	1.24	1.88	1.29
19.	unpleasant	2.44	1.48	2.64	1.45
20.	shocked	2.50	1.56	2.49	1.50
21.	pleased	2.63	1.51	2.46	1.31
22.	important	2.58	1.48	2.44	1.39
23.	indifferently	1.70	1.11	2.02	1.20
24.	healthy	3.39 (4.)	1.59	3.47 (2.)	1.42
25.	disgusted	2.06	1.37	2.49	1.49
26.	annoyed	2.18	1.39	2.92	1.55
27.	relieved	2.70	1.55	2.57	1.45

Note. Numbers in brackets represent the rank order of the top five most prominent emotional reactions to menarche

Exploratory factor analysis

The exploratory factor analysis (EFA) was performed in the whole sample. Based on Kaiser's criteria of eigenvalue higher than 1, initially, three components were extracted. However, the third factor was saturated with item 23 only. Therefore, EFA was repeated with forced 2-factor structure with oblique rotation, leaving a possibility that different factors could be in relation. The EFA was performed in the whole sample and in the premenarcheal and postmenarcheal subsamples separately. Pattern loadings after rotation can be seen in Table 2 for each subsample. The factor structure was similar in both groups. However, items 10 (*calm*), 15 (*sick*), and 26 (*annoyed*) were saturated in the premenarcheal group only, item 16 (*surprised*) was saturated with different factors in different subsamples, and item 23 (*indifferently*) was saturated with neither of the factors in both subsamples. Therefore, these five items were excluded from further analysis. The first factor was saturated by eleven items, i.e. item 1, 3, 5, 12, 13, 14, 17, 21, 22, 24, and 27, which reflect pleasant emotions. The second factor was saturated by eleven items, i.e. item 2, 4, 6, 7, 8, 9, 11, 18, 19, 20, and 25, which reflect unpleasant emotions. Two factors explained 44.7% of the total variance in the premenarcheal subsample, and 38.7% of the total variance in the postmenarcheal subsample.

The total score for each subscale was computed and divided by the number of items (i.e. 11), resulting in a score from 1 to 5. Descriptive statistics and normality tests for overall Emo-M subscale scores can be seen in Table 3. Skewness and kurtosis were non-zero values and Kolmogorov-Smirnov test for Unpleasant Emotions in postmenarcheal girls was significant. However, *z* values of skewness and

kurtosis imply that the distributions were not heavily different from normal distributions given that they were not above 2.58 (Field, 2009).

In the premenarcheal subsample, the two subscales were not correlated ($r(106) = .05$, $p>.05$), while in the postmenarcheal subsample they were in a significant, but low negative correlation ($r(244) =-.24$, $p<.01$). Scores on subscales were examined in respect to menarcheal status. A mixed-design ANOVA showed that there was no difference between the premenarcheal and postmenarcheal girls in emotions related to menarche ($F(1, 352) =0.11$, $p>.05$, $\eta_p^2 = .00$). However, both premenarcheal and postmenarcheal girls reported more pleasant, than unpleasant emotions ($F(1, 352) = 26.74$, $p<.001$, $\eta_p^2 = .07$), as can be seen in Figure 1. The interaction effect was not significant ($F(1, 352) = 0.29$, $p>.05$, $\eta_p^2 = .00$). This analysis was repeated in the primary school students only (there was no premenarcheal participants among high school students), and the effects were the same.

Table 2
Summary of the Principal Axis Factoring with oblique rotation results for the Expected/Experienced Emotional Reactions to Menarche Scale (Emo-M) *in premenarcheal and postmenarcheal girls (the pattern matrix is reported)*

		Both groups (N=354)		Premenarcheal girls (n=108)		Postmenarcheal girls (n=246)	
		Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
1.	excited	**.628**	-.111	**.718**	-.171	**.600**	-.064
2.	ashamed	.070	**.554**	-.006	**.593**	.090	**.567**
3.	mature	**.634**	.001	**.694**	.050	**.600**	-.008
4.	scared	.097	**.665**	.179	**.515**	.048	**.734**
5.	happy	**.722**	-.127	**.716**	-.127	**.735**	-.105
6.	sad	-.194	**.529**	-.195	**.665**	-.229	**.441**
7.	nervous	-.029	**.620**	.073	**.715**	-.117	**.533**
8.	worried	.116	**.730**	.122	**.676**	.093	**.767**
9.	confused	.151	**.644**	.230	**.612**	.089	**.670**
10.	calm	.326	-.330	**.453**	-.303	.254	-.367
11.	weird	.197	**.541**	.332	**.548**	.114	**.513**
12.	proud	**.734**	-.052	**.723**	-.096	**.758**	-.009
13.	feminine	**.767**	-.010	**.790**	.015	**.758**	-.004
14.	more adult	**.750**	.040	**.717**	.043	**.770**	.078
15.	sick	-.118	.394	-.041	**.404**	-.162	.361
16.	surprised	.379	.437	**.520**	.362	.300	**.475**
17.	natural	**.616**	-.070	**.633**	.003	**.601**	-.108
18.	angry	-.193	**.527**	-.194	**.662**	-.222	**.437**
19.	unpleasant	-.108	**.676**	-.200	**.742**	-.080	**.649**
20.	shocked	.083	**.656**	.024	**.624**	.104	**.689**
21.	pleased	**.787**	-.015	**.838**	-.009	**.757**	-.011
22.	important	**.674**	.109	**.677**	.044	**.681**	.163
23.	indifferently	-.047	.297	.187	.359	-.167	.222
24.	healthy	**.624**	.034	**.687**	.050	**.590**	.022
25.	disgusted	-.215	**.545**	-.187	**.660**	-.244	**.477**
26.	annoyed	-.262	**.442**	-.188	**.600**	-.319	.350
27.	relieved	**.639**	.056	**.699**	.124	**.598**	.018
Eigen-value		6.41	4.4	6.63	5.45	6.70	3.74
Explained variance (%)		23.74	16.1834	24.54	20.18	24.81	13.85

Note. Factor loadings higher than .40 are bolded.

Reliability

Reliability can be seen in the lower part of Table 3. The average inter-item correlations were in the range from .36 to .52 for pleasant and unpleasant emotions subscales. The internal consistency Cronbach's α was very high, .91-.92 for The Pleasant, and a little lower .86-.88 for The Unpleasant Emotions subscale. Split-half reliability of the subscales was also very high, in a range from .87 to .94.

Divergent and discriminative validity

To assess divergent validity, the relationship between Emo-M and Preparedness for the Menarche (PM) scale was analysed. PM scores were in a positive correlation with the Pleasant Emotions scores (r = .35, $p<.01$) and in a negative correlation with the Unpleasant Emotions scores (r = -.24, $p<.01$). Both correlations were statistically significant, but low.

Table 3
Descriptive statistics, normality tests, and reliability for overall Expected/Experienced Emotional Reactions to Menarche Scale (Emo-M) *subscale scores in premenarcheal and postmenarcheal girls*

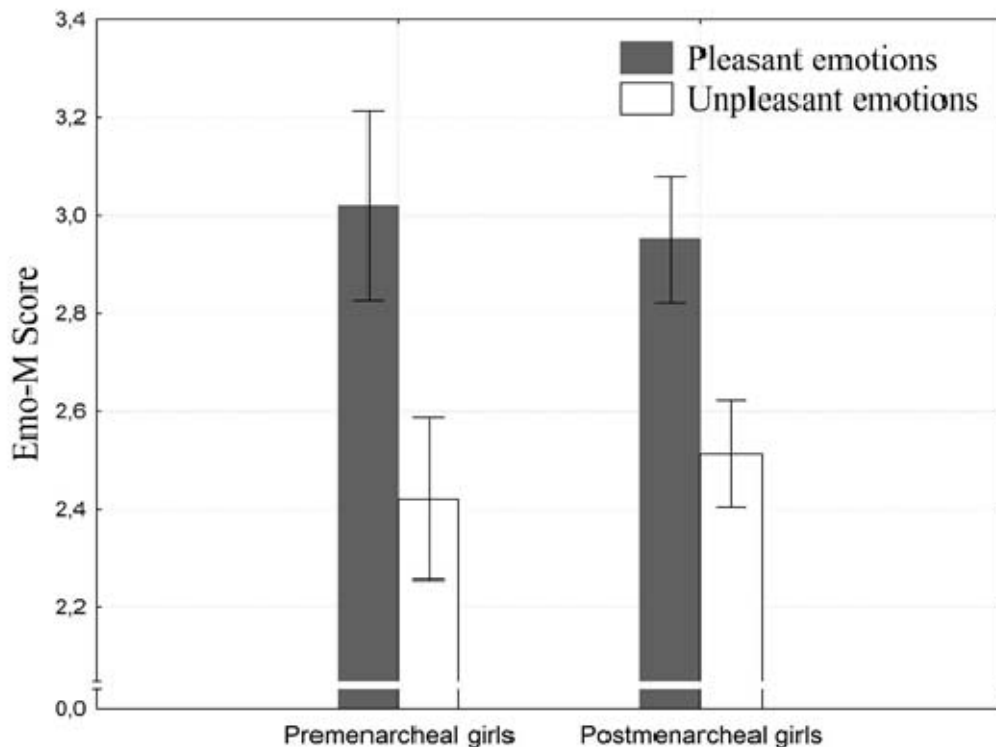|	Premenarcheal girls (n=108)		Postmenarcheal girls (n=246)	
	Pleasant Emotions	Unpleasant Emotions	Pleasant Emotions	Unpleasant Emotions
M	3.02	2.54	2.95	2.56
SD	1.11	0.99	0.98	0.89
Median	3.09	2.41	3.00	2.55
Mode	3	3	3	4
Minimum-Maximum	1-5	1-5	1-5	1-5
Skewness	-0.134	0.414	0.011	0.185
SE of Skewness	0.233	0.233	0.155	0.155
z of Skewness	-0.58	0.002	0.07	1.19
Kurtosis	-0.959	-0.583	-0.776	-0.782
SE of Kurtosis	0.461	0.461	0.309	0.309
z of Kurtosis	-2.08	1.27	-2.51	-2.53
Kolmogorov-Smirnov test	D (108) = 0.063 $p>0.05$	D (108) = 0.081 $p>0.05$	D (246) = 0.044 $p>0.05$	D (246) = 0.063 $p<0.05$
Average inter-item correlations	.52	.41	.47	.36
Cronbach α	.92	.88	.91	.86
Split-half reliability	.93	.89	.94	.87

Figure 1. Average score on the subscales of Pleasant and Unpleasant Emotions related to menarche in premenarcheal (n=108) and postmenarcheal girls (n=246)

To assess discriminative validity, the postmenarcheal sample was divided based on the age at menarche into girls of early maturation (≤11 years; *n*=68; 27.6%), average maturation (12 years; *n*=104; 42.3%), and late maturation (≥13 years, *n*=74; 30.1%). The scores on the Pleasant and Unpleasant Emotions were analysed according to the age at menarche with a mixed-design ANOVA. The results showed that postmenarcheal girls, as previously reported, experienced more pleasant, than unpleasant emotions ($F_{(1, 243)} = 18.71$, $p<.001$, $\eta_p^2 = .07$). Although there was no significant effect of pubertal timing ($F_{(2, 243)} = 0.71$, $p>.05$, $\eta_p^2 = .00$), the interaction effect of the type of emotions and pubertal timing was significant ($F_{(2, 243)} = 4.75$, $p<.01$, $\eta_p^2 = .04$), which can be seen in Figure 2. *Post-hoc* tests showed that postmenarcheal girls with late menarche reported lower levels of unpleasant emotions in comparison with early- and average-timing girls ($p<.001$).
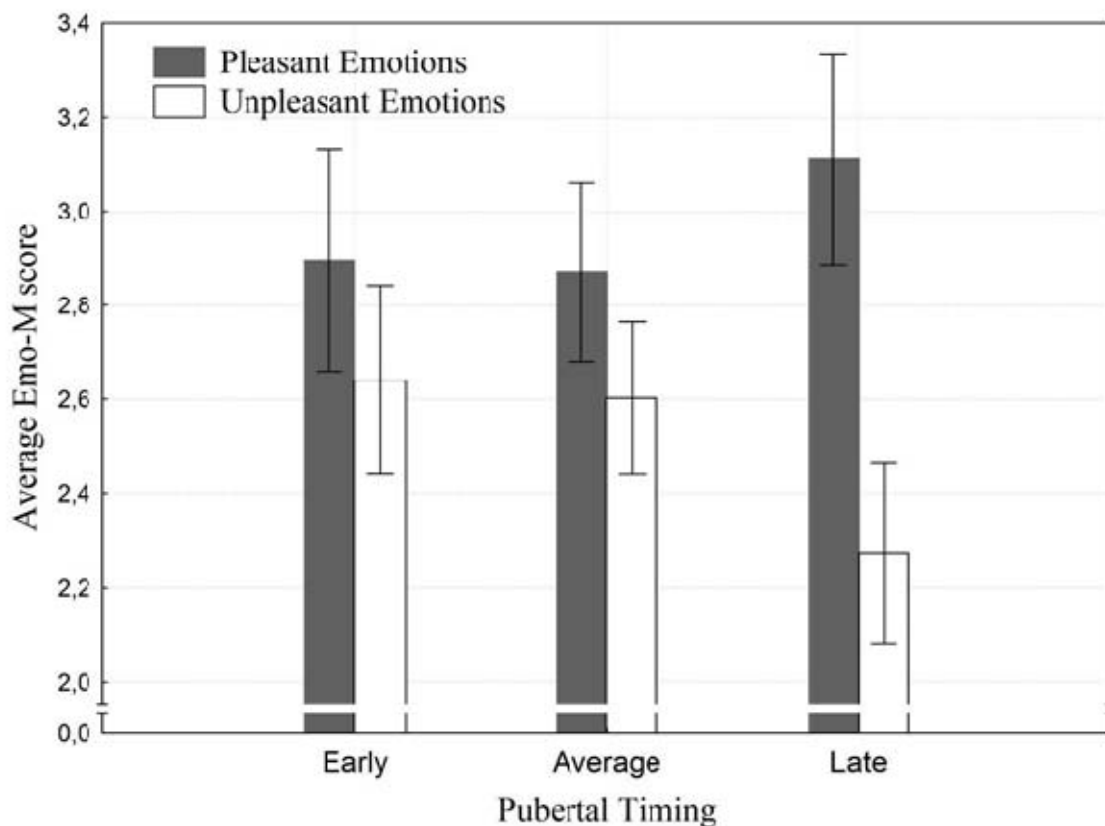

Figure 2. Average score on the subscales of Pleasant and Unpleasant Emotions related to menarche in postmenarcheal girls of early (≤11 years at menarche; *n*=68), average (12 years; *n*=104), and late maturation (≥13 years; *n*=74)

Discussion

The experience of the first period can have serious long-term consequences for different aspects of a woman's life, including menstrual experience, attitudes toward their own body, and other aspects of reproductive health (do Amaral et al., 2011; Koff & Rierdan, 1996; McPherson & Korfine, 2004). Subsequently, it is important to focus on these early experiences which are mostly neglected. Given that there was a lack of adequate tools for assessment of emotional reactions related to either expectancy or experience of the first period, the new Emo-M scale was developed. The results showed that it was a reliable and valid questionnaire for assessment of emotions related to menarche.

Exploratory factor analysis showed that the Emo-M has a two-factor latent structure in both premenarcheal and postmenarcheal girls. The first factor comprises pleasant emotional reactions and the second comprises unpleasant emotional reaction to menarche. Correlation between the two subscales was

non-significant or very low, therefore calculating separate scores for each subscale is recommended. It is difficult to compare these results to the literature given that this is, to the authors' best knowledge, the first questionnaire for this particular purpose. High reliability of the subscales was established. To demonstrate external validity, divergent and discriminant validity were assessed. The Emo-M subscales were in significant, but low correlations with the Preparedness for the Menarche (PM), where Emo-M and PM scores shared only up to 12% of the variance, meaning that these two instruments measured distinct constructs. Also, discriminative validity was demonstrated given that postmenarcheal girls of different pubertal timing (early, average, late) could be differentiated by their result on the Emo-M subscale, i.e. girls with late pubertal timing (menarche at 13 years or more) had lower levels of unpleasant emotions. Unfortunately, we could not estimate the convergent validity of the Emo-M because there was no other instrument measuring emotional reactions to menarche with known psychometric properties, except for one used in the study by Tang et al. (2003). However, the Emo-M comprises an extended list of emotions from the scale used in the latter study, and therefore, it would not be statistically justified to use it for convergent validity assessment.

Both premenarcheal and postmenarcheal adolescent girls reported similar emotional reactions related to menarche, including feeling more mature, more adult, natural and healthy as the most prominent emotions. Also, both groups reported higher levels of pleasant, than unpleasant emotions. This was an unexpected result, given that previous studies in other countries showed that postmenarcheal girls and young women report mostly negative emotional reactions. Postmenarcheal Mexican girls reported worry, feeling odd, and confusion as the first reactions to menarche (Marván & Alcalá-Herrera, 2014; Marván et al., 2006). Postmenarcheal Chinese girls reported feelings of embarrassment, worry, and fear. However, they did report some positive reactions, such as being more grown up and more feminine, but these were less frequent than unpleasant emotions (Tang et al., 2003). This discrepancy could be because girls who had negative expectations or experience of menarche were less likely to participate in the study in the first place. Although students learn about the human body and puberty in the 4th and 5th grade of the primary school in Croatia, they usually do not discuss the topics of menstruation in detail. However, a new health education syllabus had been introduced in the curriculum a year before the research was conducted. A series of lectures was given on different topics, some of which were held by the school doctor, and menstruation might have been addressed. The new health education also prompted parents to include themselves more in discussions on specific topics at home, so it may be that the students communicated with their parents more. However, this can only explain the positive expectations in premenarcheal girls, but it would not have such an impact on the memory of menarche in postmenarcheal adolescents. Research in other cultures was conducted more than 10 years ago, and perhaps experience of girls in those countries changed in the meantime. There are some indications that menstrual attitudes and emotional reactions in adolescent girls from India changed from 1985 to 1999 (Chakrabarti, Chaudhuri, & Maid, 2000), probably due to the influence of the media, which diminished the secrecy of menstruation. A qualitative study conducted more than 30 years ago showed that there were some cultural differences in menarcheal experiences (Logan, 1980), therefore, it would be interesting to apply the same questionnaire in different cultures to see if there are some current cultural differences in emotional reactions to menarche. Also, it would be necessary to conduct the same research in Croatia in 5-10 years to see possible changes, perhaps as a consequence of the new health education syllabus.

Differences between premenarcheal and postmenarcheal in the levels of pleasant and unpleasant emotions related to menarche were not established. In other words, emotional reactions were not related to menarcheal status, but were related to other aspects of pubertal development. Girls who were late maturers (13 years or older at menarche) reported significantly lower levels of unpleasant emotions than early or average maturers. This goes in line with the literature showing that girls with early maturation (menarche before 11 years) felt more scared and worried compared to girls with average or late maturation. Girls who had late maturation had the most positive reaction to menarche, i.e. they were more likely to report reactions of excitement and happiness, in comparison with early and average maturers (Marván & Alcalá-Herrera, 2014). Girls with early maturation are at risk of having more difficult adjustment and are more likely to engage in delinquent behaviours based on their teachers reports (Carter, Jaccard, Silverman, & Pina, 2009). Also, early-timing puberty is a risk factor for depression in middle adolescence (Kaltiala-Heino, Kosunen, & Rimpela, 2003). However, the relationship between age at menarche and psychological consequences is not so simple. Both early and late age at menarche can have negative consequences on psychological development in girls. Girls with early maturation are prone to internalised (depression, anxiety, low self-esteem) and externalised problems (sexual behaviour, delinquency), which are then reflected in academic (under)achievement. On the other hand, girls with late maturation get anxious and worried about whether everything is all right with them. They feel different

than their peers and there is a possibility to develop the same internalised and externalised problems as girls with early maturation (Carter et al., 2009).

Several limitations of the study should be considered. The high school participants were from the High School for Health Professions where future medical nurses, pharmacists, and physical therapists are trained. Girls from this school might have more positive attitudes towards body changes, including menstruation, which could, in turn, affect more positive emotional reactions. However, higher pleasant than unpleasant emotions were also established on the subset of primary school participants. Still, these findings should be further explored in other samples of different educational background.

Next, postmenarcheal girls reported their first emotional reactions to menarche retrospectively, which could, therefore, be biased by memory. Predictive validity of the Emo-M questionnaire for psychological adjustment and menstrual experience later in life should be tested. Additionally, this was a cross-sectional study. Given that previous study showed that differences in attitudes towards menstruation between early and late maturers were present only in those girls who got the menarche in less than two years (Marván & Alcalá-Herrera, 2014), it would be necessary to follow girls from puberty throughout adolescence. A longitudinal design would give an opportunity to consider changes in memory of the first emotional reactions and their possible effect on current menstrual attitudes.

Conclusion

It is recommended to use the shorter 22-item version of the new Expected/Experienced Emotional Reactions related to MenarcheScale (Emo-M) as a valid and reliable questionnaire. It is applicable in both premenarcheal and postmenarcheal girls for a quick assessment of emotions related to menarche for research and practical purposes. The two-factor structure of the Emo-M questionnaire revealed that adolescent girls report more pleasant than unpleasant emotional reactions related to menarche.

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Appendix A: Emo-M

Here is the list of emotions that girls can experience when they get their first menstruation.
If you **<u>still have not got</u>** your first menstruation, try to imagine how you would feel when you get it.
If you **<u>have already got</u>** your first menstruation, try to recall how you felt when you got it.
Read a list and for each emotion circle the number that describes your feelings the best.

		Not at all	Slightly	Moderately	Very true	Completely
1.	excited	1	2	3	4	5
2.	ashamed	1	2	3	4	5
3.	mature	1	2	3	4	5
4.	scared	1	2	3	4	5
5.	happy	1	2	3	4	5
6.	sad	1	2	3	4	5
7.	nervous	1	2	3	4	5
8.	worried	1	2	3	4	5
9.	confused	1	2	3	4	5
10.	calm	1	2	3	4	5
11.	weird	1	2	3	4	5
12.	proud	1	2	3	4	5
13.	feminine	1	2	3	4	5
14.	more adult	1	2	3	4	5
15.	sick	1	2	3	4	5
16.	surprised	1	2	3	4	5
17.	natural	1	2	3	4	5
18.	angry	1	2	3	4	5
19.	unpleasant	1	2	3	4	5
20.	shocked	1	2	3	4	5
21.	pleased	1	2	3	4	5
22.	important	1	2	3	4	5
23.	indifferently	1	2	3	4	5
24.	healthy	1	2	3	4	5
25.	disgusted	1	2	3	4	5
26.	annoyed	1	2	3	4	5
27.	relieved	1	2	3	4	5

Appendix B: Emo-M

Ovdje je opis kako se djevojke sve mogu osjećati kad dobiju prvu menstruaciju.
Ako još **nisi dobila** prvu menstruaciju, pokušaj zamisliti kako ćeš se osjećati kad je dobiješ.
Ako si **već dobila** prvu menstruaciju, pokušaj se prisjetiti kako si se osjećala kad si je dobila.
Pročitaj popis i za svaki osjećaj zaokruži koliko se odnosi na tebe.

		uopće se ne odnosi na mene	uglavnom se ne odnosi na mene	niti se odnosi niti se ne odnosi na mene	uglavnom se odnosi na mene	u potpunosti se odnosi na mene
1.	uzbuđeno	1	2	3	4	5
2.	posramljeno	1	2	3	4	5
3.	zrelo	1	2	3	4	5
4.	prestrašeno	1	2	3	4	5
5.	sretno	1	2	3	4	5
6.	tužno	1	2	3	4	5
7.	nervozno	1	2	3	4	5
8.	zabrinuto	1	2	3	4	5
9.	zbunjeno	1	2	3	4	5
10.	smireno	1	2	3	4	5
11.	čudno	1	2	3	4	5
12.	ponosno	1	2	3	4	5
13.	ženstvenije	1	2	3	4	5
14.	odraslije	1	2	3	4	5
15.	bolesno	1	2	3	4	5
16.	iznenađeno	1	2	3	4	5
17.	prirodno	1	2	3	4	5
18.	ljuto	1	2	3	4	5
19.	neugodno	1	2	3	4	5
20.	šokirano	1	2	3	4	5
21.	zadovoljno	1	2	3	4	5
22.	važno	1	2	3	4	5
23.	nezainteresirano	1	2	3	4	5
24.	zdravo	1	2	3	4	5
25.	gadilo mi se	1	2	3	4	5
26.	išlo mi je na živce	1	2	3	4	5
27.	osjetila sam olakšanje	1	2	3	4	5