

Reexamining Individual Differences in Women's Rape Avoidance Behaviors

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Abstract A growing number of investigators explore evolutionary psychological hypotheses concerning the avoidance of rape using self-report measures of behavior. Among the most recent and most ambitious, is the work of McKibbin et al. (2011). McKibbin et al. presented evidence supporting their predictions that such behaviors would vary according to the individual's physical attractiveness, relationship status, and proximity to kin. In addition, McKibbin et al. predicted, but failed to find evidence, that age would exercise a similar influence. We question McKibbin et al.'s position on both theoretical and empirical grounds, arguing that (1) two of their predictions do not rule out alternative explanations, and (2) their key supporting findings may well be artifacts of their measurement instrument, the Rape Avoidance Inventory (RAI). Employing new empirical evidence derived from a broader sample of U.S. women, we simultaneously tested McKibbin et al.'s predictions and compared the RAI to alternative dependent measures. We found that McKibbin et al.'s substantive predictions were not supported, and suggest that there may be limits to the utility of the RAI beyond one specific demographic category.

Keywords Sexual coercion · Rape · Rape avoidance · Evolved psychological mechanisms

Introduction

A number of evolutionary theorists have proposed that, because heterosexual coital rape can substantially reduce a woman's

biological fitness, and because such assaults likely occurred with some frequency in ancestral human societies, natural selection has favored the evolution of dedicated psychological mechanisms that serve to shape women's behavior in ways that, in the ancestral environment, would have reduced the likelihood of such victimization (Bröder & Hohmann, 2003; Chavanne & Gallup, 1998; Fleischman, Perilloux, & Buss, 2012; Garver-Apgar, Gangestad, & Simpson, 2007; Navarrete, Fessler, Fleischman, & Geyer, 2009; Petralia & Gallup, 2002; Thornhill & Thornhill, 1990). Beginning with Chavanne and Gallup (1998), many of these studies have employed women's self-reported behavior as a useful avenue for examining the predicted outputs of an evolved rape-avoidance mechanism. Seeking to add to a growing empirical literature that addresses this issue, McKibbin, Shackelford, Miner, Bates, and Riddle (2011) recently employed Floridian university women's self-reported behavior in testing four predictions that they derived from this perspective. This work is particularly noteworthy because it (1) employs a recently-developed survey instrument (McKibbin, Shackelford, Goetz, Bates, & Starratt, 2009), designed to advance the practice of investigating rape avoidance through the study of self-reported behavior, and (2) seeks to test a number of hitherto-unexplored facets of the idea that natural selection has crafted psychological mechanisms that shape rape-avoidance behavior.

We share McKibbin et al.'s view that an evolutionary approach can shed substantial light on human sexual behavior in general, and on the domain of sexual coercion in particular. Likewise, we concur that the basic logic of the evolved rape-avoidance thesis is both cogent and compelling (see, for example, McDonald, Asher, Kerr, & Navarrete, 2011; Navarrete et al., 2009; Snyder et al., 2011). Importantly, however, whenever evolutionary endeavors posit novel mechanisms above and beyond those long-documented in general psychology, such efforts must be held to a high standard of rigor, as the evidentiary bar is necessarily higher when arguing for newly-positing mechanisms than when adding to an already-voluminous body of evidence. Such high standards are particularly

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important when investigating a topic that is of grave societal import, as is the case here. McKibbin et al.'s work is the latest component in a small but growing corpus of research employing self-reports of behavior to probe the features of evolved rape-avoidance mechanisms. Because McKibbin et al.'s effort was one of the first applications of a recently-developed survey instrument, and because investigators working in an expanding area of research often employ such recently-developed measures, it is important to evaluate this instrument carefully. Likewise, because McKibbin et al. explored a number of hitherto-overlooked concomitants of the thesis that women possess evolved rape-avoidance mechanisms, it is useful to weigh their position in a timely manner. We therefore evaluated the logic of McKibbin et al.'s argument, and generated new empirical results regarding women's fear of rape that speak to the rape-avoidance behaviors addressed by McKibbin et al. We sought to both replicate and reexamine McKibbin et al.'s findings, employing both the instrument used by McKibbin et al. and additional methods that include two measures of fear of rape; in so doing, we also sought to employ a more diverse sample than that used by McKibbin et al., as there is reason to believe that some aspects of their findings might be parochial to university women.

Rape Avoidance and Fear of Sexual Assault

McKibbin et al. presented four discrete predictions, each derived from the premise that human female psychology includes evolved rape-avoidance mechanisms. We will explain each prediction, then evaluate the logic of the prediction, and finally test the prediction using our own data. Before doing so, however, it is necessary to first consider the relationship between the dependent measures used by McKibbin et al. and those that we employed.

Some of the members of the same research group previously published a survey instrument, the Rape Avoidance Inventory (RAI) (McKibbin et al., 2009). Like previous instruments (Bröder & Hohmann, 2003; Chavanne & Gallup, 1998) on which it was intended to improve, the RAI was designed to measure self-reported rape-avoidance behaviors; the instrument is composed of actions that Floridian university women reported employing in order to reduce their risk of sexual assault.

An evolved rape-avoidance mechanism could conceivably operate without involving the conscious mind. Although women in the aforementioned studies were readily able to rank various activities in terms of the risk of sexual assault that each entails, it is nonetheless possible that overt cognizance of such risks does not play a role in the decision-making process that leads to actual behavior. However, given that many aspects of anticipatory fear and anxiety are explicable in functional terms (Marks & Nesse, 1994; Öhman & Mineka, 2001), it is plausible that a mechanism that evolved in response to the fitness-reducing consequences of rape would function, at least in part, by shaping overt attitudinal fear, where such fear then motivates actions taken to avoid rape. If so, measuring women's fear of rape would constitute an alternate

means of testing the same predictions that interested McKibbin et al. Indeed, given that the RAI was developed from actions that women explicitly described as aimed at rape avoidance, even if some aspects of rape avoidance operate outside of conscious awareness, it is nevertheless reasonable to expect that women's expressed fear of rape corresponds with the extent to which they engage in the actions addressed in the RAI.

To be clear, we do not contend that all rape-avoidance behaviors performed by women are necessarily motivated by conscious intent. Nor do we contend that the existence of propositional knowledge about sexual assault in any way argues against the existence of an evolved psychological mechanism. Rather, we suggest that, because the risk of sexual assault is likely to have varied across environments in the ancestral past, such a mechanism is likely to have evolved to be sensitive to informational input in order to effectively calibrate its output to the given local environment. One source of such input might be propositional knowledge. Such a suggestion is in no way incompatible with theorizing in other areas of evolutionary psychology (e.g., Barrett, 2005), and is consistent with prior work on evolved rape defense given the extensive reliance on measures of self-reported behavior (Bröder & Hohmann, 2003; Chavanne & Gallup, 1998; Fleischman et al., 2012; McKibbin et al., 2009; see also Garver-Apgar et al., 2007). We do not claim to have quantified or fully described the likely complex relationship between propositional knowledge, fear, and the workings of an evolved rape avoidance mechanism. Rather, we simply suggest that such a relationship exists, and present data below that speaks to the association between conscious experience and rape avoidance behaviors.

Method

Participants

Using an Internet-based survey, we collected data from 333 women ranging in age from 18 to 79 years ($M = 31.59$; $SD = 12.79$). The study was advertised to women on craigslist.org in 160 regions across the U.S.; additional postings appeared on two websites used to advertise on-line psychological research, socialpsychology.org and psych.hanover.edu/research/exponent.html. Attrition and incomplete responses (particularly on the demographics section) were quite high, presumably because of the length of the study survey (123 items in all).

To be included in this study, persons had to verify their sex as female, indicate that their age was at least 18 years, and indicate that their sexual orientation included attraction to men. Hence, homosexual women and participants who declined to indicate their sexual orientation were excluded from analyses, as key items in the RAI address heterosexual sociosexual behavior, and are thus not applicable to homosexual women. This left a

final sample of 212 women. With regard to race, 53.2 % reported being White, with 12 % reporting being either African-American, Hispanic/Latino, Asian/Pacific Islander, Middle Eastern, Native American or “Other.” The sample was slightly less well-educated than the American public at large: 23.7 % reported having some college education short of a degree, 16.5 % reported having a bachelor’s degree, and 9 % reported having a master’s or professional degree, compared to 52.5 % of the U.S. populace that has some college education short of a degree, and 27.2 % that hold a degree (U.S. Census Bureau, 2004).

Measures

We asked women to report their level of concern with sexual assault and harassment, along with their concern regarding other forms of crime, on a modified version of the British Fear of Local Crime Survey (The Crime Reduction Centre, 2000). Using a scale of 1–4 (1 = not at all worried, 2 = not very worried, 3 = fairly worried, 4 = very worried), participants were instructed to “identify your level of concern about the possibility of this happening” for each of a variety of crimes and other forms of victimization. Relevant to the current discussion are the items “Being sexually assaulted” and “Being sexually harassed (unwanted advances such as ‘cat calls’ or unsolicited sexual propositions).”

In addition, participants were asked to complete the Fear of Rape Scale (FORS) (Senn & Dzinis, 1996). The FORS is a 30-item questionnaire including Likert-type scale items such as “I am wary of men,” “I am afraid of being sexually assaulted,” and “I would feel safe walking to my car alone if it was parked in an underground parking lot.” The response scale is anchored by 1 = strongly disagree and 7 = strongly agree, with 4 = don’t know/not applicable at the midpoint. All items form one scale with high inter-item reliability and construct validity (see Senn & Dzinis, 1996).

Participants were also asked to complete McKibbin et al.’s (2009) RAI. The instrument consists of 69 Likert-type questions for which participants indicate how often they engage in such behaviors as: “avoid men with a reputation for forcing themselves on women,” “avoid wearing revealing clothing,” “leave

television or music on when I’m home alone,” and “look around before I get out of my car.” The response scale is anchored by 1 = never and 7 = always, with 4 = sometimes at the midpoint. The questionnaire yields four subscales titled: “avoid strange men,” “avoid appearing sexually receptive,” “avoid being alone,” and “awareness of surroundings/defensive preparedness,” with high inter-item reliability. To the best of our knowledge, the construct validity of this instrument has not been tested.

We have suggested a link between fear of sexual assault and rape-avoidance behaviors. In addition, we have argued that evaluating fear of sexual assault can be an alternative to testing rape-avoidance behaviors directly; that is, we suggest that concern with sexual assault is related to rape-avoidance behaviors. Hence, evaluating fear of rape might serve as an alternative method of testing McKibbin et al.’s (2011) predictions, and it is appropriate to directly test and report the extent to which the three methodological tools are related. To this end, we conducted a test of correlation between the three testing instruments. In addition, we tested the associations between the instruments and our demographic variables.

Results and Discussion

Correlation analysis revealed the following relationships between the three main dependent measures: the single item, “Concern with sexual assault” was weakly correlated with the RAI and moderately correlated with the FORS; the RAI and FORS were strongly correlated with one another (see Table 1). We interpret the correlation between the FORS and the RAI as evidence that the two questionnaires are similar measurement instruments. This in turn suggested that it is appropriate to use the FORS to retest predictions that McKibbin et al. previously tested using the RAI. There is no apparent relationship between women’s race and income level with the instruments; however, the participant’s level of education is negatively correlated with responses on the FORS and RAI (See Table 1). This decrease in scores on the FORS and RAI with higher levels of education is not surprising, as fear of crime (more generally) tends to decrease with education (LaGrange, Ferraro

Table 1 Correlations between dependent measures and demographic variables

Measure	Fear of sexual assault	FORS	RAI	Race	Education level	Income	Age
Fear of sexual assault	–	.44**	.24**	.11	–.11	–.10	–.22**
FORS		–	.72**	.03	–.17*	–.04	–.01
RAI			–	.02	–.23**	–.04	.14*
Race				–	.04	–.09	–.12
Education Level					–	.20**	.12
Income						–	.15*
Age							–

* $p < .05$ (two-tailed)

** $p < .01$ (two-tailed)

& Supancic, 1992). Although the reason for this association is not entirely clear, education appears to decrease the perception of the risk of being victimized (see also Rountree, 1998). Age is negatively correlated with the single item, “Fear of sexual assault,” not correlated with the FORS, and positively correlated with the RAI. We will discuss the effects of age below.

McKibbin et al.’s Prediction 1

Reasoning that, “because attractiveness in women more than men is an indicator of fertility and expected future reproduction,” McKibbin et al.’s first prediction was that women’s rape-avoidance behaviors would vary according to individual attractiveness: “If women’s psychology includes mechanisms that motivate rape avoidance behaviors, then more attractive women may be more motivated to perform rape avoidance behaviors” (p. 344). McKibbin et al. thus implied the existence of a specialized evolved cognitive mechanism that processes rape risk based on a woman’s own attractiveness. Although McKibbin et al. did not fully articulate their reasoning, we believe that it is indeed logical to suggest that a well-designed rape-avoidance mechanism would be sensitive to input concerning the actor’s level of risk. Hence, in our view, a woman’s perceived risk, indexed by fear, should allow her to calibrate her behaviors toward the optimum, balancing the benefits of rape avoidance against the costs of cautious behaviors that restrict potential mating opportunities and resource acquisition behaviors. Indeed, it is precisely this type of calibration that seems to underlie changes in rape-avoidance behaviors as a function of conception risk across the menstrual cycle (Cahavanne & Gallup, 1998; Durante, Li, & Haselton, 2008).

Unfortunately, while McKibbin et al.’s logic was cogent in postulating that evolved mechanisms would calibrate rape avoidance as a function of risk, the test employed by McKibbin et al. did not rule out alternative explanations. Although such a specialized mechanism might well exist, finding that attractiveness correlates with rape avoidance does not clearly offer support for this postulation, as such a correlation would be expected given nothing more than the ability to learn from past experience. Attractiveness is likely to be positively correlated with having previously experienced unwelcome sexual attention; hence, it is not necessary to postulate a specialized mechanism in order to explain why more attractive women will be more cautious in this regard—while the observed correlation is consistent with such a mechanism, it is also consistent with generalized learning, and thus cannot be used to adjudicate between the two. In order to flesh out the possibility that negative experience plays a role in this regard, we conducted additional analyses, examining experiences with sexual harassment.

Reexamining McKibbin et al.’s Prediction 1

Given that women’s attractiveness is highly age-dependent (Kenrich & Keefe, 1992; Menkin, Trussell, & Larsen, 1986), we suggest that younger women are likely to receive a greater amount of unwanted sexual attention than are older women, resulting in experiences that indicate to a woman that she is at higher risk of sexual assault. Hence, cautious behavior may be the result of simple experience. We were able to test the possibility that younger women receive a greater amount of unwanted sexual attention with our data by using age as a predictor of sexual harassment in a linear regression model.

Our results were consistent with the notion that the relationship between attractiveness and rape avoidance was driven by experience. Concern with sexual harassment was negatively correlated with age, $b = -.022, t(208) = -4.43, p < .001$. Age also explained a significant proportion of variance in reports of concern with sexual harassment, $R = .086, F(1, 208) = 19.59, p < .001$. (Lower N ’s reflect the number of women that skipped questionnaire items). In addition, concern with sexual harassment was not correlated with any demographic variables besides age. In short, women in our sample who were younger, and thus presumably more attractive, appeared to suffer greater harassment, experiences that would readily provide the basis for simple learning. As a woman ages, she presumably experiences less sexual harassment, and a lack of reinforcement could then lead to the diminution of behaviors based on previous learning experiences.

Our results paralleled McKibbin et al.’s finding that self-perceived attractiveness was correlated with two subscales of the RAI. Although both sets of findings could be read as evidence in support of the existence of an evolved mechanism that calibrates rape-avoidance behavior as a function of the risk of assault, both can also be (more parsimoniously) read as evidence that general-purpose learning mechanisms lead people to take precautions based on the frequency and intensity of unpleasant experiences in the recent past.

McKibbin et al.’s Prediction 2

Thornhill and Thornhill (1990) argued that, in addition to costs intrinsic to sexual assault, women who are in committed socio-sexual relationships face an additional potential cost of sexual assault not faced by single women, namely that their partner may abandon them if the partner misinterprets the sexual assault as infidelity. Correspondingly, Thornhill and Thornhill provided evidence that mated women report more psychological pain following rape than do unmated women. Following Thornhill and Thornhill’s logic, McKibbin et al. predicted that women in relationships would evince higher scores on the RAI than those

who were single. In contrast to McKibbin et al.'s Prediction 1, this prediction allows for an unambiguous test of a theory derived from an evolutionary perspective, as, to our knowledge, no such prediction is readily derivable from non-evolutionary approaches to the mind.

McKibbin et al. reported that relationship status was positively correlated with rape-avoidance behaviors. This effect appeared to be driven by the correlations between being in a long-term relationship and the *Awareness of Surroundings/Defensive Preparedness* and *Avoid Appearing Sexually Receptive* subscales of the RAI. We attempted to retest this prediction with our three dependent measures using relationship status as an independent measure.

Although relationship status is a legitimate variable to use when exploring issues of rape avoidance, for a number of reasons, it is improved by also considering co-residence. First, because of the threat of infidelity, a male partner may seek to mate guard, that is, to regulate his partner's opportunities to interact with other men (Wilson & Daly, 1992). A man who has been able to exercise greater control over his partner's sexual behavior is more likely to abandon her if he suspects infidelity than is a man who has been content with a lower level of such control. Proximity likely plays a key role in this regard; hence, co-residence is a better index than simple relationship status in exploring rape-avoidance behavior that stems, in part, from the risk of abandonment. Second, for many cultural groups in the U.S., with or without marriage, co-residence marks an important increase in the degree to which the couple views their relationship as durable and exclusive (indeed, the act of co-residing is itself something of a commitment device); hence, there will likely be important differences in degree of commitment between women who co-reside with their partners and those who do not. Degree of commitment can influence actions, such as seeking new male acquaintances and interacting with newly-acquainted men, which are addressed by the RAI. Finally, due to time constraints, the extent to which women engage in a variety of activities may be contingent on the amount of time that they spend with their mate, and the latter will generally be greater when the two co-reside than when they do not. In light of these considerations, we differentiated between women co-residing with a romantic partner, those in a relationship but not co-residing, and those not in a relationship.

Reexamining McKibbin et al.'s Prediction 2

In order to test McKibbin et al.'s second prediction, that mated women would perform more rape-avoidance behaviors, we compared both relationship status and co-residence with our three dependent measures: fear of sexual assault (a single item), the FORS, and the RAI. Upon finding that we could not replicate McKibbin et al.'s finding using co-residence as an independent measure, for reasons described below, we then retested a modified version of the RAI.

Using *t*-tests, we found that women in our sample who stated that they were in a relationship reported neither more nor less fear of sexual assault than did those who stated that they were single nor did scores on the FORS differ significantly between these two classes. Similarly, failing to replicate McKibbin et al.'s finding, relationship status did not yield significant mean differences in RAI scores (see Table 2).

We did find a significant effect of co-residence when using the RAI as a dependent measure in a one-way ANOVA ($p = .054$) (see Table 3). Pairwise comparisons of the three groups with Bonferroni correction indicated a mean difference ($p = .09$) between women in a relationship but not co-residing ($M = 4.75$, $SD = .89$) and women co-residing with their romantic partners ($M = 5.09$, $SD = .79$). There was not a significant mean difference between women not in a relationship ($M = 4.88$, $SD = .78$) and women in a relationship—co-residing or not. In contrast to results obtained with the RAI, however, using our other dependent measures, we found that there was no significant difference in concern with sexual assault between women who lived with a

Table 2 Effects of relationship status on dependent measures

	In a relationship		<i>t</i>	<i>df</i>
	Yes M (SD)	No M (SD)		
Fear of sexual assault	2.54 (.98)	2.47 (.94)	<1	200
FORS	4.27 (1.11)	4.11 (1.07)	<1	206
RAI	5.01 (.82)	4.85 (.80)	1.41	207

Table 3 Summary of ANOVA for co-residence with romantic partner \times dependent measures

Dependent measure	Sum of squares	<i>df</i>	Mean square	<i>F</i>
Sexual assault				
Between groups	.04	2	.02	<1
Within groups	190.68	200	.95	
Total	190.72	202		
FORS				
Between groups	2.66	2	1.33	1.11
Within groups	247.84	206	1.20	
Total	250.50	208		
RAI				
Between groups	3.82	2	1.91	2.97*
Within groups	133.89	207	.65	
Total	137.71	209		

* $p < .10$

romantic partner/spouse and those who do not live with their partners nor did scores differ between these two classes on the FORS (see Table 3).

The lack of any effect of co-residence on either of our two measures of fear of rape was striking, particularly given the high correlation between the FORS and the RAI. Importantly, McKibbin et al. acknowledged that they “cannot conclusively argue that mated women perform more rape avoidance behaviors.” Rather, we suggest that mated women’s differing response pattern to the RAI was likely an artifact of the inclusion of items describing actions that were generally outside the realm of culturally prescribed behaviors for mated women in the U.S.

We tested the aforementioned possibility by removing items from the RAI that had poor face validity for women in relationships. The following 10 items were removed: “Avoiding meeting men from the internet;” “Avoid blind dates;” “Avoid leading men on sexually;” “Avoid going out alone with a man I don’t know;” “Avoid ‘making out’ with a man I have just met;” “Avoid talking to men I don’t know;” “Avoid teasing men by making sexual comments;” “When I go out, I stay with at least one person that I know;” “Let friends or family know where I am going when I go out;” and “When I go out, I go with at least one male friend.”

Removing these items slightly increased the overall correlation between the FORS and RAI, $r = .74, p < .001$. Moreover, when the one-way ANOVA was repeated using the co-residence variable as an independent measure and the modified RAI as a dependent measure, the results were no longer significant at the .05 level ($p = .097$). These patterns suggest that, rather than constituting support for Thornhill and Thornhill’s thesis, McKibbin et al.’s claim that mated women take greater pains to avoid rape could be a methodological artifact, a consequence of the fact that the RAI may be an inappropriate instrument for measuring rape avoidance in women in relationships.

McKibbin et al.’s Prediction 3

In order to protect their own inclusive fitness interests from the costs entailed by sexual coercion, a woman’s kin can be expected to attempt to both protect her and regulate her behavior so as to reduce the risk that she will be raped. Against this backdrop, McKibbin et al. predicted that women’s rape avoidance behaviors would be positively correlated with the number of kin living in close proximity. Using the RAI, they found just such a correlation.

While McKibbin et al.’s interpretation of their finding is plausible, it nevertheless overlooks a potential alternate explanation, namely that women who are more fearful of rape maintain closer proximity to kin; in this model, proximity to kin is a manifestation, rather than a cause, of rape-avoidance behavior. Our data allowed us to test between these two possibilities. If fear drives proximity, then we can expect higher fear of rape among women living with one or more parent in comparison to women not living with parents. In addition, because, being larger and stronger, fathers can provide their daughters with greater direct protection from sexual assault

than can mothers, we can expect that, if fear drives proximity, among women who live with a single parent, those who live with their fathers will be more fearful than those who live with their mothers.

Reexamining McKibbin et al.’s Prediction 3

We analyzed residence patterns (not living with any parent, living with mother only, living with father only, and living with both parents) as an independent measure in three one-way ANOVA tests: one employing concern with sexual assault as a dependent measure, a second using the FORS as a dependent measure, and a third using the RAI as a dependent measure. Because a co-resident male partner can be expected to perform similarly to kin on many of the above dimensions, so as to prevent relationship status from masking any effect of proximity to kin, we also replicated the latter ANOVA tests using only participants who did not co-reside with a romantic partner.

In addition, because education level was correlated with the FORS and RAI (see Table 1), we conducted an additional analyses examining the effects of education. Further complicating this analysis, education level was also found to be correlated with co-residence with kin ($r = -.18, p = .008$). This pattern indicates that the higher a women’s education level, the less likely she is to co-reside with her parents and the lower her scores on the FORS and RAI. Therefore, we examined the predictive values of both co-residence and education level on the FORS and RAI in two regression models among women not co-residing with a romantic partner.

All six ANOVA tests and two tests of regression produced null results (see Tables 4, 5, 6, 7). It is possible that fear and protection canceled each other out (i.e., more fearful women live with kin, but the latter provide protection that assuages fear, resulting in no net differences in fear across residence patterns). Similarly, it is possible that claustrating relatives restrict some women’s actions,

Table 4 Summary of ANOVA for co-residence with family \times dependent measures

Dependent measure	Sum of squares	df	Mean square	F
Sexual assault	3.25	3	1.08	1.16
Between groups				
Within groups	185.13	198	.94	
Total	188.38	201		
FORS				
Between groups	2.43	3	.81	<1
Within groups	239.55	204	1.17	
Total	241.99	207		
RAI				
Between groups	.599	3	.20	<1
Within groups	132.91	205	.65	
Total	133.50	208		

Table 5 Summary of ANOVA for co-residence with family \times dependent measures among women not co-residing with a romantic partner

Dependent measure	Sum of squares	df	Mean square	F
Sexual assault				
Between groups	3.34	3	1.16	1.14
Within groups	96.12	98	.98	
Total	99.46	101		
FORS				
Between groups	1.15	3	.38	<1
Within groups	124.61	105	1.19	
Total	125.75	108		
RAI				
Between groups	1.40	3	.47	<1
Within groups	68.58	105	.65	
Total	69.73	108		

Table 6 Summary of multiple regression analysis for variables correlated with the FORS among women not co-residing with a romantic partner

Variable	B	SE	β	t	p
Live with parents	.031	.099	.031	<1	ns
Education	-.055	.070	-.079	<1	ns

$R^2 = .008$

Table 7 Summary of multiple regression analysis for variables correlated with the RAI among women not co-residing with a romantic partner

Variable	B	SE	β	t	p
Live with parents	.037	.073	.050	<1	ns
Education	-.021	.052	-.039	<1	ns

$R^2 = .008$

while formidable relatives provide an umbrella of protection that allows other women to act more freely, and these two effects could cancel each other out. Such speculations aside, however, no matter how we parsed the data, and whether we used the RAI scale or a proven alternative, we were unable to find any effect of co-residing with kin. These patterns were contrary to that which we expected given McKibbin et al.'s positive correlation between kin proximity and rape-avoidance behaviors. We add that, although our results indicate that education level co-varies with fear of crime and family co-residence, this co-variation may not be apparent if researchers restrict their study to a university sample.

McKibbin et al.'s Prediction 4

Because fertility decreases with age and, correspondingly, older women are less likely to be the victims of sexual assault, McKibbin et al. predicted that rape-avoidance behaviors would decrease with

age. Following the same rationale that we presented in discussing Prediction 1, we concur that this is sound evolutionary reasoning. However, as we also noted in discussing Prediction 1, the same prediction can be readily generated without the need to postulate dedicated, domain-specific evolved psychological mechanisms: if (1) caution is a product of past experience, (2) the degree of unwelcome sexual attention is proportional to attractiveness, and (3) attractiveness declines with age, then simple learning alone would produce the predicted pattern of results.

Before comparing our findings to those of McKibbin et al., it is important to note that, for the purposes of testing predictions regarding the effects of age, along the critical dimension of age, our sample differed from McKibbin et al.'s, and, arguably, was more representative of the population than was the latter's university sample (for general discussion of the problems, see Henrich, Heine, & Norenzayan, 2010). Whereas McKibbin et al. reported that 80 % of their participants were 29 years of age or younger, our sample, covering a broader age range, was also notably older—80 % of our participants were 42 years of age or younger.

Reexamining McKibbin et al.'s Prediction 4

We retested McKibbin et al.'s prediction, using age as a predictor of our three dependent measures in three separate regression analyses. Whereas McKibbin et al. failed to find support for the predicted effect of age, our analyses revealed mixed results. Using age as a predictor of the item "concern about the possibility of being sexually assaulted," we found a significant decrease in fear with older age, $b = -.017$, $t(203) = -3.16$, $p = .002$. Age also explained a significant proportion of variance in reports of concern with sexual assault, $R^2 = .047$, $F(1, 203) = 9.97$, $p = .002$. However, the same pattern did not appear in an examination of scores on the FORS using age as a predictor. Given that "concern about the possibility of being sexually assaulted" is a single item, whereas the FORS consists of multiple items with strong internal validity, the preponderance of evidence suggests that age likely does not diminish fear of rape. We speculate that the reduced sexual harassment that occurs with increasing age may be counterbalanced by increased sensitivity to risk, resulting in no net change with age.

How do these results compare with those obtained using the RAI? Although we found a significant effect of age on RAI scores, the effect was in the opposite direction to that predicted by McKibbin et al., as RAI scores increased with age, $b = .009$, $t(210) = 2.08$, $p = .038$. Age also explained a significant proportion of variance in RAI scores, $R^2 = .020$, $F(1, 210) = 4.35$, $p = .038$. McKibbin et al. found a similar trend in which the *Avoid Appearing Sexually Receptive* subscale of the RAI was positively correlated with age—the opposite of the predicted relationship. We therefore examined the RAI subscales, finding that, in our sample, age was positively correlated with both the *Avoid Appearing Sexually Receptive* and the *Avoid Strange Men* subscales (see Table 8). Age is correlated with income (see Table 1), so it could be

Table 8 Correlations between RAI subscales and age ($N = 211$)

Measure	Avoid strange men	Avoid appearing sexually receptive	Avoid being alone	Awareness and preparedness	Age
Avoid strange men	–	.73**	.65**	.51**	.23**
Avoid appearing sexually receptive		–	.57**	.36**	.28**
Avoid being alone			–	.57**	–.07
Awareness and preparedness				–	.00
Age					–

** $p < .01$ (two-tailed)

the case that higher income yields lower risk of rape (perhaps by living in safer neighborhood), but this interpretation seems unlikely because adding income to the above regression models does not change the patterns of significance.

How are we to reconcile the fact that, on the one hand, age had little effect on fear of rape and yet, on the other hand, opposite to predictions, age had a positive effect on one or more of the rape-avoidance behaviors measured by the RAI? The answer likely lies in the fact that, as McKibbin et al. themselves acknowledged, many of the activities addressed by the RAI, particularly the items in the *Avoid Appearing Sexually Receptive* and the *Avoid Strange Men* subscales, are part of a lifestyle that changes with age for reasons having nothing to do with rape avoidance. In short, many of the behaviors included in the RAI can be viewed as over-determined. For example, there are many reasons why a woman might avoid staying out late, avoid using drugs and alcohol, avoid wearing revealing clothing, and avoid teasing men by making sexual comments. Some of these reasons likely vary systematically with age, yet are not specific to rape avoidance (e.g., decreased sensation-seeking; age-contingent cultural norms; increased concern with professional advancement). The age-bounded nature of the RAI is not surprising given that the behaviors in the RAI were nominated by young U.S. college women, and, correspondingly, appear to be most relevant to young U.S. college women. In short, the RAI may apply best to samples that are culturally and demographically similar to that from which it sprang originally.

General Discussion

In sum, we have reservations about McKibbin et al.'s recent study. First, we question the utility of invoking postulated evolved mechanisms to explain patterns that can be understood in terms of simple learning and self-evidently true phenomena. This position is in no way intended to question the utility of evolutionary perspectives on human sexuality in particular or on human behavior in general. Rather, we merely point out that claims regarding the existence of specialized, complex cognitive architecture should be substantiated by evidence that reflects specialized design features—this is

not a radical requirement, but rather stems directly from the central tenets of an adaptationist approach to the mind (see, e.g., Barrett, 2008).

Second, we question the utility of the RAI. In their original publication on this instrument, McKibbin et al. (2009) called for researchers to “investigate the psychometric properties of the RAI, including examining its reliability and validity with data from larger, more diverse samples.” We have done so, and have found evidence suggesting that the RAI may be most relevant to women who are young and single. Third, testing predictions explored by McKibbin et al. using a more diverse sample, and a more valid instrument, we failed to find supporting evidence for the conclusions reached by McKibbin et al.

It is important to acknowledge two important limitations of our work. First, as we stated initially, an evolved rape-avoidance mechanism could conceivably operate without involving the conscious mind, including the shaping of behavior independent of both conscious thoughts regarding the possibility of rape, and the conscious experience of anticipatory fear in this regard. While it is undeniably true that many evolved psychological mechanisms operate wholly outside of awareness, it is also true that humans are acutely cognizant of threats to fitness that were recurrently present in the environments in which our species evolved (Marks & Nesse, 1994), often even over-perceiving such threats in an adaptive manner (Haselton & Nettle, 2006). We therefore think it likely that evolved mechanisms that regulate rape-avoidance behavior operate through changes in cognizance of the risks of sexual assault entailed by different actions, with attendant changes in fearfulness. However, we cannot rule out the possibility that conscious thoughts and feelings in this regard are merely epiphenomenal, in which case, despite the similarities—and strong correlations—between the FORS and RAI, the methods that we have employed here would not suffice to test the predictions at issue.

Second, although we have described the ways in which we believe our sample is superior to McKibbin et al.'s (2011) sample, we acknowledge that our own sample was not a representative one. For example, our sample was less educated than the U.S. population, and may vary systematically from the U.S. population in ways that are not apparent to us.

McKibbin et al. strived to address a vital topic. Sexual violence, and the steps that people take to avoid it, are issues of the utmost importance. We therefore urge these and other scholars of the subject to exercise their considerable expertise in the most rigorous fashion possible.

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