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Psychological Dimensions of Drone Warfare

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Abstract The use of weaponized drones or "unmanned aerial vehicles" (UAVs) has become increasingly widespread and controversial over the past few decades. The current paper reviews the state of the research regarding the potential psychosocial impact of weaponized drones on operators and target populations and communities. It is concluded that research regarding the impact of drones in the psychological literature remains limited and most discussion of drones' impact has taken place in the public policy and legal/ethical spheres, often by entities invested in condoning or condemning the use of drones. The limited available data addresses potential new challenges to the well-being of drone operators, factors influencing decision making regarding the use of drones, and the impact on target communities. The current paper neither condones nor condemns the use of drones, but is advanced as a state of the research and a call for additional objective and empirical analysis on this relatively new form of warfare.

Division 48 Presidential Task Force, 2013–2014: Research Agenda for the Psychology of Weaponized Unmanned Aerial Vehicles (Drones)

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Introduction

Drone warfare refers to the use of weaponized unmanned aerial vehicles (UAV, henceforth simply "drones") in military encounters. UAVs are used for multiple purposes, civilian and military, weaponized and non-weaponized. The discussion in this paper refers only to weaponized UAVs. The military use of drones has been attracting increasing attention and controversy due to their use by the United States military in a variety of military actions collectively referred to as the "War on Terror". However, drones are in use across a number of industrialized and non-industrialized nations and their proliferation is likely to increase. The use of drones in warfare is perceived by the military to have several advantages. Being unmanned, drones involve no direct risk to pilots compared to manned aerial vehicles. Drones also have operational advantages such as remaining in-theater for long periods of time without requiring refueling or inducing pilot fatigue. Also, decisions regarding firing can involve multiple parties in the chain of command. However, the use of drones has also raised questions regarding their potential impact on both the operators and the targeted communities.

The Task Force

This paper is based on the work of a taskforce assembled in response to an open call by then-president of Division 48, Rachel MacNair. Although an ethical debate on drone use may be worthy, it was not the stated purpose of the task force to comment on the ethics or politics of drone warfare. Rather,

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the purpose of this paper is to synthesize the available data regarding the psychological dimensions of drones and to identify gaps in the literature in need of new empirical information. Task force members were specifically recruited to reflect a range of opinions regarding the ethics of drones and came from a variety of backgrounds, clinical and experimental, some with military expertise, most without. None of the task force members have a conflict of interest regarding drone warfare and none have taken prior public stances about it. Our conclusions should not be interpreted either as supportive or condemnatory of drone use.

Sources of Data

Empirical psychological research on drone warfare is extremely sparse. Our task force therefore had to consider a variety of data sources including: research in sociology and political science; psychological research regarding issues pertinent to drones; post-traumatic stress more generally; research reports from the military, policy related groups, and nongovernmental organizations; and media sources, such as interviews with relevant parties. Further, we solicited input from the APA's Division 19, as well as from a military psychologist who requested anonymity. Given the political debates on drones, we recognize that many writings about them seek to support particular policy agendas and that many sources of information are classified.

Question Area 1: the Impact on Operators of the Systems

Overview of Empirical Findings There is minimal empirical or theoretical research about the psychological impact of drone warfare on operators. Teams from the United States Air Force School of Aerospace Medicine released several studies investigating the mental health of various categories of Air Force soldiers, including drone operators. Two studies investigating burnout among remotely piloted aircraft (RPA) operators found that nearly half reported being stressed to extremely stressed (Chappelle et al. 2011b), 20% reported feeling emotionally exhausted, a key dimension of job burnout, and 11%–14% had high scores on the cynicism facet of burnout (Chappelle et al. 2011b; Chapelle et al. 2014b). These rates are higher than in noncombatant airmen (Chappelle et al. 2011b). Rates of clinically significant emotional distress among RPA operators were found to be around 20% (Chappelle et al. 2012) and approximately 4–5% of RPA operators in two studies endorsed moderate to severe PTSD symptoms that would meet criteria for diagnosis (Chappelle et al. 2012; Chapelle et al. 2014a). These figures are higher than the 1% reported in electronic medical record of drone operators (Chapelle et al. 2014a) and higher than the corresponding rates for noncombatant airmen (11% and 2%; Chappelle et al. 2012), but on the lower end of the 4–18% for combat soldiers returning from deployment (Chapelle et al. 2014a). The odds of endorsing high burnout or PTSD symptoms were found to be higher among those who worked longer hours and those who have been working as drone operators for more than two years (Chapelle et al. 2014a; b). Rates of mental health disorders in RPA operators were similar to rates in Air Force pilots in the Operation Iraqi Freedom and Operation Enduring Freedom wars, with about 1 in 12 drone pilots receiving their first mental health diagnosis of their military career. However, these rates were lower than those of the Air Force overall (Otto and Webber 2013). Two studies indicated that combat related stressors such as constant exposure to images of death and destruction and killing civilians or friendly ground forces were not rated as primary causes of distress. Rather, most operators cited demands such as long hours, frequently rotating shift work, fatigue and boredom from sustained vigilance to large amounts of audio-visual data, human-machine interface factors, difficulty of juggling work and family, geographical location of the military bases, being understaffed, and concerns about career (Chappelle et al. 2011b, 2012).

Psychological Dimensions of Being a Drone Operator The below section will highlight the need for further research to explore how various psychological dimensions of the drone operator experience may be different from other soldiers' experience. The section also addresses the special therapeutic needs of drone operators. The question of what is most useful and needed with this specific population has rarely been assessed empirically, and current conditions indicate this is a pressing need.

The Psychological Effect of Killing Unlike regular soldiers who partake in a range of combat duties that may involve threat to self or violence to others, drone operators are safe from danger to self, and by definition of the job, involved in targeted killings. There is increased interest in understanding the psychological response to engaging in violence towards others. For example, MacNair (2002) coined the term *Perpetration Induced Traumatic Stress* to describe PTSD symptoms in response to enacting violence. She found higher PTSD scores in American Vietnam War veterans who had killed someone than in those who had not, even when killing was in a sanctioned military context. Similarly, Maguen et al. (2009, 2010) found that after accounting for general combat experience, killing combatants and noncombatants was associated with PTSD, dissociation, functional impairment, and violent behavior in American Vietnam War veterans. Greater frequency of killing was associated with twice the odds of suicidal ideation, compared to no or low killing, even after

controlling for combat exposure, PTSD symptoms, and depression (Maguen et al. 2011). Given that drone pilots engage in killing and witness the impact of their confirmed killing on screen, it is likely they may experience negative psychological outcomes in response. Further research is needed to explore these effects.

Chapelle and McDonald (2011) proposed that unlike the typical PTSD of soldiers in response to clear external dangers, RPA operators may experience "existential conflict", guilt, and remorse over their perceptions of themselves as aerial snipers, witnessing collateral damage following their strikes, and being psychologically attached to the combatants. Moral injury is a relevant new concept garnering increased attention. It is defined by Litz et al. (2009) as "lasting psychological, biological, spiritual, behavioral, and social impact of perpetrating, failing to prevent, or bearing witness to acts that transgress deeply held moral beliefs and expectations". According to Stein et al. (2012), combat acts that involved moral injury to self were significantly associated with various dimensions of guilt and with severity of re-experiencing symptoms compared to other combat acts. Among combat veterans, moral injury is also associated with depression, anxiety, guilt, shame, loss of self-worth, existential and spiritual issues such as loss of meaning, spiritual conflict, and questioning one's morality (Drescher et al. 2011; Vargas et al. 2013). Some experimental research indicates that greater social invalidation of a killing act predicts greater feelings of distress (Webber et al. 2013). We propose that with popular and legal controversy over the morality of drone warfare, high published rates of civilian deaths, operators' ability to visually witness the impact of their strikes, and the lack of imminent danger to self as justification for one's actions, drone operators may be at elevated risk of experiencing moral injury. A military psychologist treating drone operators acknowledged that many do experience moral injury (Wood 2013).

Yet, drone warfare is also perceived to include many advantages such as saving American troops' lives and being highly precise and efficient in killing militants (Byman 2013). Accordingly, participating in a potentially more popular and advantageous war form might be associated with less social invalidation, more sense of purpose, and potentially less risk of moral injury or distress. It would be useful for future research to contrast the experiences of distress and moral injury among drone operators vs. soldiers in conventional combat.

In the case of other combat veterans who have engaged in killing, it has been suggested that the techniques of Prolonged Exposure (flooding) and expressive writing may be ineffective (MacNair 2002), and that Time Perspective Therapy may be helpful (Zimbardo et al. 2012). Additionally, traditions of atonement, bearing witness, and therapeutic stories have been widely suggested as possibilities. However, the empirical studies that take killing as the etiological stressor for PTSD symptomatology are not yet adequate to ascertain how to fill the needs of combat veterans in general, much less the particular needs of drone operators.

At present, there is little research examining differences in emotional reaction between pilots of UAVs and those who are in manned vehicles in combat theaters. Given that pilots of manned vehicles place themselves at direct risk of harm, there are sound theoretical reasons to believe that the emotional experience will differ in some respects as compared to drone/UAV operators who do not experience direct risk. However, direct analyses of these differences in emotional experience remain lacking. The best evidence to date comes from a 2013 study from the Armed Forces Health Surveillance Center (Otto and Webber 2013) which suggested that drone pilots experienced mental health symptoms at roughly equal levels as manned pilots, though potentially for different reasons such as high time-on-task.

It is also important to note that contextual issues matter in the experiencing of drone pilots. For instance, as strike decision policies change in ways that increase or reduce proportions of civilian casualties, the emotional experiencing of drone pilots is likely to change, particularly given the degree that trauma may be related to civilian casualties. Working conditions, such as long hours, reduced leave, the compartmentalization of shifting from warfighting to civilian life on a daily basis, and the pressures of particularly theaters such as Iraq have also been linked to experiences of stress and anxiety among drone operators (Ouma et al. 2011). Thus, the experiencing of drone operators may not be uniform but may be contextualized under specific training, working and theater conditions.

It is also important to distinguish stress created from the working conditions of drone operation as opposed to combat trauma. Much of the reviews noted earlier suggest that high time on task, boredom, pressure, reduced leave time and low recognition have all contributed to relatively high stress among drone operators. However, this stress is distinct from combat trauma. Some review speculate that needing to watch a battlefield continuously over hours, witnessing the consequence of a strike, could contribute to stress and trauma, above that experienced by manned vehicle pilots. Further, it is not unreasonable to hypothesize that stress will be greater in the context of civilian casualties, or in situations in which the parameters for carrying out a strike were more ambiguous.

One potential issue also may come in the screening and recruitment of drone which historically had not differed from manned vehicle pilots (Chappelle et al. 2011a). However, training failure has been higher among drone recruits. Characteristics related to success in drone piloting, such as rapid processing of multiple visual and auditory sensory experiences and self-reliance may call for the need for different recruitment and screening procedures for drone pilots.

Effects of Time and Space Compression Gregory (2011) described the paradox of how drone operators are thousands of miles away from the combat theater, yet inches away from the screen, which creates a compression of time and space. Such compression can pose psychosocial challenges for drone operators different from those deployed to traditional combat theaters.

Whiplash of Being a Civilian and a Combatant Drone operators work in an immersive environment with high-tech equipment and multifaceted systems. The rooms are typically cool and dark to keep electronics safe instead of keeping operators comfortable. At the end of the workday, operators leave their confined, high tempo, but occasionally monotonous work environment to return to their domestic roles at home. Operators are prone to extreme boredom due to numerous hours spent viewing primarily innocuous terrain (Cummings et al. 2012; Hancock and Krueger 2010). In addition to monotony and sporadic action, there are difficulties associated with rapid psychological switches or "whiplash" between war fighter and civilian roles (Associated Press 2008; Fitzsimmons and Sangha 2010; Ortega 2012; McCloskey 2009). Ortega (2012) discusses how traditional troops deployed and returned on ships or planes and therefore had a buffer between combat and return. This transitory period allowed them the time and space to decompress, process their experiences, and reorient themselves for reintegration to civilian life. Drone operators lack this separation between the combat and civilian worlds, which can force them to make radical context shifts that can increase stress (Fitzsimmons and Sangha 2010; Royakkers and Van Est 2010; Wilcox and Rank 2013). The transition can become more complicated by being unable to discuss details of the workday with family and friends due to security restrictions (Fitzsimmons and Sangha 2010; Lindlaw, 2008; McCloskey 2009) along with a probable desire by family and friends not to hear details of killing people. The benefits of disclosing trauma have long been known and can improve both physical and mental functioning (Pennebaker 1999). Moreover, operators often report difficulty balancing their fighter role with family and personal relationships (Chappelle et al. 2012, 2011a) which has been noted to cause family and marital discord (McCloskey 2009). At the same time, separation from home can be a major stressor for conventional combat soldiers, and being able to return daily to the comfort of home and family may buffer the impact of combat stress in drone operators. Future research may seek to understand how this paradox of being close to the comfort of home, which may offer a protective factor, interplays with the strain of rapid shifting between civilian and combatant roles in influencing operator mental health.

Literature on National Guard members (NGM) provides insight on rapid transitions from war-fighter to civilian. Because of their established civilian life, the rapid civilian-military-civilian transition is more difficult for NGM (Wilcox et al. 2015). The post-deployment period is critical for readjusting to community and family life. Mental health challenges associated with combat and deployment can impede successful family reintegration. NGM and Reservists experience more psychological problems than active duty military personnel, and the prevalence of emotional distress increases during the first 180 days post-deployment. Despite experiencing psychological difficulties, because NGM are often dispersed throughout their states of residence, they have reduced peer support, and have less access to and are less likely to seek treatment (Wilcox et al. 2015).

Similar to reduced peer support seen in NGM, operators may miss peer support that comes with conventional combat units that deploy, fight, and return together. This form of war provides soldiers with shared experiences that help forge a high degree of unit cohesion which can help reduce stress from traumatic events. Yet, this may be lacking in drone operation units with commuter operators whose civilian family and friends fight for their attention. Moreover, off-duty socializing with colleagues is inadequate (Fitzsimmons and Sangha 2010), which might be a major detriment to mental wellbeing because social immersion in settings where others have similar traumatic experiences and are willing to discuss them improves coping with combat related stress (Fitzsimmons and Sangha 2010; Flora 1985).

Connection with Targets Interviews with drone pilots and psychologists (McCloskey 2009; Miller 2012; Schogol 2012; Wood 2013) indicate that unlike regular combat pilots, drone pilots may be required to monitor a particular destination on screen for days and weeks. They learn about the community's pattern of life, observe targets' daily interactions with their families and children, and then are subsequently ordered to strike (Schogol 2012). Prolonged contact and personal connection with a target's life may represent a novel dimension of combat stress that calls for further inquiry. Operators may exist in a psychologically dissonant state where there is disconnection and removal from the battleground but simultaneous feelings of proximity and intimate connection with targets' lives. Similarly, drone pilots witness the aftermath of a strike on their screens (Wall and Monahan 2011) which may heighten the adverse impact of exposure to traumatic stimuli.

Connection with Troops Another aspect of drones related to time and space compression is the paradox of operators being removed from ground troops but connected to them through their screens. Operators often feel connected to ground troops, can observe the live flow of combat, and may feel distressed when fellow soldiers are threatened but they are safely remote (Drew 2010; McCloskey 2009; Ortega 2012). Therefore, the

psychological proximity of operators to ground soldiers and its potential effects on feelings of guilt, helplessness, or decisions to strike is important aspect of drone warfare that needs further exploration.

Impact of Being Out of Danger What is the impact of being out of danger while killing others, and how does it differ from combat soldiers who are in danger themselves? There is little direct empirical research on this question. However, aggression research suggests that anonymity can play a role in aggression. The interview conducted by the co-chair of the task force with an Air Force psychologist (Anonymous, personal communication, September 12, 2013) indicated that the military recognizes the threat of acting out of anonymity and being out of danger as an issue and actively counsels operators to take their responsibilities with the greatest seriousness. Given that decisions to fire typically come through a chain of command, the issue may be less about the individual actions of pilots and more of whether political decisions to use drones may be more likely, given that the risk to operators is minimal. As discussed later under bureaucracy in decision making, psychological concepts related to diffusion of responsibility (Mynatt and Sherman 1975; Wallach et al. 1964) or compliance within a hierarchy could also influence drone operators who do not, themselves, make the decision to fire.

One Government Accountability Office (2014) report suggests drone operators are commonly given fewer opportunities for advancement or medals, given the perception that they are not equivalent to traditional combat pilots. To the extent that stress is not balanced with recognition or accolades, this may increase the likelihood of burnout or PTSD in operators. Having the sense of inflicting danger on others while not being in danger oneself could have psychological ramifications on operators that are not yet well understood. These issues may combine to produce situations of compliance at the moment of combat, yet potentially produce guilt at a later time when the operators have "time to think" outside of the chain of command.

Video Games Do commercial video games, particularly with action or violent content contribute either to facility in drone use or desensitization to their use in combat? In response to a question about the role of video games in pilots' duties, an Air Force psychologist stated that the military does not use video games to train drone pilots nor were video games used to desensitize military personnel. The psychologist did state that simulators are used in training, but that, overall, the military did not wish to equate drone piloting with games and avoided games for that purpose. Further, prior research evidence has been unable to connect playing violent video games to socially relevant aggression or violence (Ferguson 2015).

Question Area 2: Decision Making

Decisions to use drone weapons take place in the context of both short-term and long-term risks and benefits. As the collective violence and punishment literature in the behavioral sciences makes clear, persons and groups who perceive themselves to be victimized often eventually seek revenge in direct or indirect ways (see reviews in Hall and Whitaker 1999; Hall and Pritchard 2002). Therefore, one issue for U.S. policymakers and government leaders to consider concerns retaliatory capacity and motivation to counterattack. We recommended research directed at the gap between established psychological findings regarding collective violence and punishment and drone warfare.

The behavioral science literature regarding violence and risk analysis provides terminology and models relevant to drone-related situations. All forms of threatened, attempted, or consummated fatal violence can be conceptualized as an interaction of intentional instigator behaviors acting on a target in a particular context (Hall and Ebert 2002). Several hundred violence-related investigations and reviews have been conducted during the last half century (e.g. Hall and Whitaker 1999; Hall and Pritchard 2002). Findings suggest two basic types of human violence: emotionally-charged, disorganized, impulsive violence; and highly controlled, focused, organized violence. Controlled collective violence involves a high degree of goal formulation, high clarity of thought, low expression of emotion, rapid habituation, organized execution of plans, focused awareness, less likelihood of displacement to victims other than the primary target, flexible changes in principle, a stated goal of destruction and/or exploitation, and the violence itself followed by likely attempts to hide, avoid and conceal. Violence by drone operators and crews closely fits the controlled type of violence, as opposed to impulsive, disorganized violence characterized by high emotion. As such, findings from the literature on controlled violence can be used to formulate research directions for drones.

From this literature, the strongest associations with violence are the perpetrator's history, opportunity and availability factors that make violence possible or expand the degree of lethality, and triggers to aggress. The "**h**istory, **o**pportunity, and **t**riggers" (HOT) factors can provide a decision model for predicting drone-related events with human operators. This places drone-related findings within an empirical model again capable of producing testable hypotheses. The research literature shows that weapon selection, as an opportunity variable, accounts for only a small contribution to violence, generally less than 5% of the variance (Hall and Ebert 2002). Availability of weapons does not determine whether violence will occur; it makes it possible. A well-established history of violence is the best single predictor of future violence. For collective violence, the history of the parties needs to be

scrutinized. Primary triggers for collective violence are directives from superiors which in the case of drones are orders from above and preset computer programs.

Within the context of these factors, a sequence of binary choices is made by the drone crew from the beginning to the end of the mission. Successful violence, at least that associated with external acknowledgment is frequently followed by self-reinforcing thoughts, feelings and behaviors, at least in the initial unfolding (Hall and Whitaker 1999). The negative features of violence seem to be associated with stress responses to intertwining physical, psychological, and social-psychological stressors, leading to disorders such as PTSD, discussed in detail earlier.

Bureaucratic Decision Making Findings related to decision making were sparse because detailed information on bureaucracy for weaponized drones is classified. A rough outline is possible, however, from non-classified studies, media announcements, and information pertaining to the military's bureaucracy. The term "bureaucratic decision-making" refers to what, how, and by whom decisions are made within and outside an organization. The flow of information within a drone bureaucracy includes decisions to deploy, track, coordinate and return drones and to monitor their effect.

One issue in understanding decision making concerns compliance with authority. Blass (1999) performed a meta-analysis on experiments on obedience to authority such as Milgram's (1974) and consistently found that 61–66% of participants were willing to inflict fatal voltages in electroshock studies in response to requests from authority. Although the generalizability of these experimental results to trained military personnel can be debated, it seems reasonable to suggest compliance with authority is a significant factor in the decision-making process.

The drone literature reveals two primary types of U.S. bureaucracies regarding weaponized drones. In both, the President is ultimately responsible for whether and how drones are used. The first type usually, but not always, involves regions of conflict, primarily Iraq and Afghanistan. The top drone purchasing agencies are the military services, with the Army alone accounting for over 90% (Deltek 2012). According to a detailed field manual, drone activities involve training, dissemination of equipment and drone assembly kits, usage and control of drone-related information, the duties of key personnel apart from the drone crews, coordination with joint aerial and artillery systems, dynamic re-tasking during missions, execution of the "kill box" in an operation, a primary focus on precision hits, and coordination with supporting units (see Army Unmanned Aircraft System Operations, FMI 3–04.155 applicable to the USA, USAF, USMC, USCG, USN, and National Guard units). Military personnel are expected to know and have copies of this manual covering both surveillance and weaponized drones.

Bureaucratic decisions for this first type are affected by personality, and research suggests similarities in personality and cognitive styles among U.S. military leadership. Moraski (2002) found that 95% of senior military leaders are "thinkers" on the Myers Briggs Type Indicator (Myers et al. 1998), and only 5% are feelers who rely on emotion rather than cognition for decision making. Almost 80% of middle grade to flag ranked officers had only four of 16 possible personality styles. Based upon the Keirsey-Bates Temperaments Scale (Keirsey 1998, 2002) and the above results, a constellation of traits emerges for senior leaders, including a strong goal-orientation, abilities to think abstractly as well as concretely (e.g., both long-term strategy and short-term tactics), well-developed executive skills, the ability to adapt and improvise in planning or executing an operation, medium to low people-orientation, and low feelings of empathy.

The second type of bureaucracy involves the intelligence services, particularly the Central Intelligence Agency (CIA), which contracts civilians to operate drones. There is virtually no available information on operators' characteristics or personality traits. The CIA's budget finances a covert action program, including operating a fleet of weaponized UAVs, and was allocated $2.6 billion for this purpose recently (Gellman and Miller 2013) . Adams and Barrie (2013) report that contract workers suffer from low morale despite their higher pay. They further describe this bureaucracy as predictable, conventional, unremarkable and banal, and inclined toward rule following and lax permissions to launch drone operations. President Obama, in speaking before National Defense University on May 23, 2013, acknowledged covert drone programs outside declared war zones, and that civilian and collateral deaths had occurred, but affirmed that the covert drone program would remain intact.

Moral Disengagement In his classic work, Bandura et al. (1996) probed how people use mechanisms that allow them to disengage from their normal moral understandings. This can include the use of euphemisms, displacement of responsibility, comparison to worse conduct, dehumanization and deindividuation, and other features of drone practice (see Wilson 2011). There has been very little literature exploring the possible use of these mechanisms in drone warfare. Research could be directed toward the study of whether displacement of responsibility (Mynatt and Sherman 1975; Wallach et al. 1964) serves to bolster the belief that since the multiple tasks in drone operations are shared by many persons within a tightly controlled bureaucracy, no individual moral harm is done to oneself by the drone strikes. The use of euphemisms – a prime one being "collateral damage" for the killing of innocent people when intending to kill other targets – would be another area of research. Misrepresenting or disregarding negative effects are mechanisms which could be systematically investigated. Finally, aside from opinions

as to whether a particular war is unjust, it is important to investigate whether the mere perception of immorality that is allegedly practiced by the adversary contributes to intractability of conflict. Indeed, some research suggests that wars perceived as morally unjust by the international community tend to be lost (Adams and Barrie 2013). This notion is made explicit in military writings (e.g., Marine Corps Warfighting Publication 2007).

Question Area 3: the Impact of Drones on Targeted Societies

Partly due to the classified nature of drone missions, the reluctance of civilian victims to talk for fear of retribution, and problems with access to affected areas, there is little empirical studies of the impact of drone warfare on civilians and most of the information is from reports by Non-Governmental Organization and academic legal centers.

Similarly, it is worth noting that it is not always clear whether the emotional impact of UAV/drone strikes differs from the impact of manner aerial vehicle strikes. That is to say, increased anxiety and trauma are common responses for individuals living in warzones. Although speculations both for and against the concern that drone attacks might result in greater trauma may be reasonable, at current there is a dearth of sound, objective empirical research on this issue. This observation is not intended to minimize the consequences, emotional and physical for individuals living in areas under drone surveillance and attack, but rather to note that evidence that use of drones is uniquely problematic remains lacking.

Competing Narratives about Precision of Drone Attacks and Civilian Casualties A key premise supporting the use of drones is that drones are more precise than typical aerial bombings and enhance safety in the U.S. while causing minimal "collateral damage". Yet, there continues to be disagreement as to how accurate these pinpoint assaults are, and how many civilians are killed (Deri 2012; Human Rights 2012). The independent Bureau of Investigative Journalism (Woods 2012) noted that between 2562 and 3325 people in Pakistan have been killed by drone strikes between 2004 and 2012. Of these totals, 474 to 881 have been identified as civilians, including 176 children (Speaker's Briefing 2013). U.N. Special Rapporteur Ben Emmerson projected 450 civilian casualties in Pakistan, Yemen and Afghanistan (CBSnews.com 2013). Data from the New American Foundation (2017) suggest that civilians make up approximately 10% of the casualties in drone strikes in Pakistan and Yemen. The Long War Journal (2017) likewise finds relatively lower rates of civilian casualties due to drone strikes. Lack of clear delineation on many air strikes regarding whether drones of manned aircraft were used may make exact comparisons difficult. Information on whether drone strikes resulted in more or fewer civilian deaths than manned vehicles did not appear to be clearly available.

Psychological Effects of Drones on Civilians and Affected Communities

Anticipatory Anxiety One of the most salient psychological effects civilians describe is the pervasive sense of anticipatory apprehension of impending drone strikes (Amnesty International 2013). Drones may hover over targeted areas for hours as part of constant surveillance missions. Civilians describe feeling severely stressed, depressed, anxious, and being constantly reminded of deaths in prior strikes (Amnesty International 2013; Center for Civilians 2012). Interviewees also describe reactions reminiscent of post-traumatic stress such as emotional breakdowns, angry outbursts, exaggerated startle responses, fleeing indoors and hiding when seeing or hearing drones, fainting, poor appetite, psychosomatic symptoms, insomnia, and startled awakening at night with hallucinations about drones. Interviews with Pakistani health professionals similarly indicate that patients -particularly those who are later found to have been victims or had relatives who were victims of drone strikes- exhibit high rates of posttraumatic stress symptoms and various psychosomatic complaints associated with actual strikes and apprehension of future attacks. Civilians' fear appears to cripple their daily activities, such as leaving their homes, working, attending social functions, and sending children to school. Dr. Peter Schaapveld, a clinical and forensic psychologist, reported from Yemen that most of the people he surveyed manifested clinical levels of PTSD symptoms. He added that children were particularly affected, and reported nightmares of dead people, fear of going to sleep, and fears they will be harmed by drones (Reprieve 2013b).

These observations are tempered by several methodological issues. Most of these reports included fairly small numbers of individuals (ranging from 28 to 160 interviewees) that oversampled individuals directly exposed to drone strikes, who or who had family victims killed by drone strikes. This subset of individuals might naturally be expected to have high levels of anticipatory anxiety and it is difficult to generalize these findings to communities at large. Further, most of this data comes from agencies or activists with established anti-drone views. Though such views shouldn't be discounted entirely, objective data was not available. Current data is best described as targeted sampling of affected individuals with qualitative methods. Larger, quantitative, community-based studies remain lacking.

Uncontrollability and Unpredictability Not only are civilians unable to predict when and why and to whom the strikes will happen, but they also describe feeling significant uncontrollability, helplessness, and powerlessness to escape, avoid, or protect themselves from drone strikes (Center for Civilians 2012). Civilians in targeted areas are likely poor, experience travel restrictions by local militias or militaries, live under curfews, or are subjected to a range of other factors that limit their mobility and ability to flee to safer locations (Basoglu 2012). Two aspects that may exacerbate psychological problems are the U.S.' reported policy of conducting "signature strikes" and "double taps." A signature strike, rather than targeting an individual, is based on analysis of "signature" behaviors associated with suspicious or militant activities (Amnesty International 2013). That these strikes are not based on a specific militant's identity serves to heighten their unpredictability.

"Double taps" are a series of strikes over the same target area in rapid succession. Although they may originally seek to ensure the target militants have been killed, these double taps have been reported to kill or maim first responders and other community members rescuing victims of the original strike. Their unpredictable nature and the death of rescuers may prolong the state of terror and heighten feelings of helplessness and uncontrollability in the community (Basoglu 2012).

Collective and Complex Trauma Basoglu (2012), a trauma psychiatrist, proposed that the traumatic effects of drone strikes amount to collective torture. He explained that both involve: "(a) *prolonged* exposure to (b) *unpredictable* and (c) *uncontrollable* stressors in an (d) *inescapable* environment leading to (e) *intense fear-induced helplessness* responses." Basoglu (2012) further notes the collective anticipatory anxiety of attack by drones is particularly distressing because anticipating threats to one's life may be among the most fear-evoking war situations This fear is highly resistant to extinction (Basoglu et al. 2007), so prolonged fear may continue affecting the community long after drone strikes cease.

Judith Herman (1997) distinguishes between single traumatic events and *prolonged* exposure to repeated and multiple traumas under conditions of captivity such as experienced by prisoners of war, concentration camp inmates, or victims of domestic violence. Since civilians may face significant obstacles to fleeing potential strikes, they may face conditions akin to captivity and consequently prolonged and complex trauma exposure. Those complex traumatic events, in contrast to singular ones, are conceptualized to be associated with a constellation of complex trauma reactions beyond that of PTSD, termed Disorders of Extreme Stress (DESNOS). DESNOS include deeper characterological changes and profound alterations and disturbances of affect regulation, self-perception, relating to others, somatization, and systems of meaning (Herman 1997; van der Kolk et al. 2005). We therefore raise, as an important research question whether civilians in targeted communities may also be at risk for complex trauma reactions and disorders of extreme stress.

Financial Effects One of the most prominent and lasting effects of drone strikes is destruction of property. Although drones are supposed to target individual militants, in poor societies in Yemen and Pakistan, multiple families may share a home or smaller units may be housed together. A strike that destroys a home may disrupt the lives of several families or destroy adjacent homes (Center for Civilians 2010, 2012). Also destroyed are small shops and businesses, crops, and livestock. In communities already struggling with economic vulnerability and poor infrastructure, and without insurance, savings, or other safety nets, destroying resources can deprive families of their only financial assets and income and plunge them into destitution and debt (Center for Civilians 2010, 2012). Injured civilians may no longer be able to contribute to their families by performing housework, care giving duties, or earning income. Victims often lack access to quality medical care and families accrue medical bills several times their annual income, but rarely receive financial compensation from their governments or governments conducting the attacks (Center for Civilians 2010).

Effects on Community Interactions Although the definition of who is a combatant and therefore a "legitimate" target of strikes is often discussed in the context of policy and legality, it is also important in understanding the impact of drone strikes on targeted communities. For example, in Pakistan, many fighters live among their families or in joint family compounds. Although they may technically qualify as combatants, the networks of civilians in which they are embedded are similarly affected by drone strikes but may feel forced to accept them for fear of violent retribution or reprisal (Amnesty International 2013). Many of the affected communities also have strong cultural customs regarding hospitality and not denying guests refuge and food regardless of their background (Kakar 2004). Civilians describe feelings of helplessness at being wedged between U.S. drones and militants (Human Rights Watch 2013).

Moreover, warfare theorists believe constant drone surveillance sows distrust and paranoia amongst terrorist groups (Callam 2010), though it appears this paranoia affects larger communities as well. Civilians may seek to cope with the ambiguous yet constant possibility of death by trying to create a system of understanding, such as explanations for how and why strikes happen. For example, some communities in Waziristan believe the U.S. identifies drone strike targets through "chips" (small electronic tracking devices). Many Waziris believe the Pakistani government and/or the CIA

enlists help from local informants who plant these chips in targets' homes and cars. Consequently, community members either fear being marked by a chip, or fear the Taliban will suspect them of being informants and execute them. These beliefs appear to fuel suspicion between neighbors who suspect each other of being informants or see drone strikes as exacting revenge over a dispute. Even in absence of this narrative about chips, when civilians are mistakenly struck, the fabled precision of drones may lead others to stigmatize them and suspect them of being related to militants. The victims then bear the dual burden of being victimized by the drones and the stigma and pressure to exonerate their name (Center for Civilians 2012).

Effects on Community Social and Cultural Customs Possibly due to signature strikes that target large gatherings, residents understand drones to attack people during group gatherings. Residents therefore describe reduced socializing and community gatherings, fear of praying in mosques, and general fear of congregating in large groups (Amnesty International 2013). Communities are particularly concerned by the disruption of the traditional *jirga* system, a community-based forum for decision making and conflict resolution administered by male elders and based on Pashtun values of self-administration, community contribution, and justice (Yousufzai and Gohar 2005). Yet, given amplified fears of gathering in large numbers and reports of strikes on *jirga*s in the past, residents have been increasingly reluctant to hold them. The erosion of *jirga*s may be particularly detrimental to the social order of a community already struggling with conflict and other stressors.

People's fear of gathering in large groups and of "double taps" coupled with strikes on funerals seems to have altered cultural customs related to death. Residents report waiting several hours before approaching bodies for fear of being struck. This contradicts local and religious guidance to quickly cover, wash, and bury the deceased to honor them. The traditional burial and funeral process has also been undermined, as people are less likely to participate for fear of strikes. Yet, inability to attend funerals may deprive communities of the space to grieve collectively, exchange social support, and obtain closure over the death of loved ones.

Perceptions of Injustice and Lack of Redress Compounding these problems is a perception of lack of justice and acknowledgement by any of the responsible parties. Pakistani and Yemeni civilians report that neither their governments or the governments who conduct the strikes have offered them any assistance or financial compensation for losses incurred in strikes (Amnesty International 2013; Center for Civilians 2012; Human Rights Watch 2013). Strike victims have therefore expressed anger at these governments and insisted they should be held accountable not only for financial compensation but for acknowledging the suffering the strikes have caused (Center for Civilians 2010).

Special Notes on Women and Children Most of the effects discussed above extend to children. However, children are particularly vulnerable to disruptions and losses caused by war, including loss of homes, injuries from strikes and subsequent difficulty accessing medical care, PTSD and other psychological symptoms, and being deprived of the opportunity to play with friends for fear of assembling in large groups (Reprieve 2013a). The loss of a male head of household or a female caregiver often means older children are removed from school prematurely to assume those roles (Reprieve 2013a). Some parents have also stopped sending their children to school for fear over their safety.

As for women, mothers report feeling helpless at the prospect of their children being recruited by the Taliban, especially since they have limited ability to leave the house and thus monitor their children. Because most larger decisions are made by men, they often have no choice if their older male children or other male relatives bring home Taliban members as guests, which leaves them caught between concern for family and fear they will be struck by drones because of guests they did not invite. Women who lose husbands to strikes may experience compounded difficulties in addition to grief. Traditionally, women in targeted communities have limited control over financial resources and difficulty accessing government resources or income-generating activities. Customs dictating that widowed women live with other male family members may leave them especially vulnerable and prone to harm and exploitation (Center for Civilians 2010). Note that these issues may be common to war theaters, not necessarily unique or even more prevalent in areas targeted by drone strikes.

Mounting Anger, Political Unrest, and a Desire for Revenge There is no consensus or research evidence that the U.S. drone policy creates political unrest or anti-American sentiments in affected countries leading to a proliferation of militants and terrorist acts against the U.S. (Cronin 2013). However, the limited psychological findings about civilians impacted by strikes discussed above suggest some linkage between drones' impact on communities and negative attitudes toward the U.S. For example, a major poll revealed that only 17% of Pakistanis supported drone strikes in the Federally administered tribal areas (FATA) and 74% considered the U.S. to be their enemy (Pew Research Center 2012). However, it is worth noting that the poll did not include people in the FATA region itself. The Pakistani foreign minister

attributed the U.S. drone attacks in the FATA as the main reason for anti-Americanism in Pakistan (Common Dreams 2012). Brian Williams, an Islamic history professor and an expert in Pakistani politics explains that the U.S. "continues to wrestle with a paradox.. it became obvious that America's most advanced weapon in the hunt for elusive terrorists might also be their worst enemy in the underlying battle to win the hearts and minds of the people of this volatile region.. Drone strikes are a public relations disaster in Pakistan" (2013).

An attack in Yemen in 2012 that killed ten civilians including women and children brought out considerable outrage throughout the country and beyond. One observer noted, "I would not be surprised if 100 tribesmen joined the lines of al-Qaeda as a result of the latest drone mistake. This part of Yemen takes revenge very seriously" (Woods 2012). Yemen's foreign minister, Abu Bakr al-Qirbi, estimated that the 300 members of Al Qaeda in Yemen in 2009 tripled to over 1000 by 2012 (Pryer 2013). Al Qaeda has grown exponentially and is now administering courts, collecting taxes and otherwise acting like the government in areas of Yemen (Pryer 2013). This lends credence to the possible relationship between increased drone attacks and the number of Al Qaeda members in Yemen.

Other evidence has suggested that the relationship between war victimization and attitudes toward insurgent groups is complex. For instance, Lyall et al. (2013) found that war targeting by external forces in Pakistan increased support for insurgent groups, but targeting by insurgent groups did not increase support for external forces. Other analyses (Lyall 2013) suggest that while airstrikes do increase insurgent activity, civilian casualties play little role in this and increased activity relates to insurgent resiliency against airstrikes. Other evidence from Israel suggests that targeting from rocket strikes hardens victims' perspectives toward groups perceived as initiating those strikes (Canetti-Nisim et al. 2009; Getmansky and Zeitzoff 2014). These results suggest that airstrikes tend not to weaken the resolve of target communities.

What remains questionable from the standpoint of empirically oriented research is the extent to which the military use of drones contributes to the increased number of terrorist operatives as other factors could also fuel the oppositional fires. Yet this raises the question about how the potential blowback from drone warfare is to be weighed against the military benefits gained through targeting individuals.

Conclusion

The area of weaponized drones is a recent one, so the dearth of empirical literature is not surprising. A major purpose of this paper is to encourage more research in this crucial area, since the very novelty of it could lead to unanticipated psychological problems in the areas of drone operators, decision making, and impacted communities. Psychology has a crucial role to play in contributing to the ethical debate as well as in understanding the empirical reality.

Compliance with Ethical Standards

Conflict of Interest None to declare.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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