Autonomic Arousal in the Presence of Psychopathy: A Survey of Mental Health and Criminal Justice Professionals

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ABSTRACT. The authors analyzed 584 questionnaires from mental health and criminal justice professionals in 12 U.S. cities concerning their physical reaction while interviewing a psychopathic subject. Of the respondents who had interviewed a psychopathic subject, 77.3% reported a physical reaction. Their narratives describe a physiological change, most often dermatological and least often pulmonary, due to likely sympathetic activation of their autonomic nervous system. Female respondents were significantly more likely to have a physical reaction when compared to male respondents; criminal justice professionals were significantly less likely to have a physical reaction when compared to mental health professionals. No other demographic variables showed significant differences. The data are interpreted as suggestive evidence of a primitive, autonomic, and fearful response to a predator, and understood in the context of: (a) other evolutionary and ethological findings concerning such an evolved defense against an interspecies or intraspecies threat; and (b) the demonstrable finding in other research studies of fre-

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quent predatory violence among psychopathic subjects, whom the authors consider an intraspecies predator.

KEYWORDS. Psychopathy, autonomic arousal, mental health professionals, criminal justice professionals

Clinical lore is replete with professionals' reports of strange and startling visceral responses to psychopathic individuals. Such spontaneous utterances as "the hair stood up on my neck," "he gave me the willies," "he made my skin crawl," and "got goose bumps" are the poetics of such encounters with certain subjects, variously diagnosed as psychopathic, sociopathic, or antisocial personalities (Millon, 1998). Psychoanalysts would describe these phenomena as countertransference (Racker, 1968), and a number of psychoanalytic clinicians have written about such reactions to the psychopathic individual (Symington, 1980; Lion, 1978; Strasberger, 1986; Meloy, 1988; Gabbard, 1990). Meloy (1988) took a more evolutionary-ethological approach, and described such visceral reactions as "the primitive, autonomic, and fearful response to a predator" (p. 70).

In all mammals autonomic arousal prepares the threatened object to either fight or flee (McDougall, 1921). In the nineteenth century both Thompson (1851) and Darwin (1872) described some of the physiology and behavior of flight or attack. Selye (1950) noted the neurochemical and hormonal changes that subserve the fight-flight response as central to the "general adaptation syndrome" of alarm, resistance, and then exhaustion. Such avoidance, flight, and defensive responses continue to be researched in a variety of animal phyla, and fall under the rubric of fear and defense (Brain, Parmigiani, Blanchard & Mainardi, 1990). Threats take many forms, from the unexpected intrusion of an intraspecies competitor (a conspecific) who may challenge access to territory, food, or a mate, to the fear of being eaten by an interspecies predator. Animals, including humans, who succeed in warding off imminent threats to their well-being live another day and have a greater chance of reproducing and maintaining the viability of their genes across generations (Hinde, 1966).

Autonomic arousal to the psychopathic individual, however, has never been systematically investigated. Such anecdotal reports could just be products of metaphor, myth, or fantasy, and have no scientific basis. On the other hand, such comments could hint at a widespread and evolved defense, albeit with individual differences, to a particularly dangerous character pathology that is psychobiologically rooted in a fear of being prey to a predator. We decided to begin a study of this question through the use of a survey among mental health and criminal justice professionals.

METHODS

A one-page questionnaire was designed that defined *psychopathy* according to the two-factor analysis of the Psychopathy Checklist-Revised (Hare, 1991): an individual who has a callous and remorseless disregard for the rights and feelings of others *and* has a history of chronic antisocial behavior. Respondents were then asked to provide personal demographic information (age, gender, ethnicity, profession, and work setting) and answer two questions: (a) Have you ever interviewed a psychopathic individual? (b) Did you have a physical reaction while interviewing him or her? If both questions were answered affirmatively, the respondent was asked to describe the physical reaction in narrative form.

Questionnaires were distributed at the beginning of a seven-hour workshop for mental health and criminal justice professionals on psychopathy taught by the first author between January 1998 and June 1999 in 12 cities across the United States (Spokane, Washington; Kansas City, Missouri; Phoenix, Arizona; Las Vegas, Nevada; Ft. Lauderdale, Florida; Denver, Colorado; San Diego, California; Hartford, Connecticut; Columbus, Ohio; Chicago, Illinois; Salt Lake City, Utah; and Oakland, California). Questionnaires were collected prior to any workshop discussion of countertransference or autonomic reactivity to psychopathy. Chi-square analysis was used to determine if there were significant differences between groups according to demographic variables of age, gender, ethnicity, and profession. Significance was set at $p \leq .05$.

RESULTS

One thousand forty-seven questionnaires were distributed for an average of 87.25 across the 12 cities (range 50-121). Five hundred and

eighty-four questionnaires were returned (56%). Of those who responded, 464 (79.4%) believed they had interviewed a psychopath on at least one occasion, and usually no more than twice. Table 1 shows the demographic characteristics of the respondents.

Gender was almost evenly divided (one respondent's gender was unknown). Age ranged from 23-73, with a mean age of 43.66 (SD = 10.46). Ethnicity was mostly Caucasian (88.5%) and not representative of the 1990 U.S. Census (1990). Due to the relatively small percentage of non-Caucasians (10.5%), statistical analysis of ethnicity only compared Caucasian verses non-Caucasian.

Almost half (44.7%) of the respondents were doctoral level, either MD psychiatrists or PhD psychologists, while 17.5% were law enforcement (probation, parole, or police). The respondents worked in a prison (25.1%), a forensic hospital (5.6%), a civil psychiatric hospital (8.2%), an outpatient mental health clinic (40.1%), or a probation/parole agency (14.8%).

Three hundred and fifty-nine (77.3%) respondents reported a physical reaction while interviewing a psychopathic subject. Those respondents' questionnaires in which any physical reaction was noted were tested using chi-square to determine if age, gender, ethnicity, or profession affected the results (see Table 2).

Neither age (across three groups, see Table 1) nor ethnicity (Caucasian verses non-Caucasian, see Table 1) showed any significant differences. There was a significant difference for gender, with females significantly more likely to physically react (83.6%) than males (71.3%) (χ^2 [$df = 1, N = 463$] = 10.20, $p < .001$). There was also a significant difference for profession, with law enforcement significantly less likely to react (60.8%) than master's/bachelor (83.6%) or doctoral (77.9%) level clinicians (χ^2 [$df = 2, N = 462$] = 14.18, $p < .001$).

Narratives of respondents who did report a physical reaction were coded across eight categories of systems as listed in Table 3. Definitions and examples are as follows.

Perceptual–any report of a hypervigilant state, dissociation, feeling "on guard," or avoiding eye contact with the subject. Examples: "like a bell went off in front of me," "Felt outside myself . . . dissociated . . . numb."

Gastrointestinal–any report of nausea, stomach upset, queasiness, a "sick feeling" in the stomach, tightness in the stomach, or visceral reaction related to the esophagus, stomach, or colon. Examples: "sick to my stomach," "Stomach felt like I swallowed cement," "Iciness . . . freezing

TABLE 1. Demographics of Survey Respondents (N = 584)

	Total Returns (*N* = 584)		Returns/Interview/ No Reaction (*N* = 105)		Returns/Interview/ Reaction (*N* = 359)	
	N	%	*N*	%	*N*	%
Gender						
Male	273	46.7%	66	63.5%	164	45.7%
Female	310	53.1%	38	36.5%	195	54.3%
Missing	1		1			
Age (Mean = 43.66, SD = 10.46, Range 23-73)						
20-39	202	34.6%	38	36.2%	108	30.3%
40-49	340	58.2%	30	28.6%	138	38.8%
≥ 50	38	6.5%	36	34.3%	110	30.9%
Missing	4		1		3	
Ethnicity						
Caucasian	517	88.5%	97	92.4%	322	91.2%
Black	15	2.6%	1	1.0%	9	2.5%
Hispanic	26	4.5%	4	3.8%	10	2.8%
Asian	9	1.6%	0	0%	5	1.4%
Native American	1	0.2%	2	1.9%	1	0.3%
Other	9	1.6%	1	1.0%	6	1.7%
Missing	7		0		6	
Profession						
Doctor	261	44.7%	53	50.5%	187	52.4%
Master/Bach.	219	37.5%	25	23.8%	128	35.9%
Law Enforcement	102	17.5%	27	25.7%	42	11.8%
Missing	2		0		2	
Work Setting						
Prison	144	25.1%	28	27.2%	100	28.3%
Forensic Hospital	32	5.6%	6	5.8%	23	6.5%
Civil Hospital	47	8.2%	10	9.7%	22	6.2%
Outpatient	230	40.1%	35	34.0%	151	42.8%
Probation/Parole	85	14.8%	22	21.4%	36	10.2%
Other	35	6.1%	2	1.9%	21	5.9%
Missing	9		1		6	

Interview = Interviewed a psychopath.

No React = No reported physical reaction during the interview.

React = Reported a physical reaction during the interview.

TABLE 2. Chi-Square Results for Respondents Who Interviewed a Psychopath and Reported any Physical Reaction Crossed with Four Demographic Variables

Demographic Variable	df	N	χ^2	p
Age				n.s.
Gender	1	463	10.20	.001
Males		164		
Females		195		
Ethnicity				n.s.
Profession	2	462	14.18	.001
Doctor		187		
Master/Bach.		128		
Law Enforcement		42		

of my inner stomach," "Like I'd been eviscerated," "Gut reaction of cold disbelief."

Muscular–any report of muscle tightness, tenseness, particularly in the jaw, fists, shoulders, or neck. Examples: "Unnerving," "Paralyzed," "Frozen with fear," "Shaky, tired," "My jaw clenched."

Pulmonary–any report of shortness of breath, difficulty breathing, shallow or rapid breathing. Examples: "I couldn't breathe," "I couldn't catch my breath."

Fight/flight–any report of wanting to flee, escape, fight, kill, or increased adrenalin. Examples: "laying low position," "Felt like I might be lunch," "Get out," "Like a deer caught in the headlights," "Felt like I was in extreme danger," "Defensive threat posture."

Cardiovascular–any report of heart rate acceleration, sweating, flushing of the face, racing or pounding heartbeat. Example: "My heart was pounding."

Dermatological–any report of surface changes on the skin, such as goosebumps, chills, piloerection, tingling sensations, changes in temperature on the skin, sensations of coldness or hotness. Examples: "Felt soiled," "I experienced the ride somatically," "My skin was crawling, chilled, cold," "A physical chill," "He made my skin crawl," "He got my hackles up."

Other Nonspecific–any report that did not relate to a specific physiological system. Examples: "Overall ill at ease," "Tired, angry, headachy,"

"General anxiety," "Safety concerns," "Feeling like prey," "Disgust . . . repulsion . . . fascination," "Highly stimulated," "Creeped out," "Feeling of evil," "A rush, like being bathed in a golden light," "An evil essence passed through me," "Felt like an object, a nonentity."

Coding for these systems was not done independently by each author. When differences occurred, they were discussed until agreement upon assignment was reached. Table 3 indicates that the most common reaction was dermatological (33.1%). Pulmonary was the least common reaction (7.0%). The number of reactions exceed the number of subjects due to multiple reactions being reported and coded.

Each system was tested for differences across age, gender, ethnicity, and profession using chi-square. No significant differences were found except for muscular reaction, with non-Caucasians significantly more likely to report (100%, $N = 9$) than Caucasians (63.4%, $N = 59$) ($\chi^2[df = 1, N = 102] = 4.94, p < .05$). This difference should be interpreted with caution due to the small number of non-Caucasians in this group, the number of chi-square tests done, the absence of a significant difference when general reactivity was compared between ethnic groups, and our failure to control for the ethnicity of the psychopathic subject being interviewed.

DISCUSSION

This study has many limitations. The respondents were not randomly selected, therefore delimiting the generalizability of our results. We sampled only professionals, and did not have a corresponding sample of nonprofessionals, or for that matter, members of the general public. Although we made a concerted effort to not contaminate answers to our questionnaire with information provided during the workshops, we could not control for countertransference readings or other readings on psychopathy by the respondents *prior to* the workshops. To our knowledge, however, discussion of this particular phenomenon we have investigated has only occurred in a very few publications, beginning with Meloy (1988). Most importantly, we did not measure important aspects of our independent variable, *psychopathy*: how the respondents applied the definition, whether they knew the interviewee was psychopathic before or after their interview, whether they used an instrument like the PCL-R (Hare, 1991) to determine if the interviewee was a "psychopath" (a score on the PCL-R ≥ 30), the exact location of the interview, the rea-

TABLE 3. Respondents' Physiological Reactions by System in Descending Order of Frequency While Interviewing a Psychopath

System	N = 359 Respondents	%
Dermatological	119	33.1%
Perceptual	88	24.5%
Gastrointestinal	88	24.5%
Muscular*	68	18.9%
Cardiovascular	56	15.6%
Other	51	14.2%
Fight/Flight	35	9.7%
Pulmonary	25	7.0%

*χ^2 ($df = 1$, $N = 102$) = 4.94, $p < .05$ for subjects who reported a muscular reaction crossed with ethnicity. Frequencies exceed number of subjects due to multiple reporting of physical reactions by some subjects.

son for the interview, the cumulative experience of the respondent with psychopathic subjects, the fallibility and subjectivity of both memory and self-reported internal states, and the specificity of the respondent's reactions.

Despite these many limitations, we think the findings have some empirical validity and are theoretically very interesting. Our empirical validity is supported by the high return rate for our survey (Federal Judicial Center, 2000), and the absence of difference among groups across most demographic variables, especially when we tested for significant difference across the eight categories of systems (Table 3). The theoretically intriguing aspect of our study is that the vast majority of respondents (77.3%) reported a physical reaction to a psychopath they interviewed; and without a specific suggestion, they narratively described a physiological change in some system in their body due to likely sympathetic activation of their autonomic nervous system (ANS).

Why did the respondents report such a reaction? There are a number of alternative explanations, none of which are very plausible: (a) the respondents had ANS reactions during all of their interviews with variously diagnosed individuals, and our finding is not specific to psychopathy; (b) other demographic and situational variables which we

did not measure accounted for their reactivity; (c) the respondents misinterpreted, exaggerated, or completely fabricated their ANS reactivity for unknown reasons; (d) none of the subjects they believed were psychopathic were, in fact, psychopathic; or (e) all the subjects they interviewed verbally threatened or physically assaulted them, accounting for their reported ANS reactivity.

Although these alternative explanations were not disproved, and further research of this phenomenon would mandate such testing, we think the most plausible hypothesis for their ANS reactivity is an evolved, defensive, and biologically based fear of being prey to an *intraspecies* predator.

It is an accepted principle of animal behavior that fear and defense are characterized by a relative activation of the sympathetic nervous system and quiescence of the parasympathetic portion of the autonomic nervous system (Wenger, Jones & Jones, 1956). Brain (1980) has written about the hormonal correlates of attack and defense and concluded that both cortical and medullary adrenal factors are implicated. He has also noted sex differences in fear and defense, which may account for the gender differences noted among our respondents (Brain, 1990). Edmunds (1974) noted that a defensive system in animals is comprised of sensory components to detect predators, motor components to facilitate active escape behavior, and structural components, such as armor plating or spines. Gray (1971) and others have written extensively about the heritability of fear and defense and its genetic determinants. Gray (1971) has also theorized that such reactions are caused by four general classes of events: intense stimuli, novel stimuli, dangers that are part of the evolutionary history of the species (fear of the dark, heights, or predators), and general fear produced by social threats from conspecifics. As Rodgers and Shepherd (1990) wrote, "organismic responses to environmental threat comprise a complex, yet integrated, set of physiological and behavioral adaptations. The former include changes in cardiovascular, respiratory, and sensorimotor function while the latter encompass contextually-driven reactions such as freezing, flight and defensive threat/attack" (p. 219). Ohman (1986) argued that fear and defense are phylogenetically old systems because predatory pressures have had an influence on gene pools throughout history. Fear of reptiles is probably the prototypic fear among mammals, and has contributed to the evolutionary development of a biologically-based predatory defense system.

What is the nature of the threat in an interview with a psychopathic subject? Thirty years of research have supported the theory of two bio-

logically-based modes of violence in mammals: affective and predatory (Mirsky & Siegel, 1994). Affective violence is an emotionally based response to an imminent threat that is accompanied by autonomic arousal, for which many of our respondents may have been instinctually preparing in their physical reactivity to the presence of a psychopathic individual. Affective violence serves the individual's survival. Predatory violence is planned, purposeful, emotionless, and without autonomic arousal. It is evolutionarily rooted in hunting. It also serves individual survival. The distinctions between affective and predatory violence have been measured at both a neuroanatomical and biochemical activation level in various mammals (Mirsky & Siegel, 1994), have been inferred in psychopharmacological (Eichelman, 1992) and neuroimaging (Raine, Meloy, Bihrie, Stoddard, LaCasse & Buchsbaum, 1998) research, and have been implicated in certain domestic violence perpetrators (Gottman, Jacobson, Rushe, Shortt, Babcock, LaTaillade & Waltz, 1995) and stalkers of public figures (Meloy, 2001).

Psychopathic criminals have been shown to more frequently and proportionately engage in predatory violence (Serin, 1991; Williamson, Hare & Wong, 1987; Hare & McPherson, 1984; Cornell, Warren, Hawk, Stafford, Oram & Pine, 1996) when compared to nonpsychopathic criminals. As Meloy (1988) theorized, psychopathic subjects may be particularly suited to predation due to their autonomic hyporeactivity to aversive consequences, their low levels of anxiety, their enhanced orienting responses, their low levels of empathy, their lack of attachments, their sensation-seeking, and their sadism (Holt, Meloy & Strack, 1999). They may be both biologically-wired and psychosocially conditioned to be the consummate predators, relating to others on the basis of power and dominance rather than affection (Meloy, 1988).

There are a number of theories concerning the etiology of psychopathy, one of the most recent debates concerning whether or not psychopathy is a disorder of personality or a life history strategy that conferred reproductive advantages in the ancestral environment (Quinsey, Harris, Rice, & Cormier, 1998; Mealy, 1995). Violence, hostility, deceitfulness, and dishonesty would be features of this latter strategy. Bailey (1995) referred to these individuals as "warrior hawks," and assumed that violent competition in ancestral groups was the primary evolutionary precursor of psychopathy. He wrote, "some degree of predatory violence was required in the seek and kill aspects of hunting large game animals" (p. 542); and a contingent of "warrior hawks" would be

useful to repel invasion by similar contingents from other groups. The price each community would pay would be having to tolerate such individuals in times of peace. Dunbar, Clark and Hurst (1995) cite the "berserkers" in Viking society as performing such a role, although the risk of being killed by one's own berserker bodyguard was high when there was a lull in the need for violence against threats to the community. If such individuals in the ancestral environment were psychopathic, it would follow that the nonviolent members of the community would evolve a defense to signal danger when in their presence.

The differences we found for any physical reaction by gender and profession also make sense given their directionality. Women may react more frequently due to their greater inherent vulnerability as prey: their relative size, strength, and speed when compared to a psychopathic individual, of whom most are men. The significantly less frequent physical reaction by law enforcement may be due to their more frequent encounters with psychopathic criminals and a consequent habituation or desensitization to the threat they pose. Or perhaps "warrior hawks" are more likely to populate a nonrandom sample of law enforcement respondents to a survey.

Our survey findings point to the obvious need for more study. Such work should control for other variables we did not measure, and embrace experimental designs that could further test our hypothesis: for example, recorded autonomic reactivity in a laboratory setting to both psychopaths and nonpsychopaths by subjects blind to their previously measured personality traits.

The clinical and forensic application of our findings, although tentative, should not be missed. We think that professionals should treat such spontaneous, autonomic reactivity when in the presence of a subject as a danger signal, a visceral response that, in a more general sense, Damasio (1994) has termed a "somatic marker." It should lead to further, careful diagnostic workup, even if the surface evidence does not point toward psychopathy. Given the demonstrable frequency of violence among psychopathic individuals, our visceral fear of being prey to a predator may serve us well, as it did our ancestors.

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