

### Original Article

## Rape Avoidance Behavior among Slovak Women

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**Abstract:** Rape has been a recurrent adaptive problem for many species, including humans. Rape is costly to women in terms of disease transmission, partner abandonment, and unwanted pregnancy (among other costs). Therefore, behavioral strategies which allow women to avoid coercive men may have been favored by selection. In line with this evolutionary reasoning, the current research documented that physically stronger women and those in a committed romantic relationship reported more rape avoidance behavior. In addition, virgin women tended to perform more rape avoidance behavior compared with their non-virgin counterparts. Women with high conception risk perceived themselves as physically stronger, which may protect them against a potential rapist. Fear of unwanted pregnancy from rape decreased as age increased, reflecting higher fertility among younger participants. However, older women reported more rape avoidance behavior, which contradicts evolutionary predictions. The results provide some support for evolutionary hypotheses of rape avoidance behavior which suggest that woman's perception of rape is influenced by parental investment and perceived physical condition.

**Keywords:** human, sexual coercion, rape, rape avoidance

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### Introduction

The evolutionary interests (i.e., fitness optima) of any individuals are rarely identical, because their alleles at loci differ, thus competition among alleles is expected (Arnqvist and Rowe, 2005; Chapman, 2006). Such differences arise by differential investment by males in relatively cheap sperm compared with female investment in larger and less numerous ova (Trivers, 1972). The optimal mating rate of males is higher than that of females (Bateman, 1948; Parker, 1979; Simmons and Kotiaho, 2007). This difference in optimal mating rate affects the level of sexual conflict (Arnqvist and Rowe, 2005). Generally, male mating strategies impose non-trivial reproductive costs on females in terms of offspring production (Rossi, Nonacs, and Pitts-Singer, 2010; Takeshita, Lombardo, Wada, and Henmi, 2011), male harassment (Helinski and Harrington, 2012), insemination (Arnqvist and Nilsson, 2000), maternal care (Boncoraglio and Kilner, 2012), physical injury

(Crudginton and Siva-Jothy, 2000) and/or death (Leboeuf and Mesnick, 1991; Réale, Boussès, and Chapuis, 1996). Sexual selection is expected to favor counter-adaptations to these costs in females that will maximize their individual fitness (Arnqvist and Rowe, 2005). Indeed, females have various behavioral strategies to reduce their exposure to male aggression (Clutton-Brock and Parker, 1995; Ebensperger, 1998; Smuts and Smuts, 1993). Females may also change their movement to avoid areas frequented by males (Clutton-Brock, Price, and Maccoll, 1992; Stone, 1995), to avoid association with males (Sundaresan, Fischhoff, and Rubenstein, 2007), including habitat selection that minimizes contact with males (Darden and Croft, 2008).

As defined by current Slovak criminal laws (2005), as well as by researchers (Camilleri, 2012), rape is the use of force or the threat of force to obtain copulation. Rape is the result of intense sexual conflict in humans (Thornhill and Palmer, 2000). The historical and ethnographic literature suggests that rape occurs in all known human cultures (Lalumière, Harris, Quinsey, and Rice, 2005). The lifetime prevalence of rape is estimated to be between 12% and 18% in national samples of women (Kilpatrick, Edmunds, and Seymour, 1992; Kilpatrick, Resnick, Ruggiero, Conoscenti, and McCauley, 2007; Tjaden and Thoennes, 2006), but it is likely to be more prevalent, because rapes often go unreported to the legal authorities (Kilpatrick et al., 1992). For example, one estimate indicates that more than two-thirds of rape/sexual assaults perpetrated in 1996 in the US were not reported (Ringel, 1997).

Rape circumvents female choice in mating, which may result in the production of genetically inferior offspring (Wolff and Macdonald, 2004). In addition, paternity certainty is lowered for the victim's long-term mate and reduces the fitness of the relatives of the victim and her long-term mate (Thornhill and Palmer, 2000). Further reproductive costs include injuries (Baker and Sommers, 2008; Bowyer and Dalton, 1997), sexually transmitted diseases (Jo et al., 2011; Mills, Singh, Nelson, and Nachege, 2006) and disruption of parental care for the victim's existing children, caused by a lack of paternal investment from the rapist and/or that a raped woman may be abandoned by her long-term partner (McKibbin, Shackelford, Miner, Bates, and Liddle, 2011; Thornhill, 1996; Thornhill and Palmer, 2000). Indeed, a survey of female victims of sexual violence in eastern Democratic Republic of the Congo showed that nearly one-third of raped women were rejected by their families (Kelly, Betancourt, Mukwege, Lipton, and VanRooyen, 2011). In addition, women who had a child produced by rape were almost five times as likely to report experiencing community isolation than those who did not have a child produced by rape (Kelly et al., 2011). The costs of rape for married women therefore may be higher than for single women, because the presence of children (including by rape) decreases women's market value in mating games (Volland and Stephan, 2000) and the likelihood of remarriage is lower for women with children (including by rape) than for women without children (Smith, Zick, and Duncan, 1991). This suggests that rape avoidance behavior will be more pronounced for married women than for single women (Hypothesis 1). Furthermore, married women with higher reproductive investment (i.e., those who have more offspring) will perform more rape avoidance behavior than women with lower reproductive investment (i.e., those who have fewer offspring; McKibbin and Shackelford, 2011), because abandonment by a husband poses greater reproductive costs

for women with more children (Hypothesis 2).

The negative consequences of rape may explain the evolution of psychological mechanisms designed to motivate rape avoidance behavior (McKibbin and Shackelford, 2011; Thornhill and Palmer, 2000). Women in the fertile phase of their ovulatory cycle evidence more rape avoidance behavior. Fertile women exposed to potential sexual coercion demonstrate greater handgrip strength than women outside the fertile window, which may reflect the greater costs (i.e., unwanted pregnancy) for women in the fertile window (Petralia and Gallup, 2002). Fertile women also report fewer behaviors that increase risk of being raped compared with women who are not in the fertile phase of their ovulatory cycle (Bröder and Hohmann, 2003; Chavanne and Gallup, 1998). This suggests that women at high conception risk will perceive themselves as physically stronger than women at low conception risk (Hypothesis 3), and that women at high conception risk should perform more rape avoidance behaviors than women at low conception risk (Hypothesis 4). Recent research documented associations between fear of large carnivorous predators and perceived physical condition in humans (Prokop and Fančovičová, 2010, 2013). More specifically, people with weaker perceived physical condition, and thus less able to defend themselves against a predator, reported greater fear of large predators than did people with stronger perceived physical condition. This result may be applicable to rape avoidance behavior, with women who are weaker behaving with greater caution (due to being more exploitable), reporting more rape avoidance behaviors (Hypothesis 5).

A woman's age predicts her physical attractiveness, and both variables reliably indicate fertility (Dunson, Colombo, and Baird, 2001; Henry, 1961). Indeed, reproductive-aged women are more likely to be raped than are much older women (Greenfield, 1997; Kilpatrick et al., 1992). Thus, younger women will perform more rape avoidance behavior than will older women (Hypothesis 6). McKibbin et al. (2011) did not find support for this hypothesis, but their sample showed relatively low variability with respect to age. In the current research, I replicate the previous research conducted with women in the US, to assess the replicability of these results in an Eastern European sample (Kelly, 2006). Fear of rape decreases as the age of women increases (O'Donovan, Devilly, and Rapee, 2007). Given the greater likelihood of conception with rape relative to consensual sex (Gottschall and Gottschall, 2003), the fear of pregnancy as a consequence of rape will be higher for younger women than for older women (Hypothesis 7).

Men more than women value virginity in a long-term partner (Buss, 1989), although the value men place on virginity has decreased over the past half-century in Western countries (Buss and Schmitt, 1993). Men have historically preferred virginity in a potential spouse across many cultures, presumably because this assures men that their paternal investment will be directed toward offspring to whom they are genetically related (Barber, 2000). Loss of virginity is another potential cost of rape, suggesting that virgin women will perform more rape avoidance behaviors than will non-virgin women (Hypothesis 8).

## **Materials and Methods**

### *Participants*

Surveys were conducted between September and December in 2009. The

participants were 857 women attending Trnava University in Trnava, Slovakia. Thirteen participants reported being pregnant and were therefore excluded from the analyses because we did not have a large enough sample to examine this group of individuals. The age of the remaining 844 participants ranged from 18 to 58 years ( $M = 24.18$ ,  $SE = .28$ ). The majority of the participants (75 %) were  $\leq 25$  years old. The mean age of the university students was higher than a typical undergraduate sample because about half of the students at the campus where the study was conducted differ from traditional students, such as being employed full-time and/or having children. This yielded a more diverse sample of participants along several demographic variables compared with studies that include only full-time university students.

### *Demographic data*

Participants were asked to provide basic sociodemographic information such as age, marital status [single (36%), married (19%), with boyfriend (45%)], whether they are currently pregnant, and whether they are currently using contraceptive pills or another form of hormonal contraception (32 % reported current contraceptive usage), number of children (77 % were childless) and whether they ever had sexual intercourse with the opposite sex (“Have you ever engaged in sexual intercourse (that is, penis in the vagina)?”). A total of 160 participants (19 %) reported being a virgin. We performed a separate comparison of those virgin women that were ( $n = 37$ ) and were not ( $n = 123$ ) in a committed romantic relationship with ANCOVA, and for which perceived physical condition (see below) and age were controlled to examine whether involvement in a relationship influences rape avoidance behavior. Marital status correlated with age (Spearman rank correlation,  $r = .45$ ,  $p < .001$ ,  $n = 844$ ) and, therefore, residuals from regression (with marital status controlled for the effect of age) were used in the statistical analyses (see below). Thirteen participants (1.5%) reported having been raped (“Have you ever been raped?”), although removing these participants from the sample did not influence the results of the statistical analyses. The total number of reported children correlated with age ( $r = .82$ ,  $p < .001$ ,  $n = 844$ ) and, therefore, residuals from regression (number of children controlled for the effect of age) were used in the statistical analyses (see below). The phase of the menstrual cycle as a potential confound was examined by asking the current date and the date when their last menstrual period began. Women were divided into high fertility days (9 – 14) and low fertility days (0 – 8 and 15 – 28) based on self-reports of the previous onset of menstruation. These groups correspond to the follicular phase and menstruation and the luteal phase, respectively (e.g., Regan, 1996), and these groupings have been used in previous research (e.g., Little, Burt, Penton-Voak, and Perrett, 2007; Rantala, Polkki, and Rantala, 2010). After excluding participants that reported being menopausal ( $n = 68$ ), participants currently using hormonal contraceptives ( $n = 273$ ) and those who did not provide useful data about their menstrual cycle ( $n = 37$ ), the sample was reduced to 466 participants, about 55% of the original sample. Due to these limitations, we examined the possible effects of conception risk on rape avoidance behavior separately.

### *Measures*

*Rape Avoidance Inventory (RAI)*. I used an abbreviated version of the RAI

developed by McKibbin et al. (2009). The original inventory consists of 69 items belonging to four dimensions: Avoid Strange Men (ASM), Avoid Appearing Sexually Receptive (AASR), Avoid Being Alone (ABA), and Awareness of Surroundings/Defensive Preparedness (ASDP). The reliability and validity of the scale was established by McKibbin et al. (2009). I used many of the items, but due to a number of additional questions (see below) I decided to use only those items that had the strongest factor loadings in the original study by McKibbin and colleagues. I specifically omitted items with factor loadings  $\leq .44$ . The final questionnaire consisted of 43 items (see Appendix) belonging to the same four dimensions as described above: ASM (12 items, Cronbach's  $\alpha = 0.69$ ), AASR (15 items,  $\alpha = 0.81$ ), ABA (9 items,  $\alpha = 0.62$ ), ASDP (7 items,  $\alpha = 0.38$ ). The relatively low reliability of the ASDP dimension likely was due to use of a small number of items. Moreover, the revised RAI's validity was not further evaluated and, therefore, readers are cautioned when interpreting relevant results. Participants indicated on a 5-point scale how often they performed each act. The response values were as follows: 1 = *Never*, 2 = *Rarely*, 3 = *Sometimes*, 4 = *Almost always*, 5 = *Always*. I calculated scores for each subscale by averaging the responses to the constituent items.

The translation of the questionnaire from English to Slovak proceeds as follows: A bilingual speaker translated the English questionnaire into Slovak. A second bilingual speaker translated the English version independently from the first one. Then the two bilingual speakers consensually resolved the few resulting discrepancies between the original English questionnaire and the translated Slovak version.

*Perceived physical condition.* To assess Perceived Physical Condition (PPC), I modified 11 items from the Physical Strength scale (Hagger, Hulyaa Sci, and Indwall, 2004; Klomsten, Skaalvik, and Espnes, 2004; Cronbach's  $\alpha = 0.81$ ). Example items are: "I am physically stronger than other people of the same age and sex", "I am able to be physically active for a longer period without a break", and "I am unsure whether I have enough energy and power" (reverse scored). The translation of the questionnaire was the same as for the Rape avoidance inventory. I calculated scores for the scale by averaging the responses to the constituent items. The PPC score negatively correlated with age ( $r = -.09$ ,  $p < .05$ ,  $n = 844$ ) and, therefore, residuals from regression (PPC score controlled for the effect of age) were used in the statistical analyses (see below).

*Fear of pregnancy after rape.* Participants were provided with five possible consequences of rape: betrayal of trust, psychological trauma, physical injury, personal degradation and unwanted pregnancy. These categories were established by a pilot study based on brief interviews with female college students ( $n = 10$ ) that were not included in this research. Participants were instructed to rate each of the five potential consequences hierarchically, i.e., each consequence could receive only one number from 1 (*worst*) to 5 (*least bad*). Although I wanted to examine only the possible relationship between participant's age and fear of unwanted pregnancy, I used the four additional consequences of rape as distractors to mask this interest.

### *Procedure*

The present study was conducted online, which affords a high degree of anonymity, which elicits more candid responses to questions about socially undesirable behavior and

emotions than do paper and pencil methods or interview methods (Locke and Gilbert, 1995; Musch, Singh, Nelson, and Nachega, 2001). This would seem to be a particular advantage in the present research, where many questions are extraordinarily personal. In addition, internet surveys are a convenient, user-friendly, comfortable, and secure data gathering method (e.g., Campos, Zucoloto, Bonafe, Jordani, and Maroco 2011; Lewis, Watson, and White, 2009; van Gelder, Bretveld, and Roeleveld, 2010). Before the web page with the online survey was available, each participant received a unique numerical code to secure individual identity. All the participants received extra credit for a human biology course.

### Statistical analyses

The dependent variables were the mean scores of the four RAI domains (AASR, ASM, ABA, and ASDP) and the five possible consequences of rape: betrayal of trust, psychological trauma, physical injury, personal degradation, and unwanted pregnancy. The continuous predictors were age and the mean score of the PPC scale. The categorical predictors were marital status and virginity for the RAI domains. Age, marital status, having children, using contraceptives, and virginity were predictors for the five possible consequences of rape. Basic regression assumptions (normality, collinearity, and homoscedasticity) were met and, therefore the data were examined with multiple linear regression. Analysis of covariance (ANCOVA) was used for comparing differences in mean scores between high and low conception risk phase and between virgin women who were and virgin women who were not in a romantic relationship. Age or the mean score of the PPC scale were defined as covariates.

## Results

Descriptive analysis of the RAI domains is shown in Table 1. The ASM domain showed highest mean score (i.e. avoidance of potential rapists was high). Conversely, the ASDP domain showed relatively low mean score, suggesting that carrying equipment for self-protection (e.g., knife, pepper spray) was relatively infrequent among Slovak women.

**Table 1.** Descriptive analysis of the RAI domains.

	Mean	SE	Min	Max	<i>n</i>
AASR	3.64	.02	1.27	4.93	844
ASM	4.10	.02	1.83	5.00	844
ABA	3.83	.02	1.22	5.00	844
ASDP	2.88	.02	1.43	4.57	844

### Hypotheses 1, 5, 6 and 8

*Avoid appearing sexually receptive (AASR.)* Simultaneous multiple regression on mean scores of the AASR dimension resulted in a significant model ( $R^2 = .09$ ,  $F(4,839) = 21.81$ ,  $p < .0001$ , Table 2). In particular, women that perceive themselves as physically stronger scored higher. As the age of participants increased, the mean score of AASR increased. Virgin women scored higher than their non-virgin counterparts. The effect of

marital status was not significant. Virgin women that were in a committed romantic relationship ( $n = 37$ ) had a higher mean score ( $M = 3.96$ ,  $SE = 0.1$ ) than those that were not ( $M = 3.71$ ,  $SE = 0.05$ ,  $n = 123$ , ANCOVA controlled for PPC and age,  $F(1,156) = 4.42$ ,  $p = .04$ ). These results provide support for Hypothesis 5 and 8. Hypotheses 1 and 6 were not supported.

**Table 2.** Multiple regression on the mean AASR score.

	$\beta$	$SE$ of $\beta$	B	$SE$ of B	$t(839)$	$p$
Intercept	-	-	-23.7	5.75	-4.12	< .0001
Marital status	-0.03	0.03	-0.03	0.04	-0.94	.35
Virginity	0.16	0.04	0.25	0.06	4.51	< .0001
Age	0.24	0.03	1.26	0.18	6.96	< .0001
Physical condition	0.17	0.03	0.15	0.03	5.35	< .0001

*Avoid strange men (ASM).* Simultaneous multiple regression on mean scores of the ASM dimension resulted in a significant model ( $R^2 = .02$ ,  $F(4,839) = 3.35$ ,  $p < .009$ , Table 3). As the age of the participants increased, a tendency to avoid strange men increased. Women with higher perceived physical condition avoided strange men more than others. Virginity and marital status showed no associations with avoidance of strange men. Virgin women that were in a committed romantic relationship ( $n = 37$ ) had a higher mean score ( $M = 4.30$ ,  $SE = .09$ ) than those who were not ( $M = 4.08$ ,  $SE = .05$ ,  $n = 123$ , ANCOVA controlled for PPC and age,  $F(1,156) = 4.45$ ,  $p = .04$ ). In summary, Hypotheses 1, 5, 6 and 8 were not supported.

**Table 3.** Multiple regression on the mean ASM score.

	$\beta$	$SE$ of $\beta$	B	$SE$ of B	$t(839)$	$p$
Intercept	-	-	-3.12	5.35	-0.58	.56
Marital status	0.01	0.35	0.009	0.03	0.28	.78
Virginity	0.05	0.04	0.07	0.05	1.25	.21
Age	0.1	0.04	0.46	0.17	2.74	.006
Physical condition	0.08	0.03	0.06	0.03	2.21	.03

*Avoid being alone (ABA).* Simultaneous multiple regression on mean scores of the ABA dimension resulted in a significant model ( $R^2 = .06$ ,  $F(4,839) = 13.49$ ,  $p < .0001$ , Table 4). Women with better perceived physical condition and younger women avoided being alone more than others. This supports Hypothesis 6. Marital status and virginity did not correlate with the ABA dimension. Single women scored similarly to married women and women who reported having a partner but were not married. Virgin women in a committed romantic relationship ( $n = 37$ ) had a higher mean score ( $M = 4.12$ ,  $SE = .09$ ) than those that were not ( $M = 3.74$ ,  $SE = .05$ ,  $n = 123$ , ANCOVA controlled for PPC and age,  $F(1,156) = 11.96$ ,  $p < .0001$ ). Hypotheses 1, 5 and 8 were not supported.

**Table 4.** Multiple regression on the mean ABA score.

	$\beta$	<i>SE</i> of $\beta$	B	<i>SE</i> of B	<i>t</i> (839)	<i>p</i>
Intercept	-	-	8.49	5.75	1.48	.14
Marital status	-0.02	0.03	-0.03	0.04	-0.72	.47
Virginity	-0.03	0.04	-0.04	0.06	-0.72	.47
Age	-0.08	0.03	-0.4	0.18	-2.2	.03
Physical condition	0.23	0.03	0.21	0.03	6.99	< .0001

*Awareness of Surroundings/Defensive Preparedness (ASDP).* Simultaneous multiple regression on mean scores of the ASDP dimension resulted in a significant model ( $R^2 = .02$ ,  $F(4,839) = 3.67$ ,  $p < .006$ , Table 5). Women with better perceived physical condition had lower ASDP score than others. This supports Hypothesis 5. Other variables showed non-significant correlations with the ASDP dimension. Virgin women in a committed romantic relationship ( $n = 37$ ) had similar mean score ( $M = 2.89$ ,  $SE = .08$ ) to those that were not ( $M = 2.82$ ,  $SE = .04$ ,  $n = 123$ , ANCOVA controlled for PPC and age,  $F(1,156) = 0.65$ ,  $p = .65$ ). Hypotheses 1, 6 and 8 were not supported.

**Table 5.** Multiple regression on the mean ASDP score.

	$\beta$	<i>SE</i> of $\beta$	B	<i>SE</i> of B	<i>t</i> (839)	<i>p</i>
Intercept	-	-	10.44	4.96	2.1	.04
Marital status	0.04	0.04	0.04	0.03	1.24	.21
Virginity	-0.05	0.04	-0.07	0.05	-1.49	.14
Age	-0.04	0.04	-0.18	0.16	-1.16	.25
Physical condition	-0.11	0.03	-0.08	0.03	-3.25	.001

### Hypothesis 2

The Pearson correlation between the total number of children and the AASR score (controlled for the effect of age, PPC score, and the use of contraceptives) on a restricted sample of married women was significant ( $r = 0.16$ ,  $p = .045$ ,  $n = 157$ ). However, correlations between the total number of children and the ASM, ABA and ASDP dimensions were not significant ( $r = .09$ ,  $.1$  and  $-.09$ , all  $p > .20$ , respectively). Hypothesis 2 received only partial support.

### Hypothesis 3

As hypothesized, women at high conception risk scored higher on the PPC scale (controlled for age) than women at low conception risk ( $M = 0.10$ ,  $SE = .07$ ,  $n = 111$  and  $M = -0.06$ ,  $SE = .04$ ,  $n = 355$ , ANOVA,  $F(1,464) = 4.12$ ,  $p = .04$ ).

### Hypothesis 4

After controlling for the effect of age, the mean scores of the RAI dimensions were not affected by conception risk in the subsample of 466 women (Table 6). Only the mean score of the ASDP dimension was higher for women who were in the high conception risk



phase of the menstrual cycle compared with women who were a low conception risk phase of the menstrual cycle. This provides little support for Hypothesis 4.

**Table 6.** Differences in RAI domains (presented as means and SE) with respect to conception risk.

	AASR	ASM	ABA	ASDP
High risk ( $n = 111$ )	3.63 (.06)	4.1 (.05)	3.77 (.06)	2.96 (.05)
Low risk ( $n = 355$ )	3.7 (.03)	4.11 (.03)	3.79 (.03)	2.83 (.03)
$F(1,463)$	1.49	0.008	0.001	6.38
$p$	.22	.93	.97	.01

### Hypothesis 7

I used stepwise multiple regression to investigate whether any of the individual difference variables uniquely predicted fear of unwanted pregnancy after rape. I ran a series of five multiple regressions (forward stepwise method) on the five consequences of rape that were evaluated by participants [betrayal of trust ( $M = 3.41$ ,  $SE = .05$ ), psychological trauma ( $M = 1.58$ ,  $SE = .03$ ), physical injury ( $M = 3.57$ ,  $SE = .04$ ), personal degradation ( $M = 3.21$ ,  $SE = .04$ ) and pregnancy ( $M = 3.22$ ,  $SE = .05$ )]. The multiple regression model on unwanted pregnancy ( $R^2 = .04$ ,  $F(3,840) = 11.63$ ,  $p < .0001$ ) suggests that as the age of participants increased, fear of pregnancy decreased ( $\beta = 0.17$ ,  $p = .01$ ). Single women reported higher fear of pregnancy than women in a committed relationship (married or with boyfriend;  $\beta = -0.09$ ,  $p < .05$ ). The multiple regression model on personal degradation ( $R^2 = .03$ ,  $F(4,839) = 5.46$ ,  $p < .001$ ) suggests that as the age of participants increased, personal degradation increased ( $\beta = -0.20$ ,  $p < .0001$ ). Other variables were excluded from the multiple regression models or showed no significant association with fear of pregnancy. The multiple regression models predicting betrayal of trust, psychological trauma, and physical injury were not statistically significant. Hypothesis 7 was supported.

### Discussion

This study investigated factors influencing rape avoidance behavior in a sample of adult Slovak women. I found support for several evolutionary hypotheses of rape avoidance behavior (McKibbin and Shackelford, 2011; Thornhill and Palmer, 2000). The conception phase of the menstrual cycle was not associated with rape (Hypotheses 4), in contrast to reports of previous research (Bröder and Hohmann 2003; Chavanne and Gallup, 1998; Garver-Apgar, Gangestad, and Simpson, 2007). This failure to replicate may have resulted because I compared *general* rape avoidance behavior without asking whether this behavior was *actually* performed. In contrast, research designed specifically to assess the effects of conception risk on rape avoidance behavior measured *actual* rape avoidance behavior (e.g., in the previous 24 hours, see Chavanne and Gallup, 1998). Importantly, relying on participant reports of ovulatory status may be problematic, as women may know or recall their current cycle or where they are in it. Hormonal assays are necessary before more definitive conclusion can be made. The current result nevertheless suggests that responses

to the Rape Avoidance Inventory (McKibbin et al., 2009) may not vary with conception risk.

Women in a committed romantic relationship performed more rape avoidance behavior than did single women (Hypothesis 1), arguably a consequence of the greater costs for mated women associated with losing the support and resources of their partner (McKibbin et al., 2011; Thornhill, 1996; Thornhill and Palmer, 2000; Wilson and Mesnick, 1997). This result coincides, however, with an alternative explanation that single women are simply alone more often and more likely to go to parties or clubs to find potential mates (McKibbin et al., 2011). Further research is needed to disentangle these alternatives. Future research should take into account a potential limitation of some of the RAI items. Some RAI items may not properly assess rape avoidance behaviors in married women. For example, “Going out alone with a man I don’t know”, “Talking to men I don’t know”, or “When at a club or party, refuse drinks from men I don’t know” may occur because of one’s marital status, not because they are indicative of rape avoidance.

Single women reported greater fear of unwanted pregnancy than did women in a romantic relationship. O'Donovan et al. (2007) also found that fear of rape is greater for single women than for married women. This supports an alternative hypothesis that mated women can receive paternal care for unwanted children. Clearly, this alternative contradicts the results of Kelly et al. (2011) and likely reflects interpersonal differences in women's abilities to manipulate certainty of paternity (Turney, 2005). I speculate that greater fear of unwanted pregnancy in single women is mediated by risk of sperm competition. Single women may be less likely to currently have sperm in their reproductive tract and, therefore, the risk of sperm competition is lower and the likelihood of conception with a rapist may be higher. This hypothesis can be tested by investigating associations between the presence of partner's sperm in woman's reproductive tract and fear of pregnancy as a result of rape.

McKibbin and Shackelford (2011) suggested that women with dependent children would avoid potential rapists more than would childless women, because the former group has more to lose in the form of support/resources from their partner. The current results partly support this hypothesis, because rape avoidance behavior increased with the number of children, for the AASR domain (Hypothesis 2). It is possible that comparison with childless married women and those who have children would produce a more pronounced difference in rape avoidance behavior. As far as I am aware, this is the first empirical evidence of an association between maternal investment and rape avoidance behavior in humans.

The current results provide mixed support for associations between women's age and rape avoidance behavior. On the one hand, fear of unwanted pregnancy was higher for younger participants (Hypothesis 7), which suggests that rape avoidance behavior is mediated by the fear of pregnancy (O'Donovan et al., 2007). This is a particularly interesting result considering that fear of pregnancy was not perceived as negatively as psychological trauma. However, compared with other possible consequences of rape, only the risk of conception was hypothesized to vary with age (because the conception risk is highest among younger women) and this association was supported. On the other hand, women's age showed opposite associations with rape avoidance behavior (Hypothesis 6). Similar to McKibbin et al. (2011), I found positive correlations between age and the AASR

subscale and, furthermore, with the ASM subscale (Snyder and Fessler, 2013). These associations may reflect an overall decrease in involvement and sexual interest that typically accompanies aging (Bancroft, 2002). Another alternative is that older women may have more experience with and knowledge about the potential for rape, resulting in a higher RAI score than younger women. These results also imply that age needs to be controlled in future research on rape avoidance behavior in humans.

Women with better perceived physical condition (PPC) reported performing more rape avoidance behaviors across three of four RAI domains. However, I hypothesized that these correlations would be negative, meaning that women who are weaker would be more cautious and, therefore, would perform more rape avoidance behaviors (Hypothesis 5). In line with this reasoning, recent research showed that fear of large predators is related negatively to perceived physical condition (Prokop and Fančovičová, 2010, 2013). Positive associations between the PPC and the three RAI domains might be explained such that women allocate their physical power to defense against rape. This is the first study showing that women's perceived physical condition is associated with specific rape avoidance behaviors. There are, however, at least two alternatives to these results. First, women with better PPC may participate in sport activities in which they are less frequently alone compared with those who perceive their physical condition as lower. Indeed, the PPC scale correlates with attitudes toward sport (Prokop and Fančovičová, 2010). Sport behavior and attitudes, however, can only explain differences in the ABA scale. Differences in the AASR and ASM scale are unexplained. Second, women with a higher PPC score have higher self-esteem (Klomsten et al., 2004). Perhaps women with higher self-esteem avoid male harassment/sexual violence more successfully than women with lower self-esteem. A higher PPC score was also associated with the fertile phase of the menstrual cycle (Hypothesis 3). This supports the idea that women at high conception risk display greater strength, which may protect them against rapists (Petralia and Gallup, 2002).

Virginity showed significant associations with the AASR domain (Hypothesis 8). This supports the possibility that more rape avoidance behavior is motivated by avoiding greater costs, perhaps because virginity is valued by men (Buss, 1989; Buss and Schmitt, 1993). Alternatively, virgin women may be avoiding all sexual behavior for personal, religious, or other reasons. For example, Prokop and Fedor (in press) recently found that virgin women showed more conservative attitudes toward casual sex than non-virgin women, which also provides support for this alternative. On the other hand, marital status influenced the RAI scores in virgin women in the same way as in non-virgin women (i.e., single women scored lower) suggesting that at least some patterns of rape avoidance behavior are applicable to virgin women, as well. Additional research in countries where virginity is more valued than in Western culture and controlling for potential confounds (e.g., religiosity) is required to fully support this possibility. I am not aware of research that investigates the perception of women's virginity by men in Slovakia, but it is likely to be less valued than in reports from traditional cultures in Asia (see Buss and Schmitt, 1993). More comparative research in this field is required.

To conclude, the current research provides further support for the hypothesis that rape by men selects over evolutionary time for behavioral strategies that motivate women to avoid potential rapists. Women with better perceived physical condition performed more

rape avoidance behaviors than weaker women, and greater conception risk was associated with better perceived physical condition. Virgin women tended to perform more rape avoidance behaviors than non-virgin women, which collectively indicate that the costs of rape influence the behavioral strategies associated with rape avoidance. However, women with greater parental investment (i.e., those who have more children) did not perform more rape avoidance behaviors than women with lower parental investment. Future research would continue to ask how parental investment (e.g., by comparing younger vs. older women with children and their childless counterparts) and satisfaction with the current partner (e.g., by comparing women who are in relationships with physically and socially superior vs. inferior men) affects rape avoidance behavior. Fear of unwanted pregnancy after rape might be investigated from the perspective of a woman's ability to confuse certainty of paternity and risk of sperm competition with a rapist's sperm. Proximate explanations for divorce after rape are still unclear and, therefore, more research is required on how risk of sperm competition and risk of disease transmission affects the raped woman's partner's decision to terminate the relationship.

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## **Appendix**

Items from the Rape Avoidance Inventory used in the present research

### **Avoid Appearing Sexually Receptive (AASR)**

Avoid wearing revealing clothes  
Avoid drinking alcohol in unfamiliar places  
Dress conservatively  
Avoid staying out too late  
Avoid drinking alcohol  
Avoid drinking alcohol if I am around men I don't know  
Avoid wearing sexy clothing  
Avoid going out alone with a man I don't know  
Avoid "making out" with a man I have just met  
Avoid attracting attention to myself  
Avoid large groups of men  
Avoid talking to men I don't know  
Avoid taking drugs  
Be cautious of male friends  
Avoid places where I am the only woman

### **Avoid Strange Men (ASM)**

Avoid men with a reputation for forcing themselves on women  
Lock my house doors  
Avoid men I don't know that make me feel uneasy  
Avoid giving too much personal information to men I don't know well  
Avoid taking rides with men I don't know  
Avoiding meeting with men from the internet  
Avoid accepting drinks from men that I did not watch being made  
Avoid men who make me feel uncomfortable  
Avoiding meeting with men I don't know in places I'm not familiar with  
Avoid being around violent men  
When at a club or party, refuse drinks from men I don't know  
Park in well-lit areas

### **Avoid Being Alone (ABA)**

Leave television or music on when I'm at home alone  
When I go out, I stay with at least one other person that I know  
Let friends or family know where I am going when I go out  
Stay around other people when I go out  
Respond negatively to men when they flirt with me  
Avoid going to public restrooms alone  
Avoid unfamiliar places where I could get lost

*Rape avoidance in Slovakia*

Keep lights on in my house when alone  
Avoid going to gas stations at night

**Awareness of Surroundings/Defensive Preparedness (ASDP)**

Look in my car before I get in  
Keep a sharp object in my purse  
Carry a knife  
Report suspicious men in my neighborhood  
Pay special attention to my surroundings  
Check behind me when walking  
Carry pepper spray