Intergenerational Transmission under Extreme Violence: Families, Memorial Institutions, and the Legacies of Atomic Bombings

Sangyong Son*
New York University
sangyong.son@nyu.edu

Word Counts: 9999
This is a very preliminary draft. Please do not circulate.

Abstract

How do societies preserve and transmit political lessons drawn from the most extreme forms of violence? This article examines whether and how intergenerational value transmission occurs in the aftermath of extreme wartime violence. Leveraging the natural experiment of the atomic bombings, I assess whether family transmission persists under extreme violence and whether state institutions reinforce or substitute for this process. The results show that survivor parents pass anti-militarist preferences to their children, demonstrating that family transmission endures even under extreme violence. State-led memorial institutions further reinforce—rather than substitute for—this process. These findings show that anti-militarist preferences forged in extreme violence can persist across generations through the joint work of victimized families and state institutions. The findings suggest that postwar peacebuilding can be designed to prioritize the transmission of value-based lessons—rather than merely experiential accounts—through context-rich commemorative practices.

KEYWORDS: Intergenerational Transmission, Legacy of Violence, War, Peacebuilding, Anti-militarism[1]

*PhD candidate in Wilf Family Department of Politics at New York University

[1]I appreciate valuable feedback from Alberto Bisin, Bruce Bueno de Mesquita, Amy Catalinac, Jonathan Chu, Mike Gilligan, Noam Lupu, Arturas Rozenas, Tara Slough, Daniel Solomon, Carly Wayne, and Anna Wilke.

1 Introduction

Intergenerational value transmission is one of the most fundamental processes sustaining human societies. Across time and cultures, the passing of ideas, values, and norms from one generation to the next enables social continuity, cultural coherence, and collective identity (Parsons and Bales, 1955; Durkheim, 1956; Bourdieu and Passeron, 1977). Through this mechanism, human societies preserve hard-earned knowledge, accumulated experience, and shared understandings of the world. Families are central to this process. Children learn a wide range of beliefs and practices—spanning daily habits, economic preferences, and political orientations—from their parents (Van IJzendoorn, 1992; Sharkey, 2008; Jennings, Stoker and Bowers, 2009; Bowers and Yehuda, 2016; Dohmen et al., 2012). Yet parents do not transmit values in isolation. They adjust how much they invest in transmission depending on how closely their own values align—or conflict—with dominant societal norms (Bisin and Verdier, 2001; Doepke and Zilibotti, 2017). Intergenerational transmission therefore emerges from a dynamic interplay between parental efforts and the broader institutional environment that shapes and sustains those norms.

Intergenerational value transmission in the aftermath of violence is particularly important. What victimized parents choose to share—or choose to withhold—guides how the next generation understands vulnerability, responsibility, and the uses and limits of force. As these orientations accumulate across families and generations, they shape how societies come to remember, interpret, and respond to violence. These inherited understandings influence whether communities gravitate toward peace or toward the acceptance of retaliatory violence (Curtis, 1963; Widom and Wilson, 2014)—whether the memory of suffering becomes a call for tolerance and nonviolence or a rationale for further hatred and violence (Balcells, 2012; Lupu and Peisakhin, 2017; Rozenas, Schutte and Zhukov, 2017; Wayne and Zhukov,

2022). Although these choices unfold within households, they do not exist apart from the broader environment that signals which lessons are affirmed, contested, or left unspoken. The extent to which these family memories are amplified or silenced depends, in large part, on how state institutions reinforce or counter the narratives that parents choose to pass on.

However, extreme violence from nuclear, chemical, and radiological weapons alters these dynamics in ways that differ fundamentally from more ordinary forms of violence. Because it produces not only acute harm but also permanent biological injury, enduring psychological trauma, and long-term social isolation, its effects extend beyond direct victims and reach subsequent generations (Ludlum et al., 1994; Shimizu et al., 2010; Shimizutani and Yamada, 2021). This *transgenerational harm* introduces profound uncertainty into how families respond: such experiences can push parents toward silence—out of fear, stigma, or a desire to shield their children from the weight of the past—or, conversely, toward deliberate efforts to articulate moral lessons about human suffering and the dangers of extreme violence. Furthermore, these choices unfold within broader social and institutional environments that can either *reinforce* the lessons families seek to impart or *substitute* institutional narratives that crowd out or silence the transmission that would otherwise occur within families. As a result, the direction and strength of intergenerational transmission under extreme violence are contingent on these environments rather than inherently determined.

A recent nationwide survey conducted in the eightieth year since the atomic bombings shows the complexity of intergenerational transmission under extreme violence (Asahi Shimbun, 2025).[2] Even after eighty years, 36.5 percent of survivors report that their experiences and messages have never been passed down, and 28.3 percent have never shared their story

[2]The Asahi Newspaper, together with the Chugoku Newspaper and the Nagasaki Newspaper, conducted a nationwide survey of 3,564 atomic bomb survivors across 43 prefectures in Japan. The survey asked about survivors' views on nuclear weapons and related issues. See The Asahi Newspaper, "Survey of 3,564 Atomic Bomb Survivors: Main Questions and Answers, Joint Project with Chugoku Newspaper and Nagasaki Newspaper," July 6, 2025, https://www.asahi.com/articles/AST732D41T73PTIL017M.html.

with anyone. When asked why they remained silent, 24.8 percent cited memory-related difficulties; other common reasons included a lack of opportunity to speak (13.2 percent), fear of stigma or discrimination (9.2 percent), emotional distress (7.7 percent), and the belief that others would not understand (7.0 percent). At the same time, while a majority of survivors who speak about their experiences do so within their own families—53 percent report sharing their stories with their children—substantial numbers also speak in institutional or public settings. For example, 12.2 percent testify to local students and 14.4 percent speak at peace gatherings, channels that are shaped and sustained by state-supported educational and commemorative institutions.

This article addresses two sets of questions on intergenerational value transmission under extreme violence. First, does intergenerational value transmission persist even under the most extreme forms of violence? Second, how do state institutions shape the transmission of political lessons from extreme violence—do they reinforce family transmission, or do they substitute institutional narratives that crowd out or silence family transmission? Addressing these questions deepens our understanding of how political lessons are passed from survivors to their descendants in the aftermath of extreme violence and illuminates the broader dynamics through which victimized families and state institutions jointly shape the intergenerational transmission of values in postviolence societies.

I examine intergenerational transmission in the aftermath of the atomic bombings of Hiroshima and Nagasaki, focusing on whether survivors' experiences and political attitudes can be transmitted to their children. Specifically, I assess whether family transmission persists under the most extreme forms of violence and whether state-level memorial institutions reinforce this process or substitute for it. To evaluate these questions, I exploit a natural experiment of the atomic bombings in Japan, in which Hiroshima and Nagasaki were bombed while Kokura—the original target—was spared due to exogenous weather conditions. I collected

original survey data from descendants of atomic bomb survivors both within and outside Hiroshima and Nagasaki, as well as from descendants of Kokura residents who experienced conventional wartime violence but had no familial ties to survivors.

I find empirical evidence that intergenerational value transmission occurs even under the most extreme forms of violence. Descendants of atomic bomb survivors express stronger anti-militarist preferences than descendants of the wartime generation in Kokura who had no familial ties to survivors. This transmission operates primarily through family conversations, with value-laden discussions about peace and anti-nuclear views exerting a stronger influence than conversations about the bombing experience itself. State-level memorial institutions play a reinforcing role in this family transmission. Among descendants of atomic bomb survivors, commemorative practices in Hiroshima and Nagasaki are associated not only with more frequent family conversations but also with stronger anti-militarist preferences. Together, these findings indicate that family transmission—reinforced through interaction with state-level memorial institutions—serves as a key channel for conveying the memories of the atomic bombings and the political lessons attached to them to subsequent generations.

This article makes important contributions to the study of intergenerational value transmission, with particular implications for the legacy of violence and postwar peacebuilding. First, it advances the legacy of violence scholarship by theorizing and empirically demonstrating intergenerational value transmission under conditions of extreme violence. Unlike conventional forms of violence—which generate political and social consequences primarily through the experiences and attitudes of the directly exposed generation (Blattman, 2009; Gilligan, Pasquale and Samii, 2014; Lupu and Peisakhin, 2017; Fouka and Voth, 2023; Wayne and Zhukov, 2022)—extreme violence from nuclear, chemical, and radiological weapons produces *transgenerational harm* that affects descendants through biological, psychological, and social channels. Exposure to extreme violence embeds its effects into the everyday lives of

survivors' descendants through chronic illness, enduring uncertainty about when latent biological damage may surface, and inherited stigma. These persistent *transgenerational harms* fundamentally reshape the incentives and constraints surrounding family transmission: parents may feel compelled to articulate moral lessons drawn from their suffering, yet the same harms may induce silence as they attempt to shield their children from trauma or discrimination. As a result, whether—and how—intergenerational transmission occurs in the aftermath of extreme violence remains theoretically ambiguous.

This article provides the first evidence that intergenerational value transmission occurs even under the most extreme forms of violence.[3] However, the intergenerational transmission under extreme violence does not occur through the passive recounting of experience alone. When survivors communicate factual descriptions of the atomic bombings, descendants gain knowledge about the event but do not adopt their parents' political attitudes. In contrast, when survivors articulate their value-laden judgments—moral evaluations of war and peace—descendants internalize both the factual content and the associated political lessons. This distinction between experiential and attitudinal transmission is crucial: while descendants may not fully comprehend the biological or psychological dimensions of their parents' suffering, they can nonetheless absorb the normative interpretations survivors attach to those experiences. Political lessons from extreme violence therefore travel across generations not through detailed memories of what occurred but through the moral and political interpretations survivors construct from their experiences. Therefore, attitudinal transmission—not experiential recounting—constitutes the central mechanism through which the legacies of extreme violence persist over time.

Second, this article examines the relationship between families and state institutions in in-

[3] Kikuchi (2025) finds that family transmission does not operate in the case of the atomic bombings. However, these null findings are plausibly attributable to (1) the inclusion of non–direct descendants and (2) the absence of a causal identification strategy.

tergenerational value transmission. In their foundational model, Bisin and Verdier (2001) formalize how transmission operates through two channels: direct vertical transmission within families and oblique transmission from broader social institutions. Their key insight is that these channels can function either as substitutes—where societal messaging reduces the need for intensive family socialization—or as complements, reinforcing each other to sustain particular norms. Building on this framework, prior work has examined a range of potential pathways for intergenerational transmission, including victimized communities (Charnysh and Peisakhin, 2022), martyrdom memorialization (Fouka and Voth, 2023), and formal education (Wayne, Damann and Fachter, 2025). This article shows that state-led memorial institutions reinforce—rather than substitute—family transmission by increasing the frequency of family conversations about the experience of violence and the political lessons survivors draw from it. I further examine the specific mechanisms through which this reinforcement occurs: formal education and commemorative practices. Notably, commemorative practices are more strongly associated with family discussion than school-based instruction. Museum visits and memorial ceremonies create voluntary, context-rich moments that prompt renewed dialogue within families. As a result, memorial institutions operate as an institutional anchor that legitimates survivors' interpretations, reduces the stigma attached to extreme violence, and strengthens the family-based transmission of political lessons from violence.

2 Theory

2.1 Extreme Violence

I define extreme violence as violence involving nuclear, chemical, or radiological weapons that generate three interrelated anti-personnel effects: (a) permanent biological damage, (b) persistent psychological trauma, and (c) long-term social stigma. These three elements

are jointly required for an episode of violence to qualify as extreme violence.[4] The defining characteristics of extreme violence can be illustrated by three core anti-personnel effects that distinguish it from conventional forms of violence.

First, extreme violence causes permanent biological damage that resists full medical remediation—such as chronic organ failure, irreversible neurological impairment, and DNA-level mutations[5]—whereas conventional violence produces severe but largely non-mutagenic injuries that do not create comparable long-term biological disruption (Ludlum et al., 1994; Dacre and Goldman, 1996; Ghabili et al., 2011; Figueiredo et al., 2018). Second, extreme violence generates persistent psychological trauma centered on chronic anxiety over latent health hazards and potential hereditary risks (e.g., delayed radiation sickness). These fears—rooted in uncertainty about invisible and delayed-onset harm—differ from the psychological trauma of conventional violence, which, while potentially severe and long-lasting, is not typically driven by concerns over hereditary risk or latent toxic exposure (Shimizu et al., 2010; Schnurr, Friedman and Green, 1996; Karami et al., 2013; Satkin et al., 2017). Third, extreme violence imposes a durable stigma rooted in perceived physical contamination or hereditary risk that often extends to descendants and results in long-term exclusion from marriage, employment, and community life (Jacobs, 2014; Shimizutani and Yamada, 2021; Dũng, 2023); by contrast, victims of conventional violence are generally reintegrated without such multigenerational marginalization.

The atomic bombings of Hiroshima and Nagasaki exemplify the three defining char-

[4] I conceptualize extreme violence as an ideal-type category defined by the full co-occurrence of permanent biological damage, persistent psychological trauma, and long-term social stigma. In empirical settings, however, these anti-personnel effects operate along a continuum rather than as strict thresholds. Some episodes of nuclear, chemical, or radiological violence may exhibit only partial manifestations of these effects, while certain high-intensity conventional cases may approximate them without fully meeting the ideal-type definition. The conceptual distinction is therefore discrete, but the empirical variation is continuous.

[5] For example, sulfur mustard gas—used in the Second Battle of Ypres (1917) and the Halabja chemical attack (1988)—alkylates DNA, producing persistent mutations and elevated cancer risk (Ludlum et al., 1994; Dacre and Goldman, 1996).

acteristics of extreme violence. First, they caused permanent biological damage, including chronic radiation-induced illnesses, irreversible cellular and genetic mutations, and long-term diseases such as leukemia and thyroid cancer that often manifested years or even decades later (Shimizu et al., 2010; Kamiya et al., 2015; Tomonaga, 2019). Second, they generated persistent psychological trauma, characterized by enduring fear of invisible radiation threats, intergenerational anxiety over latent health effects, and chronic anticipatory grief rooted in the loss of family and community (Ohta et al., 2000; Yamada and Izumi, 2002). Third, they produced pervasive social stigma and isolation: survivors were often perceived as "contaminated," excluded from employment, and particularly marginalized in marriage due to presumed genetic risks (Jacobs, 2014; Shimizutani and Yamada, 2021). Together, these three interrelated harms—biological, psychological, and social—underscore the unique anti-personnel effects of nuclear weapons and place the atomic bombings firmly within the conceptual category of extreme violence.

2.2 Extreme Violence, Anti-militarist Preferences, and Intergenerational Transmission

Despite the distinctive nature of extreme wartime violence, existing scholarship remains largely limited to conventional wartime violence. Previous studies have examined how conventional wartime violence shapes foreign and security policy preferences. Some studies find that conventional wartime violence fosters hawkish foreign policy preferences (Horowitz, Stam and Ellis, 2015; Hirsch-Hoefler et al., 2016; Grossman, Manekin and Miodownik, 2015; Canetti et al., 2017), whereas others find that it promotes dovish foreign policy preferences (Lyall, 2009; Tellez, 2019; Hazlett, 2020; Kim, 2024). These mixed findings are based on cases of conventional wartime violence—including war, civil war, and terrorism.

Only a few studies have investigated the relationship between extreme wartime violence

and foreign policy preferences. Blair and Horowitz (2024) find that soldiers who underwent chemical weapons training during World War II—though not direct exposure to chemical agents in combat—are more likely to oppose the use of chemical weapons in wartime. Son (2025*a*) provides a more general theory and direct evidence. Son theorizes that exposure to extreme violence generates strong aversion not only to the violence itself but also to the weapons of extreme violence, operating through both recalibrated cost–benefit calculations and heightened altruism toward potential victims. Findings show that individuals exposed to the atomic bombings of Hiroshima and Nagasaki exhibit strong aversion to nuclear war and nuclear weapons, similar to the nuclear taboo. Together, this body of evidence suggests that exposure to extreme wartime violence can generate specific forms of *anti-militarism*, including aversion to particular weapons and to the use of force.

While the legacy of violence literature shows that conventional forms of mass violence can generate persistent political legacies across generations, little is known about whether extreme violence leaves a comparable intergenerational imprint. Previous studies have examined intergenerational value transmission in contexts such as war and civil war (Fouka and Voth, 2023; Cremaschi and Masullo, 2024; Balcells, 2012), repression (Rozenas and Zhukov, 2019; Wang, 2021), forced migration (Lupu and Peisakhin, 2017; Dinas, Fouka and Schläpfer, 2021; Charnysh and Peisakhin, 2022), slavery (Acharya, Blackwell and Sen, 2016), and genocide (Homola, Pereira and Tavits, 2020; Wayne and Zhukov, 2022).[6]

Yet these forms of conventional violence differ fundamentally from extreme violence, which produces uniquely severe anti-personnel effects—including permanent biological damage, persistent psychological trauma, and long-term social stigma—that are rarely present

[6]Prior work has analyzed a wide range of theoretically relevant outcomes, including in-/out-group attitudes (Lupu and Peisakhin, 2017; Homola, Pereira and Tavits, 2020; Dinas, Fouka and Schläpfer, 2021; Wayne and Zhukov, 2022), partisanship (Acharya, Blackwell and Sen, 2016), political mobilization (Cremaschi and Masullo, 2024), political values (Besley and Reynal-Querol, 2014; Charnysh and Peisakhin, 2022), voting patterns (Charnysh and Finkel, 2017; Fouka and Voth, 2023), and loyalty to the regime (Rozenas and Zhukov, 2019; Wang, 2021).

together in conventional wartime settings.[7] More importantly, because these harms extend temporally beyond the directly exposed generation and blur the boundary between survivors and their descendants, it remains an open question whether intergenerational value transmission can persist under conditions of such extreme violence.[8] To address this gap, I examine whether the transmission mechanisms identified in studies of conventional violence travel to contexts characterized by extreme violence. More specifically, the article investigates whether family-based transmission can operate under conditions of permanent biological damage, persistent psychological trauma, and long-term social stigma, and whether state institutions reinforce—or instead substitute for—this process.

2.3 Family Transmission under Extreme Violence

Family socialization is the most foundational channel of intergenerational transmission (Jennings and Niemi, 1968). Survivors of violence convey their experiences and associated attitudes to their children through within-family discussions (Lupu and Peisakhin, 2017; Wayne and Zhukov, 2022), and children internalize parental orientations through observational learning and imitation (Bandura, 1969). Given the intimate nature of family socialization in violent contexts, previous studies have typically operationalized it as interactions between victimized parents and their direct descendants [9]

Unlike conventional violence, extreme violence—arising from toxic exposure to nuclear, chemical, and radiological weapons—creates *transgenerational harm*. Its consequences are

[7]The Holocaust may satisfy the second and third elements of extreme violence—persistent psychological trauma and long-term social stigma—through the enduring social marking and intergenerational trauma experienced by Jewish survivors and their descendants. See Wayne and Zhukov (2022); Canetti et al. (2018).

[8]I do not categorize Kikuchi (2025) in this line of inquiry, since the operationalization of "family transmission"—which includes distant relatives—deviates from the direct descendant focus used in prior research (Lupu and Peisakhin, 2017; Wayne and Zhukov, 2022; Charnysh and Peisakhin, 2022).

[9]For instance, Lupu and Peisakhin (2017) study first, second, and third generations of forcibly deported Crimean Tatars. Wayne and Zhukov (2022) examine Holocaust survivors and their direct descendants. Dinas, Fouka and Schläpfer (2021) analyze the descendants of Asia Minor refugees.

not confined to direct survivors but unfold across generations through permanent biological damage, persistent psychological trauma, and multigenerational stigma. Chronic illnesses, organ dysfunction, and long-term physiological impairment generated by toxic exposure create persistent health risks that blur the boundary between the exposed generation and their children. The invisible and latent nature of these risks produces sustained anxiety about whether harm may surface unpredictably or appear in descendants. At the same time, societal stigma—often reinforced through survivor registries, medical classification systems, and targeted welfare programs—publicly marks survivors and contributes to their long-term social isolation.[10]

Atomic bomb survivors in Japan exemplify these dynamics. Many live with chronic radiation-induced illnesses requiring lifelong specialized treatment at designated atomic bomb hospitals operated by the Japanese Red Cross (Shimizu et al., 2010; Kamiya et al., 2015; Tomonaga, 2019). Crucially, these health risks extend beyond the directly exposed generation: second-generation descendants have long faced uncertainty about potential hereditary effects, routinely undergoing medical checkups and monitoring programs created specifically for the children of survivors (Yamada and Izumi, 2002). This intergenerational medical surveillance reinforces the persistent fear that latent biological damage may manifest years later. Social stigma has likewise extended to their children, who have faced discrimination in marriage and employment due to widespread beliefs about genetic risk (Jacobs, 2014; Shimizutani and Yamada, 2021). The issuance of *Hibakusha Techo*—atomic bomb survivor health handbooks—and the provision of government-managed medical subsidies publicly mark survivor status and make it visible to subsequent generations, institutionalizing their

[10]See the Vietnam Association for Victims of Agent Orange/Dioxin (VAVA) registration systems (Vietnam Association for Victims of Agent Orange/Dioxin (VAVA), N.d.), as well as other formal state mechanisms that classify and support survivors of extreme violence (Federation of American Scientists, N.d.; United States Institute of Peace, N.d.).

social distinctiveness.[11]

Because extreme violence generates enduring *transgenerational harm*, its consequences shape the everyday family environment through which children encounter their parents' experiences of suffering. Transgenerational harm spills over into the next generation—shaping children's everyday interactions with parental illness, uncertainty about inherited risks, and the social stigma attached to the family. Because the effects of extreme violence permeate family life in this way, they become continually present for children through chronic health problems, routinized medical management, subtle forms of social exclusion, and state-issued institutional markers that classify survivors as a distinct group. These features make the parent's exposure to extreme violence salient to children in ways that conventional violence—whose consequences largely end with the directly exposed generation—does not. The visibility generated by transgenerational harm in extreme violence gives rise to two opposing theoretical predictions about whether family-based transmission of attitudes persists under conditions of extreme violence.

On the one hand, visibility can facilitate both explicit and implicit family transmission by making the parent's experience and its associated values and attitudes a recurring feature of children's daily lives. Explicit transmission occurs when observable signs of suffering or the formal recognition of survivor status prompt direct conversations about the bombing and related attitudes. Implicit transmission operates through indirect cues—nonverbal expressions of fear or unease surrounding nuclear weapons, survivors' routinized medical care, or participation in commemorative rituals that convey moral lessons without verbal articulation. When visibility facilitates explicit or implicit transmission, children are repeatedly exposed—through conversation, observation, and shared commemorative practices—to the

[11]For official descriptions of the *Hibakusha Techo* system, see Hiroshima City (https://www.city.hiroshima.lg.jp/living/medical/1003066/1027965/1022297.html) and Nagasaki City (https://www.city.nagasaki.lg.jp/page/1452.html).

anti-militarist orientations formed through their parents' experiences of atomic bombings. In such cases, family-based intergenerational transmission should occur, with children adopting the anti-militarist values and attitudes rooted in their parents' experiences of extreme violence.

H1A (Family Transmission Hypothesis)

Second-generation atomic bomb survivors are more likely to hold anti-militarist preferences than individuals with no such family experience

On the other hand, the same visibility can heighten concerns about trauma, stigma, and discrimination, discouraging transmission within families. Although physical and institutional markers cannot be fully concealed, survivors can still shape the narratives that accompany these visible traces. Because the details of their experience and the political meanings attached to it may intensify their children's trauma—stemming from hereditary toxic exposure and psychological burden—or expose them to social penalties such as marriage discrimination or enduring stigma, survivors may choose silence as a protective strategy. Such silence may arise from a desire to avoid retraumatization (trauma-induced silence) in themselves and their children or from an effort to shield children from secondary stigma (protective concealment). In this way, transgenerational harm creates a paradox: while the consequences of extreme violence remain visible in family life, the stories that would explain or politicize those traces may be deliberately withheld. In such cases, family-based intergenerational transmission is unlikely to occur, and second-generation survivors are no more likely to hold anti-militarist preferences than individuals without such family experience.

H1B (Family Silence Hypothesis)

Second-generation atomic bomb survivors are no more likely to hold anti-militarist preferences than individuals with no such family experience

2.4 Role of Memorial Institutions in Family Transmission

I conceptualize memorial institutions as formalized infrastructures of collective memory, established by local, municipal, or state authorities. These institutions mobilize institutional resources to facilitate the formation, preservation, and transmission of historical memory. Specifically, they operate through both material and performative modes of commemoration. Material forms include monuments (Rozenas and Vlasenko, 2022), mass graves (Renshaw, 2016), street names (Villamil and Balcells, 2021), and memorial museums (Balcells, Palanza and Voytas, 2022). Performative forms encompass commemorative ceremonies, memorial services, and ritual gatherings (Kertzer, 1988; Olick, 2013).

While memorial institutions play a central role in shaping collective memory, their mechanisms of intergenerational transmission differ in important ways from those of family- and community-based transmission.[12] These two channels overlap in purpose but diverge along two key dimensions. First, family- and community-based transmission occurs within intimate networks of victims' households, where narratives emerge organically from personal experience, whereas memorial institutions are deliberately structured to reach broader publics, including those with no direct ties to victims. Second, informal exchanges in family or community settings allow considerable autonomy over content and framing, while institutional channels impose standardized scripts and symbolic frameworks. Through formal channels—such as school curricula, museum exhibitions, and state-sponsored commemorations—memorial institutions convert private testimonies into curated, socially sanctioned narratives. These institutionalized mechanisms not only amplify the reach of memory but also centralize narrative control, effectively steering collective remembrance toward politically authorized meanings.

[12]Here, following the definition provided by Charnysh and Peisakhin (2022), community denotes a network of victimized family units that engage in regular interaction based on shared experiences and social proximity. Accordingly, community transmission refers to the diffusion of memories and attitudes through informal conversations and gatherings, absent formal institutional mediation.

These dynamics are particularly visible in the cases of Hiroshima and Nagasaki, where municipal governments have actively institutionalized the memory of the atomic bombings. In both cities, state authorities have mobilized institutional resources by embedding bombing narratives into public education (Moody, 2006; Romano, Werblow and Williams, 2022), establishing memorial museums (Utaka, 2008; Van den Dungen and Yamane, 2015), preserving bombing sites (Ide, 2007), and organizing annual commemorative rituals (Fukuda, 2015; Nemoto, 2019). At the same time, memorial institutions in the atomic-bombed cities exercise selective control over the agents and content of memory transmission. Since 2012, for instance, the Hiroshima municipal government has operated the Atomic Bomb Testimony Successor Training Program, which recruits and trains designated memory messengers. Trainees complete a multi-year program and are formally commissioned to deliver peace lectures in schools, museums, and official events. This structure enables the city government to regulate which stories are told, how they are framed, and who is authorized to speak, thereby aligning collective memory with institutionally curated narratives.[13]

Memorial institutions may intervene in family-based transmission in two theoretically distinct ways. On one hand, they may reinforce family transmission by transforming private trauma into a socially validated narrative.[14] Survivors who might otherwise remain silent—due to psychological trauma or fear of stigma—may feel more empowered to speak when their experiences are framed as part of a legitimate collective history. Public commemoration also lowers the perceived social and psychological costs of disclosure, facilitating family-based transmission of atomic bombing experiences and related attitudes. The observable implication is that parental efforts to transmit their experiences and political values

[13]Both Hiroshima and Nagasaki operate official training programs to institutionalize the transmission of survivor testimonies. For details, see Hiroshima's program at https://www.city.hiroshima.lg.jp/site/peace/9805.html and Nagasaki's program at https://www.peace-wing-n.or.jp/inheriting/training-storytellers/.

[14]This corresponds to the complementarity regime in Bisin and Verdier (2001), in which family and societal transmission reinforce each other.

should increase, and the frequency of family conversations about these experiences and values should be higher where memorial institutions are present.

H2A (Institutional Reinforcement Hypothesis)

Atomic bomb survivors in Hiroshima and Nagasaki are more likely than those in other regions to actively transmit their experiences and anti-militarist preferences to their children

On the other hand, memorial institutions may substitute for family-based transmission. Standardized narratives disseminated through museums, peace education, and civic rituals may reduce survivors' perceived need—or obligation—to recount painful personal stories at home. Survivors may defer to institutional narratives to protect their children from secondary trauma, stigma, or anxiety about genetic health risks.[15] When this occurs, institutional messaging can crowd out or silence the intimate, affective content that only family narratives can provide. The observable implication is that parental efforts to transmit their experiences and political values should decline, and the frequency of family conversations about these experiences and values should be lower where memorial institutions are present.

H2B (Institutional Substitution Hypothesis)

Atomic bomb survivors in Hiroshima and Nagasaki are less likely than those in other regions to actively transmit their experiences and anti-militarist preferences to their children

I next theorize the broader influence of memorial institutions as a distinct pathway of intergenerational transmission. In Hiroshima and Nagasaki, memorial institutions channel survivors' experiences into public education, museum exhibits, and commemorative rituals. As a result, second-generation survivors are exposed to both family-mediated narratives and institutional messaging. By contrast, second-generation survivors living outside these cities

[15]This parallels the substitutability regime in Bisin and Verdier (2001), in which societal transmission reduces families' incentives to engage in costly private socialization.

rely primarily on intimate family transmission, as formal memorial institutions are weak or absent. Whether institutional transmission reinforces or substitutes for family transmission is an open empirical question. Yet regardless of the direction of interaction, the combined effect of family-based transmission and sustained institutional exposure should produce stronger anti-militarist orientations among second-generation survivors in Hiroshima and Nagasaki than among their counterparts elsewhere. This leads to the memorial institution hypothesis.

H3 (Memorial Institution Hypothesis)

Second-generation atomic-bomb survivors in Hiroshima and Nagasaki will express stronger anti-militarist preferences than their counterparts in regions without formal memorial institutions

3 Research Design

3.1 Identification Strategy

I leverage a natural experiment to estimate the effect of parental exposure to the atomic bombings on their children's foreign-policy preferences. The case of Hiroshima and Nagasaki satisfies the two identifying assumptions for a natural experiment: (1) probabilistic treatment assignment and (2) pre-treatment covariate balance between the treated and control cities—and, by extension, the populations residing in them (Titiunik, 2021; Dunning, 2012; Sekhon and Titiunik, 2012).

The first criterion—probabilistic treatment assignment—is satisfied because the bombs' eventual targets were determined by exogenous weather shocks that constrained the U.S. military's visual bombing protocol. Under this protocol, pilots were prohibited from using radar to release the bomb and were required to visually identify the military target before detonation. Given the highly unpredictable summer weather in Japan, the War Department

designated multiple potential targets—Hiroshima, Kokura, and Nagasaki—and authorized pilots to divert if cloud cover prevented visual confirmation of the primary target.[16]

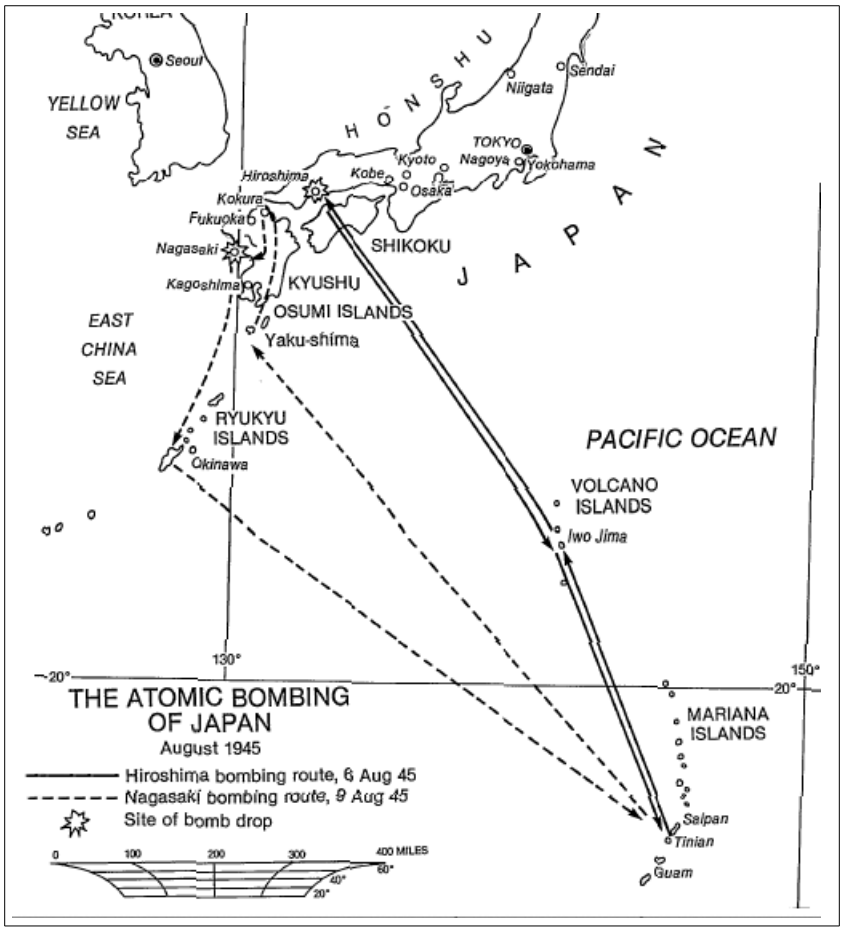


Figure 1: Flight paths for the atomic bombing missions in August 1945. Source: U.S. Department of Energy, Office of History and Heritage Resources, "The Manhattan Project: An Interactive History."

This protocol generated as-if random assignment. In the first mission (CENTERBOARD I), clear skies enabled the Enola Gay to release Little Boy over Hiroshima rather than the secondary target, Kokura, or the tertiary target, Nagasaki. In the second mission (CENTERBOARD II), Kokura—the designated primary target—was unexpectedly obscured by

[16]For instance, the Target Committee explicitly acknowledged the severity of weather uncertainty during its deliberations, as reflected in declassified documents: "The months in which the initial mission will be run constitute the worst weather months of Japan... [We] have three good days in the month of August but these three good days could not be positively predicted in advance of more than 48 hours." Refer to U.S. War Department. (1945). Notes on Initial Meeting of Target Committee, May 2, 1945.

heavy ground haze and smoke. After three unsuccessful bombing runs, the Bockscar diverted to the secondary target, Nagasaki, where Fat Man was released. Weather-induced visibility constraints therefore determined which cities were bombed, satisfying the requirement of probabilistic treatment assignment.

The second criterion—pre-treatment covariate balance—is satisfied because the three potential target cities were highly similar in their pre-atomic-bombing characteristics. This similarity was both a reason for their selection and a direct consequence of the targeting protocol. On the one hand, the Target Committee selected candidate cities according to criteria such as population size, urbanization, industrial output, and military or strategic value.[17] All three cities were major urban centers with populations of several hundred thousand and important roles in Japan's war economy: Hiroshima served as the commercial hub of the Chūgoku region with military supply depots and light industry; Nagasaki hosted major naval shipyards; and Kokura contained one of Japan's largest arsenals producing small arms and artillery shells. On the other hand, once designated as preliminary targets, these cities were deliberately spared from conventional air raids—the Committee explicitly requested this to ensure that the bombs' effects could be observed on intact urban environments.[18] As a result, unlike heavily bombed cities such as Tokyo, Nagoya, and Osaka, the three candidate cities remained relatively unscathed prior to August 1945.

Under Japan's wartime economy, city-level characteristics translated directly into the demographic and socioeconomic composition of their residents. Industrial structure, occupational distributions, and population size were closely linked, such that cities with similar economic and strategic profiles also exhibited highly comparable individual-level characteristics. Census data from the 1940 Population Census corroborates this pattern: residents of Hiroshima, Kokura, and Nagasaki shared similar demographic and occupational profiles

[17] U.S. War Department. (1945). Notes on Initial Meeting of Target Committee, May 12, 1945.
[18] Refer to the Supplementary Information (hereinafter, SI) for declassified documents on target selection.

prior to the atomic bombings (Bureau of Statistics, Office of the Prime Minister, 1940*a*,*b*).

With both criteria satisfied, I leverage the natural experiment of the atomic bombings in Japanese cities as an identification strategy. The treatment group consists of second-generation atomic bomb survivors whose parents were exposed in Hiroshima or Nagasaki, while the control group comprises individuals of the same generation in Kokura whose parents lived in what would have been the hypocenter had the bomb not been diverted to Nagasaki. Consistent with the aggregate-level similarity documented above, pre-treatment parental characteristics in the two groups are closely balanced. Most pre-bombing parental demographic and socioeconomic characteristics exhibit close covariate balance across groups (SMD < 0.10).[19]

3.2 Data Collection

Research on descendants of atomic bomb survivors requires an unusually rigorous ethical framework and a carefully designed sampling strategy. Descendants constitute a highly vulnerable population: inquiries about the bombings can trigger retraumatization, fears of transgenerational biological harm, and the enduring effects of social stigma, which have made many deeply reluctant to identify themselves or discuss their experiences with outsiders. These ethical constraints interact with a nontrivial sampling challenge. Without access to trusted networks, researchers can reach only a small minority of descendants who are publicly active in survivor movements, or those who—having heard little or nothing from their parents about the bombings—feel relatively unburdened when responding to such questions.

To address ethical concerns, I developed and implemented a three-step precautionary

[19]The only exception is parental gender, which exhibits a modest difference (SMD ≈ 0.18). This could raise concerns about selective attribution. However, parental gender is not theoretically related to treatment assignment (exposure to the atomic bombings) or to the formation of children's anti-militarist preferences. Sensitivity analyses in the SI further show that the main results in Table 3 are robust to confounding strengths more than five times greater than what parental gender could plausibly generate.

protocol designed to prevent retraumatization of human subjects. The protocol consisted of: (1) expert review[20] of all survey items by local specialists familiar with survivor communities; (2) intensive training of research assistants in research ethics, including mock interviews with descendants of atomic bomb survivors; and (3) pilot surveys with a small number of participants to monitor potential short-term and medium-term harms. After revising the survey instrument based on expert feedback, completing RA training, and confirming through pilot surveys that no harm was observed, I proceeded with full-scale data collection.

I employed a multi-pronged recruitment strategy to reach research participants. I worked closely with national and local second-generation survivor organizations (e.g., the National Liaison Council of Second-Generation Atomic Bomb Survivor Organizations), which provided credible access to descendants registered within survivor organizations. Although this strategy enabled reliable engagement with affiliated descendants, it could not reach the large share of second-generation survivors who are not members of any formal organization. To overcome this limitation, I collaborated with local governments, social and political associations, community centers, and medical and elder-care institutions. I distributed formal research cooperation letters through these organizations and recruited participants through their outreach channels. Yet even these networks risked undersampling second-generation survivors who, due to work and family responsibilities, are not connected to community organizations of any kind. To address this remaining gap, I contracted an online survey firm (Cross Marketing) to recruit additional descendants through randomized sampling within its national panel.

I conducted extensive fieldwork in Japan and administered in-person, telephone, and online surveys to collect data from second-generation atomic bomb survivors and from de-

[20]Experts included officials from atomic bomb survivor and second-generation survivor organizations, as well as former and current doctors and counselors at hospitals and elder-care institutions serving atomic bomb survivors and their descendants.

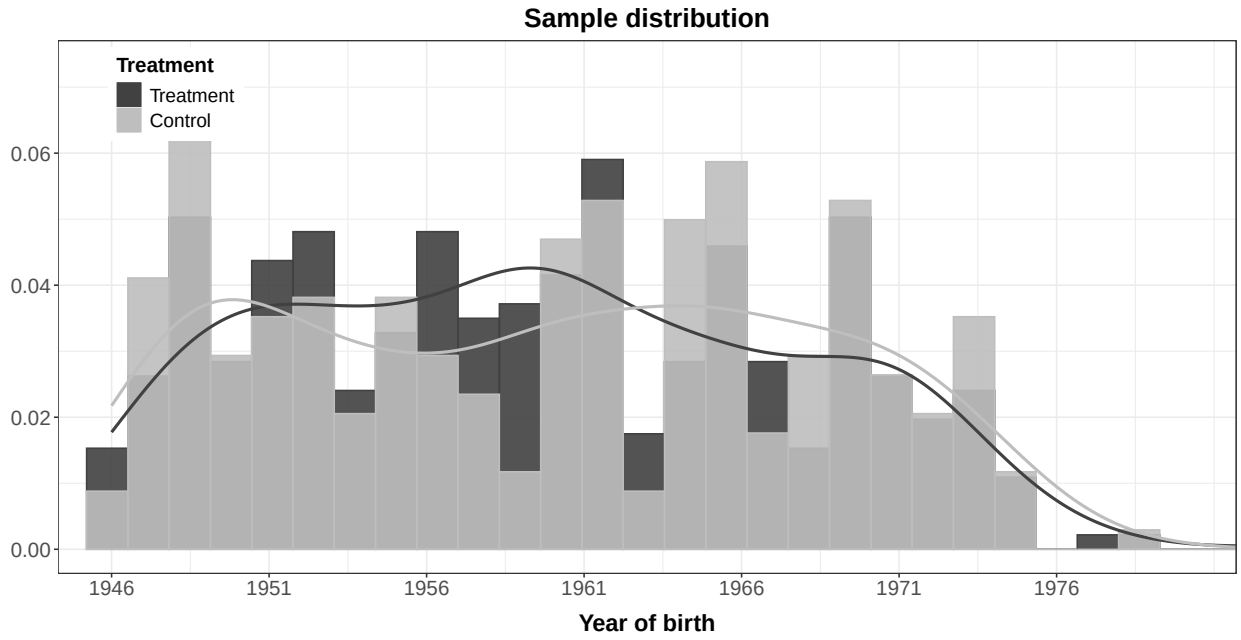


Figure 2: Sample distribution by year of birth

scendants of the wartime generation in Kokura. Local research assistants carried out the in-person and telephone interviews under my supervision, while online surveys enabled participation among individuals who were unable to attend in-person sessions due to time or distance constraints. Through this multi-modal data collection strategy, I collected original survey data from both the treatment and control groups. The treatment group consists of descendants whose parents were exposed to the atomic bombings and includes two subgroups defined by the presence or absence of memorial institutions: descendants residing in Hiroshima and Nagasaki, where formal memorial institutions are present (N = 233), and descendants residing outside these cities, where such institutions are absent (N = 116). The control group comprises descendants whose parents lived in Kokura at the time the atomic bomb was dropped on Nagasaki (N = 260).[21]

[21]Of the 349 second-generation survivors in my sample, 50.14 percent were recruited through in-person fieldwork and 49.86 percent through the online survey. In the control group of 260 respondents, 49.23 percent were recruited through in-person fieldwork and the remaining 50.77 percent through the online survey.

3.3 Estimation Strategy

$$Y_i = \alpha + \beta_1 T_i + \delta X_i + \epsilon_i$$

I estimate the above equation to examine the intergenerational effects of exposure to atomic bombings on foreign policy preferences. The treatment variable, T_i, indicates parental exposure to the atomic bombings: $T_i = 1$ denotes that at least one parent was directly exposed in Hiroshima or Nagasaki, while $T_i = 0$ denotes no direct exposure in Kokura. In this setup, second-generation atomic bomb survivors constitute the treatment group, and second-generation descendants of the war generation in Kokura serve as the control group.

X_i is a vector of parental pre-treatment covariates for those who were exposed either to the atomic bombings in Hiroshima or Nagasaki, or to conventional war in Kokura. Demographic controls include parental age and gender, while socioeconomic controls include parental employment status, military service, education, and religion. I do not include post-treatment covariates (e.g., characteristics of second-generation descendants) to avoid introducing post-treatment bias in the estimation.

Y_i denotes the outcome variables, which include two sets of foreign policy preferences: nuclear weapons–related policy preferences and anti-militarist policy preferences. I measure nuclear weapons–related foreign policy preferences by constructing a use index and an acquisition index. I measure anti-militarist policy preferences using survey items tailored to the Japanese security context.

However, measuring nuclear weapons–related outcomes raises particular concerns about social desirability bias. Because atomic bomb survivors occupy a highly symbolic position in Japan's anti-nuclear movement, their descendants may feel pressure to report attitudes that conform to prevailing social norms rather than their genuine views. To mitigate this risk, I employ scenario-based survey items that embed respondents in realistic strategic trade-offs

involving nuclear options, prompting them to articulate their true preferences rather than default to socially desirable responses.

In the use index, I present survey respondents with hypothetical but realistic scenarios involving the use of nuclear weapons against North Korea under the United States–Japan alliance, as illustrated in Figure 1. Respondents are sequentially shown scenarios with varying levels of civilian casualties in preventive military strikes against North Korea. They are also presented with scenarios that vary the relative military effectiveness of nuclear versus conventional weapons in preemptive strikes against North Korea. I measure the number of scenarios in which respondents support the use of nuclear weapons. Accordingly, the use index ranges from 0 (no support in any scenario) to 5 (support in all five scenarios).

US-JPN military operation	Costs and benefits of nuclear strikes		
Preventive strike	Civilian casualty	High	1 - 1.5 million
		Low	less than 100
Preemptive strike	Military effectiveness	Nuclear 90%	Conventional 90%
		Nuclear 90%	Conventional 60%
		Nuclear 90%	Conventional 45%

Table 1: Summary of hypothetical nuclear-weapons scenarios based on military simulations (Son, Ham and Yim, 2024)

In the acquisition index, I present survey respondents with hypothetical but realistic scenarios involving the acquisition of nuclear weapons by Japan under heightened external security threats, as illustrated in Figure 2. These scenarios depict substantially increased security threats, making nuclear weapons development a plausible policy option for Japan.[22] I manipulate the external security environment by varying the presence of nuclear threats from neighboring countries and the withdrawal of extended nuclear deterrence by the United States. I measure the number of scenarios in which respondents support the acquisition of

[22]For the relationship between security threats and nuclear proliferation, see Sagan (1996); Monteiro and Debs (2014); Reiter (2014).

indigenous nuclear weapons. Accordingly, the acquisition index ranges from 0 (no support in any scenario) to 5 (support in all five scenarios).

	Type of security threat	Scenario
1	Security Threat	North Korea's increased nuclear threats
2	Security Threat	China's repudiation of the no-first use doctrine
3	Security Threat	South Korea's acquisition of independent nuclear weapons
4	Security Commitment	US withdrawal of extended nuclear deterrence

Table 2: Summary of hypothetical scenarios on the acquisition of nuclear weapons

More general anti-militarist policy preferences are measured using a set of survey items designed to capture respondents' orientations toward Japan's military expansion and constitutional pacifism. Specifically, I include three items that ask whether respondents support or oppose revising Article 9 of the Japanese Constitution (the war-renouncing clause), increasing Japan's defense spending, and expanding the scale of the Self-Defense Forces (SDF). These items directly tap into foreign policy preferences for maintaining or relaxing Japan's postwar anti-militarist stance. Respondents indicate their level of support or opposition on a seven-point Likert scale, ranging from "strongly oppose" to "strongly support."

4 Results

4.1 Family Transmission

I first examine the regression results for the family transmission (H1A) and silence (H1B) hypotheses. The results in Table 3 support the family transmission hypothesis. Compared with the control group, second-generation atomic bomb survivors are significantly more likely to display strong aversion to nuclear weapons, opposing both their use and their acquisition. They also exhibit stronger anti-militarist preferences more broadly, including greater opposition to revising the Peace Constitution, increasing the defense budget, and expanding the

Self-Defense Forces.

These findings indicate that family transmission can occur even under conditions of extreme wartime violence. Extreme violence leaves highly visible anti-personnel effects and generates consequential transgenerational harm for both survivors and their descendants. However, such transgenerational harm does not impede intergenerational value transmission. Rather, family transmission persists as survivors convey their anti-nuclear and anti-militarist preferences to their children.

Table 3: Family transmission

	Dependent variable				
	Atomic aversion		Anti-militarism		
	Use index	Acquisition index	Revise peace constitution	Increase defense budget	Increase self-defense force
	(1)	(2)	(3)	(4)	(5)
Parental exposure to the atomic bombings	-0.567^{***}	-0.559^{***}	-1.119^{***}	-1.025^{***}	-1.050^{***}
	(0.129)	(0.140)	(0.169)	(0.150)	(0.151)
DV mean	1.00	1.05	3.03	3.39	3.63
Control: parental demographic	✓	✓	✓	✓	✓
Control: parental socioeconomic	✓	✓	✓	✓	✓
Sample size	609	609	609	609	609

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

I next examine the channels through which family transmission occurs. Specifically, I assess whether the two groups differ in the frequency of family discussions—an explicit form of transmission—about wartime experiences and about peace and opposition to nuclear weapons. Results in SI Table 5 show that children of atomic bomb survivors are significantly more likely than those in the control group to have heard both accounts of wartime experiences and explicit messages advocating peace and rejecting nuclear weapons. These findings indicate that parental exposure to the atomic bombings increases family conversations about both experiences and attitudes, which in turn helps explain the attitudinal differences between descendants of atomic bomb survivors and those in the control group.

4.2 Role of Memorial Institutions in Family Transmission

I present regression results testing the hypotheses related to memorial institutions. In these analyses, I restrict the sample to descendants of atomic bomb survivors and compare those living in Hiroshima and Nagasaki with those living outside these cities to assess the role of memorial institutions.

I first examine the institutional reinforcement (H2A) and substitution (H2B) hypotheses, which predict that memorial institutions either reinforce or substitute for family transmission by increasing or decreasing the frequency of family conversations. The results in Table 4 support the institutional reinforcement hypothesis. Second-generation survivors in Hiroshima and Nagasaki report more frequent family conversations about the atomic bombing and more discussions of peace and opposition to nuclear weapons than do second-generation survivors living outside these cities. This pattern indicates that memorial institutions reinforce family transmission, as reflected in the greater frequency of both experiential and attitudinal conversations within survivor families.

Table 4: Frequency of family discussion under the memorial institutions

	Dependent variable: family discussion on	
	atomic bombing experience	peace & anti-nuclear weapons
	(1)	(2)
Memorial institutions	1.186*	1.868**
in Hiroshima and Nagasaki	(0.686)	(0.726)
DV mean	8.41	7.46
Control: parental characteristics	✓	✓
Sample size	349	349

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

Next, I present the results testing the memorial institutions hypothesis, which posits that second-generation atomic bomb survivors living in Hiroshima and Nagasaki should hold stronger anti-militarist preferences than their counterparts living outside these cities

due to the combined influence of family transmission and institutional transmission through memorial institutions. Table 5 supports this expectation. Second-generation survivors in Hiroshima and Nagasaki are significantly more likely to oppose both the use and the acquisition of nuclear weapons, and they are also more likely to endorse anti-militarist foreign policy positions. Taken together, these findings suggest that exposure to memorial institutions reinforces the political lessons transmitted within families, producing stronger anti-nuclear and anti-militarist preferences than family transmission alone.

Table 5: Anti-militarist preferences under the memorial institutions

	Dependent variable				
	Atomic aversion		Anti-militarism		
	Use index	Acquisition index	Revise peace constitution	Increase defense budget	Increase self-defense force
	(1)	(2)	(3)	(4)	(5)
Memorial institutions in Hiroshima and Nagasaki	-0.579^{***} (0.183)	-0.468^{***} (0.194)	-1.061^{***} (0.256)	-0.755^{***} (0.209)	-0.860^{***} (0.214)
DV mean	0.75	0.81	2.52	2.95	3.18
Control: parental demographic	✓	✓	✓	✓	✓
Control: parental socioeconomic	✓	✓	✓	✓	✓
Sample size	349	349	349	349	349

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

4.3 Mechanisms

4.3.1 Family Transmission

Family discussion is the primary channel through which parents transmit personal experiences and political attitudes to their children. To explore what is being transmitted, I analyze how variation in the content and frequency of these conversations—among second-generation survivors themselves—relates to their factual knowledge of the bombings and their foreign policy preferences. I distinguish between two dimensions of family discussion. *Experiential transmission* captures how often survivors recount their own bombing experi-

ences, whereas *attitudinal transmission* captures how often they articulate anti-nuclear or peace-oriented views. This distinction allows a direct assessment of whether *factual experience* or *value-laden political messaging* plays a greater role in shaping second-generation survivors' historical knowledge and policy preferences.

Table 6: Mechanisms underlying family transmission

	Dependent variable:					
	Knowledge	Policy preferences		Knowledge	Policy preferences	
	Quiz score	Use index	Acquisition index	Quiz score	Use index	Acquisition index
	(1)	(2)	(3)	(4)	(5)	(6)
Experiential transmission	0.085***	−0.018	−0.005			
(Discussion on atomic bombing experience)	(0.020)	(0.012)	(0.014)			
Attitudinal transmission				0.093***	−0.028**	−0.022*
(Discussion on peace and anti-nuclear attitudes)				(0.017)	(0.011)	(0.013)
DV mean	4.26	0.75	0.81	4.26	0.75	0.81
Control: parental demographic	✓	✓	✓	✓	✓	✓
Control: parental socioeconomic	✓	✓	✓	✓	✓	✓
Sample size	349	349	349	349	349	349

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

The results in Table 6 show that attitudinal transmission plays a stronger role than experiential transmission in passing down both experience and political orientations. Experiential transmission—how often survivors recount the bombing—increases second-generation survivors' factual knowledge but does not shape their anti-nuclear policy preferences (Columns 2–3). In contrast, attitudinal transmission—how often survivors articulate peace and anti-nuclear views—increases factual knowledge and also strengthens opposition to the use and acquisition of nuclear weapons (Columns 4–6). Taken together, these results indicate that it is not the passive recounting of experience but the *active communication of value-laden attitudes* that drives the intergenerational transmission of both experience and its associated political lessons.

4.3.2 Memorial Institutions

Memorial institutions are state-supported infrastructures that curate, preserve, and publicly transmit the historical memory of the atomic bombings through museums, commemorative events, and peace-education programs. Earlier analysis shows that second-generation survivors residing in Hiroshima and Nagasaki exhibit substantially stronger anti-nuclear and anti-militarist preferences than their counterparts living elsewhere (Table 5). Yet residence alone may be an imprecise proxy for exposure to these institutions: some descendants engage actively with museums and commemorative activities, while others may have little direct contact despite living in the same city. To address this concern and evaluate the mechanism more directly, I construct an individual-level index of memorial-institution exposure that captures respondents' participation in museums, commemorative events, peace-education initiatives, and related activities. This index enables a direct test of whether variation in personal engagement with memorial institutions amplifies the family-based transmission of experience and political attitudes.

I operationalize exposure to public education and commemorative activities under memorial institutions using two separate indexes. `School Index` captures institutionalized peace education by measuring whether respondents attended elementary, middle, and high schools in Hiroshima or Nagasaki. The index ranges from 0 to 3, where 0 indicates no schooling in these cities and 3 indicates attendance at all three levels under the memorial-institution curriculum. `Memorial Index` captures experiential exposure to commemoration, including visits to the atomic bomb museum and participation in city-level memorial ceremonies. This index ranges from 0 to 2, where 0 indicates no direct exposure to either activity and 2 indicates exposure to both.

Regression analyses in Table 7 reveal a clear divergence between the effects of schooling and commemorative participation on intergenerational dialogue. Exposure to memorial

Table 7: Memorial institutions and family transmission

	Dependent variable: family discussion on	
	atomic bombing experience	peace & anti-nuclear weapons
	(1)	(2)
School index	−0.025	−0.194
	(0.275)	(0.283)
Memorial index	1.291***	2.164***
	(0.496)	(0.503)
DV mean	8.41	7.46
Control: parental demographic	✓	✓
Control: parental socioeconomic	✓	✓
Sample size	349	349

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

institutions through museum visits and city-level memorial services is strongly and positively associated with the frequency of conversations between second-generation survivors and their parents about the bombing experience and about peace and anti-nuclear attitudes. In contrast, attending elementary, middle, and high school in Hiroshima or Nagasaki shows no statistically significant relationship with either form of conversation.

This pattern suggests that commemorative participation—unlike school-based instruction—creates meaningful opportunities for families to revisit and reinterpret bombing experiences and the political lessons attached to them together. Because museum visits and memorial ceremonies are voluntary, emotionally charged, and context-rich, they appear to prompt renewed family dialogue and thereby reinforce familial transmission. By contrast, school-based instruction, while mandatory and universal, may lack the immediacy or personal resonance needed to sustain intergenerational discussion. Taken together, these results imply that memorial institutions complement family transmission most effectively when they provide voluntary settings that encourage reflection and conversation beyond the classroom.[23]

[23]Because the data do not capture the timing of participation, these results should be interpreted as correlational rather than causal. Individuals who are already more inclined toward family discussion may also be more likely to engage in commemorative activities.

4.4 Alternative Explanations

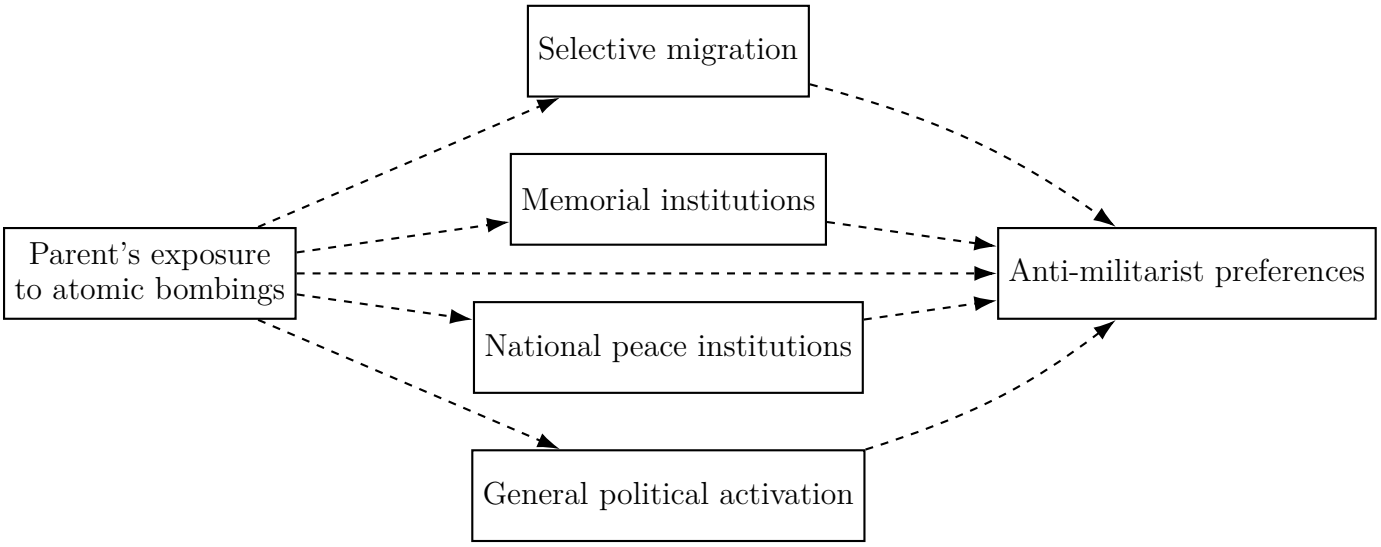


Figure 3: Alternative explanations

4.4.1 Selective Migration

One alternative explanation is selective migration—atomic bomb survivors or their descendants choosing whether to live inside or outside Hiroshima and Nagasaki based on their political attitudes. I provide evidence against this possibility at both the parental and second-generation levels. For the first generation, historical demographic patterns offer little support for attitude-based sorting. Population movements during the 1940s and early 1950s were driven primarily by state-directed wartime mobilization, mass evacuation, and postwar repatriation—not by individual political preferences.[24] Wartime inflows into Hiroshima and Nagasaki reflected the relocation of workers to military industries (Tani, 2012), and postwar population recovery resulted largely from the return of evacuees and wartime migrants. Crucially, the period of most intense migration (1945–1952) coincided with strict U.S. occupation censorship, which suppressed public discussion of the atomic bombings and prevented

[24]Refer to the Japanese cabinet decision on Principles of National Policy Under the Current Situation (現情勢下ニ於ケル政運要綱, September 1943) and Urban Evacuation Implementation Outline (都市疎開施要綱, December 1943).

the emergence of anti-nuclear activism (Dower, 2015; Brau, 2017). With no public sphere in which anti-nuclear attitudes could form or be expressed, residential decisions were unlikely to reflect political preferences.

Selective migration among the second generation is also unlikely to account for the findings. Of the 349 second-generation respondents, only 54 were born in Hiroshima or Nagasaki and later moved elsewhere, and just 8 relocated into these cities—patterns inconsistent with large-scale political sorting. The timing of these moves further weakens this explanation: if militarist orientations shaped residential decisions, out-migration should have occurred during adolescence, when peace education could most strongly influence attitudes. Yet 32 of the 54 out-migrants completed all levels of schooling locally before leaving, suggesting that their moves reflected employment or economic opportunities typical of early adulthood rather than political beliefs. To empirically substantiate this interpretation, I compare the anti-nuclear and anti-militarist attitudes of second-generation survivors who migrated out with those who remained. As reported in SI Table 6, the two groups exhibit no meaningful attitudinal differences, providing no evidence that selective migration accounts for the observed intergenerational transmission.

4.4.2 Memorial Institutions

Another alternative explanation is that the apparent family transmission observed among second-generation atomic bomb survivors in Hiroshima and Nagasaki reflects intensive exposure to the memorial institutions in these cities. This concern is reinforced by prior work showing a counterintuitive pattern: individuals with familial ties to survivors—not limited to direct descendants but including distant relatives—exhibit weaker opposition to nuclear weapons development than those who resided in Hiroshima or Nagasaki (Kikuchi, 2025). If institutional transmission—rather than familial transmission—drives anti-militarist orienta-

tions, then second-generation survivors should display attitudes that are no stronger than those of local residents who have been equally exposed to the same memorial environment.

To conduct a falsification test of this alternative explanation, I compare second-generation survivors in Hiroshima and Nagasaki with a placebo population (N = 123): local residents who were born, raised, and currently reside in the two cities but have no family ties to atomic bomb survivors. This placebo group provides a hard test of the alternative explanation, as they are maximally exposed to memorial institutions yet entirely lack family transmission from atomic bomb survivors. If memorial institutions alone account for the observed patterns, the two groups should exhibit similar attitudes. Conversely, if family transmission has independent effects, second-generation survivors should continue to display stronger anti-militarist orientations even relative to this placebo population.

Table 7 in SI provides empirical evidence against this alternative explanation. Second-generation atomic bomb survivors in Hiroshima and Nagasaki exhibit stronger anti-nuclear and anti-militarist preferences than their local peers. Because both groups are equally exposed to the state-level memorial infrastructure in Hiroshima and Nagasaki, these differences cannot be attributed to institutional socialization. Rather, they provide strong evidence against the memorial-institution alternative explanation and demonstrate the independent role of family transmission in conveying anti-militarist political lessons.

4.4.3 National Peace Institutions

Another alternative explanation concerns Japan's distinctive postwar political environment. Japan has institutionalized pacifism through Article 9 of the Constitution, the Three Non-Nuclear Principles, and nationwide commemorations of the atomic bombings (Berger, 1993; Katzenstein, 2018). This national-level peace infrastructure raises the possibility that the intergenerational transmission observed in Japan may simply reflect its uniquely support-

ive institutional context rather than a more general mechanism. To address this concern, I collected original data from South Korean descendants of atomic bomb survivors (N = 150)—a context with no nationwide peace institutions, no state recognition of survivors until 2016, and persistent nuclear threats from North Korea. In Korea, where no comparable peace or memorial infrastructures existed, family narratives remained the primary—if not the sole—channel through which memories and political lessons of the atomic bombings could be transmitted across generations.

I examine whether family transmission operates similarly in this institutionally distinct environment. Empirical evidence in SI Table 8 shows that the frequency of family conversations is strongly associated with anti-nuclear preferences in simple OLS regressions. To mitigate concerns about reverse causality, I use an instrumental variable capturing whether a respondent's parent lost an acquaintance to atomic-bomb–related causes—an event that survivors frequently report as prompting them to share their experiences. Although the instrument exhibits moderate relevance (first-stage F = 6.03), the IV estimates closely mirror the OLS coefficients in sign and substantive magnitude. These results strengthen the external validity of the argument by demonstrating that family transmission persists even in the absence of national peace institutions.

4.4.4 General political activation

Another concern is that parental exposure to the atomic bombings may have generated a broad form of political activation among their descendants. Under this alternative explanation, second-generation survivors might appear more anti-nuclear or anti-militarist not because of transmission specific to extreme violence, but simply because they are more politically engaged or more inclined toward a wide range of pro-social policy positions.[25]

[25]This explanation is consistent with prior findings that exposure to — or resistance against — violence increases political participation and pro-social behavior (Blattman, 2009; Gilligan, Pasquale and Samii, 2014;

To adjudicate this possibility, I conduct a placebo outcome test. The test evaluates whether intergenerational transmission is specifically focused on domains theoretically linked to extreme violence or instead reflects a generalized political activation. I include one outcome variable directly tied to nuclear weapons and two placebo outcome variables that are unrelated to militarism: support for imposing higher tariffs to protect domestic industries and support for accepting more immigrants. These issues were selected precisely because neither protectionist trade policy nor economic immigration attitudes bears any theoretical connection to atomic bombing experiences or to the political messages transmitted through families.

Results in SI Table 9 do not support the alternative explanation. As expected, parental exposure increases support for Japan's three non-nuclear principles while showing no effect on protectionist trade policy. The only placebo outcome that shifts is support for accepting more immigrants. Follow-up interviews indicate that many respondents interpreted this item as referring specifically to refugees displaced by the Russian–Ukrainian war rather than to economic immigration. This pattern is consistent with previous research showing that exposure to extreme violence generates empathy-based altruism toward vulnerable war victims, which in turn reinforces aversion to the use of force (Son, 2025*a*). Thus, rather than contradicting the placebo logic, this result strengthens the interpretation that intergenerational transmission is anchored in political lessons tied directly to the human costs of war, not in generalized political activation.

Hartman and Morse, 2020; Son, 2025*b*).

5 Conclusions

This article shows that even the most extreme forms of wartime violence—and the political lessons they generate—can transmit across generations. Using the natural experiment of the atomic bombings, I find that descendants of survivors systematically inherit stronger anti-nuclear and anti-militarist preferences. This transmission occurs not through exposure to experience alone but through explicit, value-laden conversations in which survivors articulate the moral lessons of violence. State-led memorial institutions reinforce this process: by legitimating survivors' interpretations and reducing the stigma associated with extreme violence, they strengthen—rather than substitute for—the family-based transmission of political lessons from violence. These findings provide important policy implications for the design of postwar peacebuilding. Preventing renewed violence requires more than exposing citizens to value-neutral accounts of past harm; effective transmission of peace-oriented norms depends on value-laden narratives and context-rich commemorative practices—rather than mandatory, classroom-based instruction—to sustain the political lessons of violence across generations.

References

Acharya, Avidit, Matthew Blackwell and Maya Sen. 2016. "The political legacy of American slavery." *The Journal of Politics* 78(3):621–641.

Asahi Shimbun. 2025. "Survey of 3,564 Atomic Bomb Survivors: Main Questions and Answers, Joint Project with Chūgoku Shimbun and Nagasaki Shimbun [被爆者3564人アンケート　主な質問と回答　3社合同企]." https://www.asahi.com/articles/AST732D41T73PTIL017M.html. In Japanese. Accessed August 21, 2025.

Balcells, Laia. 2012. "The consequences of victimization on political identities: Evidence from Spain." *Politics & Society* 40(3):311–347.

Balcells, Laia, Valeria Palanza and Elsa Voytas. 2022. "Do transitional justice museums persuade visitors? Evidence from a field experiment." *The Journal of Politics* 84(1):496–510.

Bandura, Albert. 1969. "Social-learning theory of identificatory processes." *Handbook of socialization theory and research* 213:262.

Berger, Thomas U. 1993. "From sword to chrysanthemum: Japan's culture of anti-militarism." *International Security* 17(4):119–150.

Besley, Timothy and Marta Reynal-Querol. 2014. "The legacy of historical conflict: Evidence from Africa." *American Political Science Review* 108(2):319–336.

Bisin, Alberto and Thierry Verdier. 2001. "The economics of cultural transmission and the dynamics of preferences." *Journal of Economic theory* 97(2):298–319.

Blair, Christopher W and Michael C Horowitz. 2024. "Military Attitudes on the Chemical

Weapons Taboo: Evidence from the Pacific Theater." *The Journal of Politics* 86(3):1075–1082.

Blattman, Christopher. 2009. "From violence to voting: War and political participation in Uganda." *American political Science review* 103(2):231–247.

Bourdieu, Pierre and Jean-Claude Passeron. 1977. *Reproduction in Education, Society and Culture*. London: Sage Publications.

Bowers, Mallory E and Rachel Yehuda. 2016. "Intergenerational transmission of stress in humans." *Neuropsychopharmacology* 41(1):232–244.

Brau, Monica. 2017. *The atomic bomb suppressed: American censorship in occupied Japan*. Routledge.

Bureau of Statistics, Office of the Prime Minister. 1940*a*. *1940 Population Census of Japan. Volume I: Total Population, Sex, Age, Marital Status and Race or Nationality*. Tokyo: Bureau of Statistics, Office of the Prime Minister. Original title: 昭和15年勢調査報告 第一 人口男女の別年令配偶の係民族または籍.

Bureau of Statistics, Office of the Prime Minister. 1940*b*. *1940 Population Census of Japan. Volume II: Industry and Employment Status*. Tokyo: Bureau of Statistics, Office of the Prime Minister. Original title: 昭和15年勢調査報告 第二 産業事業上の地位.

Canetti, Daphna, Gilad Hirschberger, Carmit Rapaport, Julia Elad-Strenger, Tsachi Ein-Dor, Shifra Rosenzveig, Tom Pyszczynski and Stevan E Hobfoll. 2018. "Collective trauma from the lab to the real world: The effects of the holocaust on contemporary Israeli political cognitions." *Political Psychology* 39(1):3–21.

Canetti, Daphna, Julia Elad-Strenger, Iris Lavi, Dana Guy and Daniel Bar-Tal. 2017. "Exposure to violence, ethos of conflict, and support for compromise: Surveys in Israel, East Jerusalem, West Bank, and Gaza." *Journal of conflict resolution* 61(1):84–113.

Charnysh, Volha and Evgeny Finkel. 2017. "The death camp Eldorado: Political and economic effects of mass violence." *American political science review* 111(4):801–818.

Charnysh, Volha and Leonid Peisakhin. 2022. "The role of communities in the transmission of political values: Evidence from forced population transfers." *British Journal of Political Science* 52(1):238–258.

Cremaschi, Simone and Juan Masullo. 2024. "The political legacies of wartime resistance: How local communities in Italy keep anti-fascist sentiments alive." *Comparative Political Studies* p. 00104140241252094.

Curtis, George C. 1963. "Violence breeds violence—perhaps?" *American journal of Psychiatry* 120(4):386–387.

Dacre, Jack C and Max Goldman. 1996. "Toxicology and pharmacology of the chemical warfare agent sulfur mustard." *Pharmacological reviews* 48(2):289–326.

Dinas, Elias, Vasiliki Fouka and Alain Schläpfer. 2021. "Family history and attitudes toward out-groups: Evidence from the European refugee crisis." *The journal of politics* 83(2):647–661.

Doepke, Matthias and Fabrizio Zilibotti. 2017. "Parenting with style: Altruism and paternalism in intergenerational preference transmission." *Econometrica* 85(5):1331–1371.

Dohmen, Thomas, Armin Falk, David Huffman and Uwe Sunde. 2012. "The intergenerational transmission of risk and trust attitudes." *The Review of Economic Studies* 79(2):645–677.

Dower, John W. 2015. The bombed: Hiroshimas and Nagasakis in Japanese memory. In *United States and Asia at War: A Cultural Approach*. Routledge pp. 27–48.

Dũng, Phan Xuân. 2023. *Agent Orange Victims in Vietnam: Their Numbers, Experiences, Needs, and Sources of Support*. US Institute of Peace.

Dunning, Thad. 2012. *Natural experiments in the social sciences: A design-based approach*. Cambridge University Press.

Durkheim, Emile. 1956. *Education and sociology*. Simon and Schuster.

Federation of American Scientists. N.d. "Agent Orange and Dioxin: U.S. Government Reports.". Accessed July 2025.
URL: *https://sgp.fas.org/othergov/agent-orange/*

Figueiredo, Taiza H, James P Apland, Maria FM Braga and Ann M Marini. 2018. "Acute and long-term consequences of exposure to organophosphate nerve agents in humans." *Epilepsia* 59:92–99.

Fouka, Vasiliki and Hans-Joachim Voth. 2023. "Collective remembrance and private choice: German–Greek conflict and behavior in times of crisis." *American Political Science Review* 117(3):851–870.

Fukuda, Yu. 2015. "Transition of Rituals in the N agasaki C ity A tomic B omb M emorial C eremony." *International Journal of Japanese Sociology* 24(1):78–91.

Ghabili, Kamyar, Paul S Agutter, Mostafa Ghanei, Khalil Ansarin, Yunes Panahi and Mohammadali M Shoja. 2011. "Sulfur mustard toxicity: history, chemistry, pharmacokinetics, and pharmacodynamics." *Critical reviews in toxicology* 41(5):384–403.

Gilligan, Michael J, Benjamin J Pasquale and Cyrus Samii. 2014. "Civil war and social cohesion: Lab-in-the-field evidence from Nepal." *American Journal of Political Science* 58(3):604–619.

Grossman, Guy, Devorah Manekin and Dan Miodownik. 2015. "The political legacies of combat: Attitudes toward war and peace among Israeli ex-combatants." *International Organization* 69(4):981–1009.

Hartman, Alexandra C and Benjamin S Morse. 2020. "Violence, empathy and altruism: Evidence from the Ivorian refugee crisis in Liberia." *British Journal of Political Science* 50(2):731–755.

Hazlett, Chad. 2020. "Angry or weary? How violence impacts attitudes toward peace among Darfurian refugees." *Journal of Conflict Resolution* 64(5):844–870.

Hirsch-Hoefler, Sivan, Daphna Canetti, Carmit Rapaport and Stevan E Hobfoll. 2016. "Conflict will harden your heart: Exposure to violence, psychological distress, and peace barriers in Israel and Palestine." *British Journal of Political Science* 46(4):845–859.

Homola, Jonathan, Miguel M Pereira and Margit Tavits. 2020. "Legacies of the Third Reich: Concentration camps and out-group intolerance." *American Political Science Review* 114(2):573–590.

Horowitz, Michael C, Allan C Stam and Cali M Ellis. 2015. *Why leaders fight*. Cambridge University Press.

Ide, Kanako. 2007. "A symbol of peace and peace education: The Genbaku Dome in Hiroshima." *The Journal of Aesthetic Education* 41(4):12–23.

Jacobs, Robert. 2014. "The radiation that makes people invisible: A Global Hibakusha Perspective." *Asia-Pacific Journal* 12(31):e1.

Jennings, M Kent, Laura Stoker and Jake Bowers. 2009. "Politics across generations: Family transmission reexamined." *The Journal of Politics* 71(3):782–799.

Jennings, M Kent and Richard G Niemi. 1968. "The transmission of political values from parent to child." *American political science review* 62(1):169–184.

Kamiya, Kenji, Kotaro Ozasa, Suminori Akiba, Ohstura Niwa, Kazunori Kodama, Noboru Takamura, Elena K Zaharieva, Yuko Kimura and Richard Wakeford. 2015. "Long-term effects of radiation exposure on health." *The lancet* 386(9992):469–478.

Karami, Gholam-Reza, Javad Ameli, Rahim Roeintan, Nematollah Jonaidi-Jafari and Amin Saburi. 2013. "Impacts of mustard gas exposure on veterans mental health: A study on the role of education." *Industrial psychiatry journal* 22(1):22–25.

Katzenstein, Peter J. 2018. *Cultural norms and national security: Police and military in postwar Japan*. Cornell University Press.

Kertzer, David I. 1988. *Ritual, politics, and power*. Yale University Press.

Kikuchi, Masanori. 2025. "Legacies of the Atomic Bombings: Wartime Violence and Foreign Policy Attitudes." Working paper.

Kim, James D. 2024. "Fear or Anger? Leaders' Childhood War Trauma and Interstate Conflict Initiation." *International Studies Quarterly* 68(2):sqae069.

Ludlum, David B, Paula Austin-Ritchie, Miasnig Hagopian, Tian-Qi Niu and Dong Yu. 1994. "Detection of sulfur mustard-induced DNA modifications." *Chemico-biological interactions* 91(1):39–49.

Lupu, Noam and Leonid Peisakhin. 2017. "The legacy of political violence across generations." *American Journal of Political Science* 61(4):836–851.

Lyall, Jason. 2009. "Does indiscriminate violence incite insurgent attacks? Evidence from Chechnya." *Journal of Conflict Resolution* 53(3):331–362.

Monteiro, Nuno P and Alexandre Debs. 2014. "The Strategic Logic of Nuclear Proliferation." *International Security* 39(2):7–51.

Moody, Richard D. 2006. *Peace education curricula in selected schools of Hiroshima and Nagasaki*. Seattle University.

Nemoto, Masaya. 2019. "Remaking Hiroshima and Nagasaki: Local Commemorations of Atomic Bombings in the United States." *Journal for Peace and Nuclear Disarmament* 2(1):34–50.

Ohta, Yasuyuki, Mariko Mine, Masako Wakasugi, Etsuko Yoshimine, Yachiyo Himuro, Megumi Yoneda, Sayuri Yamaguchi, Akemi Mikita and Tomoko Morikawa. 2000. "Psychological effect of the Nagasaki atomic bombing on survivors after half a century." *Psychiatry and clinical neurosciences* 54(1):97–103.

Olick, Jeffrey K. 2013. *The politics of regret: On collective memory and historical responsibility*. Routledge.

Parsons, Talcott and Robert F. Bales. 1955. *Family: Socialization and Interaction Process*. Glencoe, IL: Free Press.

Reiter, Dan. 2014. "Security Commitments and Nuclear Proliferation." *Foreign Policy Analysis* 10(1):61–80.

Renshaw, Layla. 2016. *Exhuming loss: memory, materiality and mass graves of the Spanish Civil War*. Routledge.

Romano, Arthur, Jacob Werblow and Audrey Williams. 2022. "Evolving conceptualizations of peace education in Hiroshima, Japan." *Asian Journal of Peacebuilding* 10(2):411–434.

Rozenas, Arturas and Anastasiia Vlasenko. 2022. "The real consequences of symbolic politics: breaking the soviet past in Ukraine." *The Journal of Politics* 84(3):1263–1277.

Rozenas, Arturas, Sebastian Schutte and Yuri Zhukov. 2017. "The political legacy of violence: The long-term impact of Stalin's repression in Ukraine." *The Journal of Politics* 79(4):1147–1161.

Rozenas, Arturas and Yuri M Zhukov. 2019. "Mass repression and political loyalty: Evidence from Stalin's 'terror by hunger'." *American Political Science Review* 113(2):569–583.

Sagan, Scott D. 1996. "Why Do States Build Nuclear Weapons?: Three Models in Search of a Bomb." *International Security* 21(3):54–86.

Satkin, Mojtaba, Mostafa Ghanei, Abbas Ebadi, Sahar Allahverdi and Mahdi Elikaei. 2017. "The quality of life of mustard gas victims: A systematic review." *Tanaffos* 16(2):115.

Schnurr, Paula P, Matthew J Friedman and Bonnie L Green. 1996. "Post-traumatic stress disorder among World War II mustard gas test participants." *Military Medicine* 161(3):131–136.

Sekhon, Jasjeet S and Rocio Titiunik. 2012. "When natural experiments are neither natural nor experiments." *American Political Science Review* 106(1):35–57.

Sharkey, Patrick. 2008. "The intergenerational transmission of context." *American Journal of Sociology* 113(4):931–969.

Shimizu, Yukiko, Kazunori Kodama, Nobuo Nishi, Fumiyoshi Kasagi, Akihiko Suyama, Midori Soda, Eric J Grant, Hiromi Sugiyama, Ritsu Sakata, Hiroko Moriwaki et al. 2010.

"Radiation exposure and circulatory disease risk: Hiroshima and Nagasaki atomic bomb survivor data, 1950-2003." *Bmj* 340.

Shimizutani, Satoshi and Hiroyuki Yamada. 2021. "Long-term consequences of the atomic bombing in Hiroshima." *Journal of the Japanese and international economies* 59:101119.

Son, Sangyong. 2025*a*. "Extreme Wartime Violence and Attitudes toward the Use of Force: Evidence from Atomic Bomb Survivors." Working Paper.

Son, Sangyong. 2025*b*. "Legacy of Resisting State Repression: Evidence From Gwangju Uprising in South Korea." *Comparative Political Studies* p. 00104140251392527.

Son, Sangyong, Hyeongpil Ham and Man-Sung Yim. 2024. "How fear of entrapment shapes South Korean public opinion on conflicts with North Korea under US extended deterrence." *The Nonproliferation Review* 0(0):1–26.
URL: *https://doi.org/10.1080/10736700.2024.2306020*

Tani, Kenji. 2012. "Domestic Migration in Japan in the 1940s: A Cohort Analysis (1940年代の人口移動にするコホト分析)." *Geographical Review of Japan (地理評論)* 85(4):324–341.

Tellez, Juan Fernando. 2019. "Worlds apart: Conflict exposure and preferences for peace." *Journal of Conflict Resolution* 63(4):1053–1076.

Titiunik, Rocio. 2021. "Natural experiments." *Advances in experimental political science* 6:103–129.

Tomonaga, Masao. 2019. "The atomic bombings of Hiroshima and Nagasaki: A summary of the human consequences, 1945-2018, and lessons for homo sapiens to end the nuclear weapon age." *Journal for Peace and Nuclear Disarmament* 2(2):491–517.

United States Institute of Peace. N.d. "Agent Orange in Vietnam: Legacy and Response.". Accessed July 2025.
URL: *https://www.usip.org/publications/agent-orange-vietnam*

Utaka, Yushi. 2008. The Hiroshima 'peace memorial': Transforming legacy, memories and landscapes. In *Places of Pain and Shame*. Routledge pp. 48–63.

Van den Dungen, Peter and Kazuyo Yamane. 2015. "Peace education through peace museums.".

Van IJzendoorn, Marinus H. 1992. "Intergenerational transmission of parenting: A review of studies in nonclinical populations." *Developmental review* 12(1):76–99.

Vietnam Association for Victims of Agent Orange/Dioxin (VAVA). N.d. "About VAVA and Its Activities.". Accessed July 2025.
URL: *https://www.vava.org.vn/home*

Villamil, Francisco and Laia Balcells. 2021. "Do TJ policies cause backlash? Evidence from street name changes in Spain." *Research & Politics* 8(4):20531680211058550.

Wang, Yuhua. 2021. "The political legacy of violence during China's cultural revolution." *British Journal of Political Science* 51(2):463–487.

Wayne, Carly, Taylor J Damann and Shani Fachter. 2025. "The Holocaust, the socialization of victimhood and outgroup political attitudes in Israel." *Comparative Political Studies* 58(14):3179–3214.

Wayne, Carly and Yuri M Zhukov. 2022. "Never again: The holocaust and political legacies of genocide." *World Politics* 74(3):367–404.

Widom, Cathy Spatz and Helen W Wilson. 2014. "Intergenerational transmission of violence." *Violence and mental health: Its manifold faces* pp. 27–45.

Yamada, Michiko and Shizue Izumi. 2002. "Psychiatric sequelae in atomic bomb survivors in Hiroshima and Nagasaki two decades after the explosions." *Social psychiatry and psychiatric epidemiology* 37:409–415.

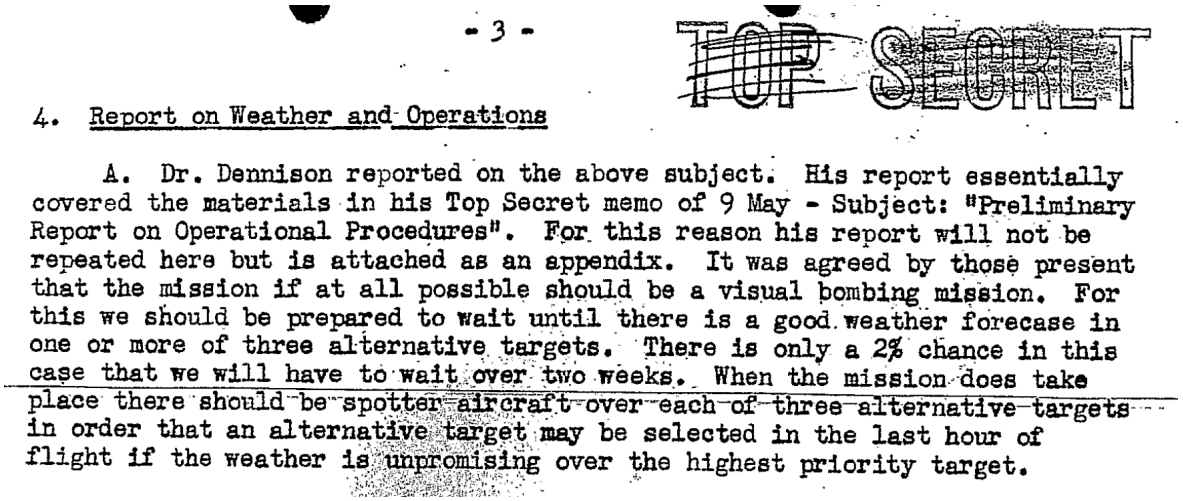
Supplementary Information for Intergenerational Transmission under Extreme Violence: Families, Memorial Institutions, and the Legacies of Atomic Bombings

Contents

1 Identification Strategy

1.1 Operational directives and target selection

I present information from declassified U.S. Target Committee meetings to demonstrate the requirement for visual bombing and the role of weather conditions in shaping the probabilistic assignment of atomic bombings. The first document in Figure 1 outlines the requirement for visual bombing operations and the contingency that pilots could alter targets depending on weather conditions.



- 3 -

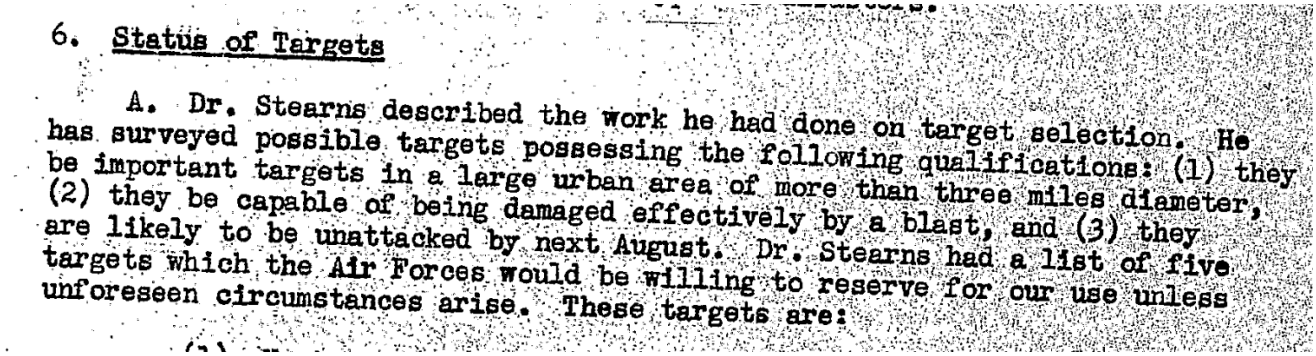
TOP SECRET

4. Report on Weather and Operations

A. Dr. Dennison reported on the above subject. His report essentially covered the materials in his Top Secret memo of 9 May - Subject: "Preliminary Report on Operational Procedures". For this reason his report will not be repeated here but is attached as an appendix. It was agreed by those present that the mission if at all possible should be a visual bombing mission. For this we should be prepared to wait until there is a good weather forecase in one or more of three alternative targets. There is only a 2% chance in this case that we will have to wait over two weeks. When the mission does take place there should be spotter aircraft over each of three alternative targets in order that an alternative target may be selected in the last hour of flight if the weather is unpromising over the highest priority target.

Figure 1: U.S. War Department. (1945). Notes on initial meeting of target committee

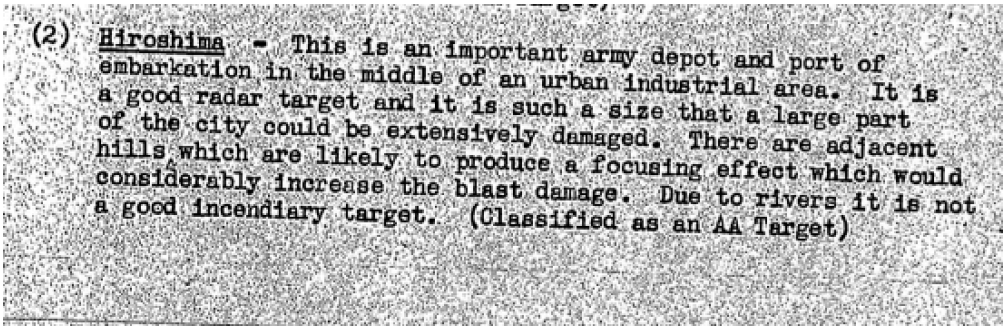
I also present the criteria for target selection and descriptions of designated cities from declassified documents. The document in Figure 2 outlines the criteria, which emphasized urban character, the potential for effective damage, and the exclusion of cities previously reserved from conventional bombing. Additional documents in Figures 3 and 4 contain the Target Committee's assessments of Hiroshima and Kokura.



6. Status of Targets

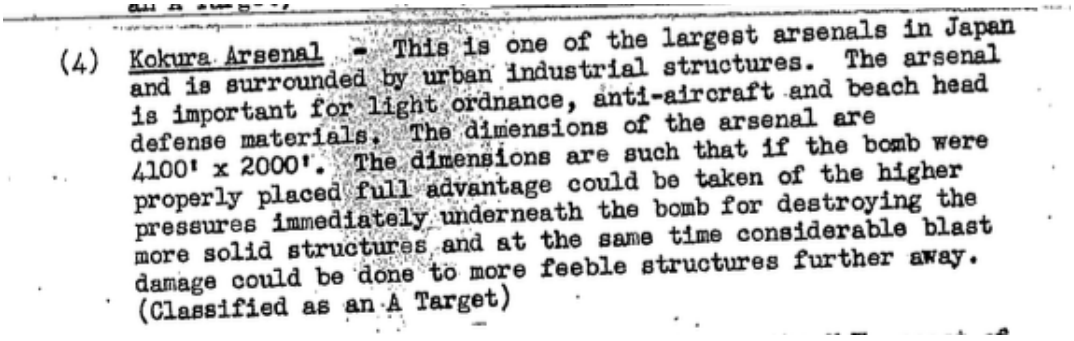
A. Dr. Stearns described the work he had done on target selection. He has surveyed possible targets possessing the following qualifications: (1) they be important targets in a large urban area of more than three miles diameter, (2) they be capable of being damaged effectively by a blast, and (3) they are likely to be unattacked by next August. Dr. Stearns had a list of five targets which the Air Forces would be willing to reserve for our use unless unforeseen circumstances arise. These targets are:

Figure 2: U.S. War Department. (1945). Notes on initial meeting of target committee



(2) Hiroshima - This is an important army depot and port of embarkation in the middle of an urban industrial area. It is a good radar target and it is such a size that a large part of the city could be extensively damaged. There are adjacent hills which are likely to produce a focusing effect which would considerably increase the blast damage. Due to rivers it is not a good incendiary target. (Classified as an AA Target)

Figure 3: U.S. War Department. (1945). Notes on Initial Meeting of Target Committee



(4) Kokura Arsenal - This is one of the largest arsenals in Japan and is surrounded by urban industrial structures. The arsenal is important for light ordnance, anti-aircraft and beach head defense materials. The dimensions of the arsenal are 4100' x 2000'. The dimensions are such that if the bomb were properly placed full advantage could be taken of the higher pressures immediately underneath the bomb for destroying the more solid structures and at the same time considerable blast damage could be done to more feeble structures further away. (Classified as an A Target)

Figure 4: U.S. War Department. (1945). Notes on Initial Meeting of Target Committee

1.2 Covariate balance

Census data presented in Table 1 show that Hiroshima, Nagasaki, and Fukuoka prefecture, which encompasses Kokura, exhibited similar demographic compositions in 1940 (Bureau of Statistics, Office of the Prime Minister, 1940*a*). The three regions shared comparable proportions of military personnel and displayed similar distributions of internal migrants and foreigners. Although city-specific figures for Kokura are unavailable, historical records identify it as a major garrison town hosting multiple divisions of the Imperial Japanese Army, suggesting that the local share of military personnel likely exceeded the prefectural average. By contrast, Kyoto and Niigata exhibited lower proportions of military personnel despite similar civilian distributions. Taken together, these figures underscore that Hiroshima, Nagasaki, and Kokura were demographically comparable across multiple dimensions.

Table 1: Population Composition by Region (%)

Region	Natives	Internal Migrants	Foreigners	Military
Kyoto	95.69	4.27	0.04	2.04
Niigata	99.74	0.25	0.01	2.92
Hiroshima	97.60	2.34	0.06	3.59
Nagasaki	98.24	1.68	0.08	3.05
Fukuoka	96.16	3.79	0.05	2.45

Census data from 1940 on industrial sector composition (Table 2) further demonstrate the comparability of Hiroshima, Nagasaki, and Kokura (Bureau of Statistics, Office of the Prime Minister, 1940*b*). Across all three cities, the overwhelming share of the labor force was concentrated in industry and commerce, while only small proportions were employed in agriculture, fisheries, mining, transport, or domestic service. Although the precise distribution varied slightly—for instance, Kokura displayed a somewhat higher concentration of industrial workers—the general pattern was consistent: these cities were heavily industrialized and commercially oriented. Combined with their similar demographic structures noted above, these figures underscore that Hiroshima, Nagasaki, and Kokura shared broadly comparable socioeconomic foundations in the early 1940s.

Table 2: Industrial Sector Composition of Selected Cities (in %)

City	Agriculture	Industry	Commerce	Fisheries	Mining	Transport & Communication	Domestic service
Hiroshima	4.44	36.72	28.72	1.24	0.19	9.83	2.87
Nagasaki	8.30	44.34	22.21	3.91	0.25	6.39	3.42
Kokura	6.31	53.87	18.78	0.67	0.74	6.14	1.52

To assess whether the survey sample reflects the historical comparability between the cities, Figure 5 reports covariate balance between second-generation atomic bomb survivors (treatment group) and descendants of the wartime generation in Kokura (control group) across key pre-treatment parental characteristics: gender, age, religion, education, employment status, and military service. With the exception of parental gender, all characteristics exhibit close covariate balance (standardized mean differences below 0.15). Although parental gender is not theoretically related to treatment assignment (exposure to the atomic bombings) or to children's foreign-policy preferences, I empirically evaluate whether this modest imbalance has any implications for the main results.

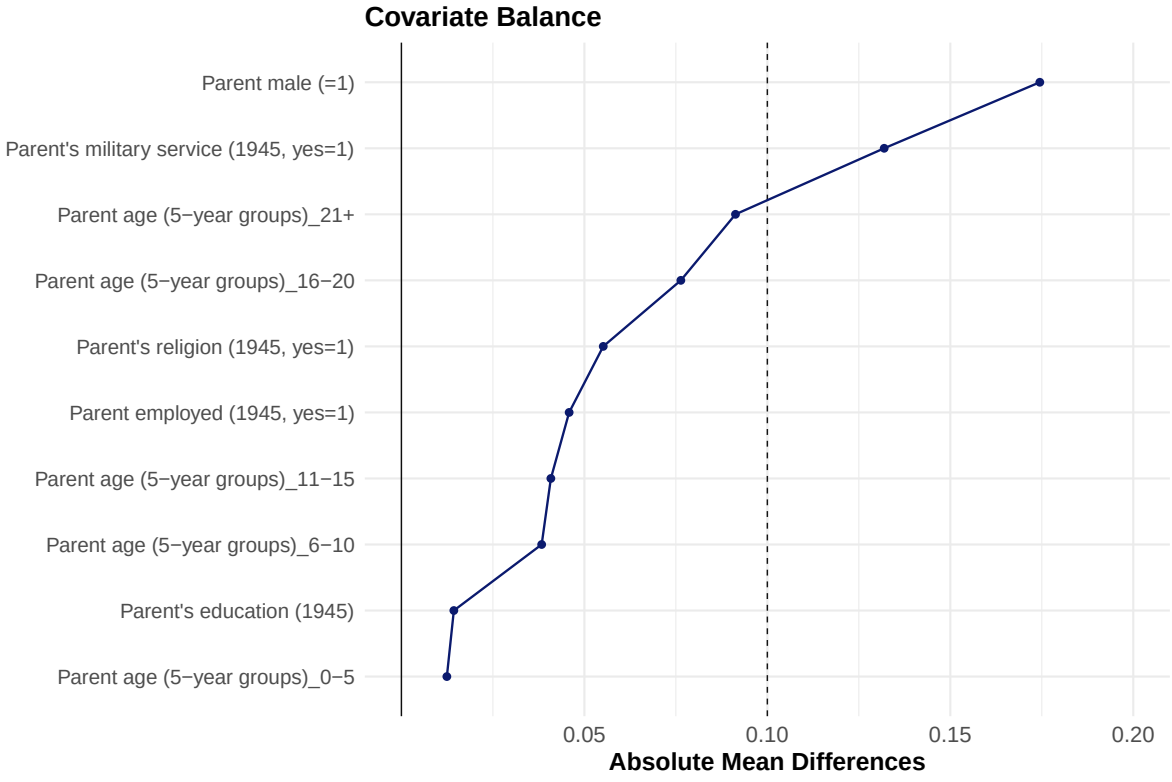


Figure 5: Covariate balance

Given this slight imbalance, I assess the robustness of the main findings to unobserved confounding by conducting a sensitivity analysis using parental gender as a benchmark covariate (Cinelli and Hazlett, 2020). This benchmark allows evaluation of whether the estimates in Table 3 remain stable in the presence of unobserved confounders that would need to be substantially stronger than any observed imbalance to overturn the results. As shown below, the estimated effect of parental exposure to the atomic bombings is robust to confounding that is five to ten times as strong as the association between parental gender and the outcome. Overall, the analysis shows that the slight imbalance in parental gender does not meaningfully influence the estimated effect, indicating that the main results are not sensitive to this discrepancy.

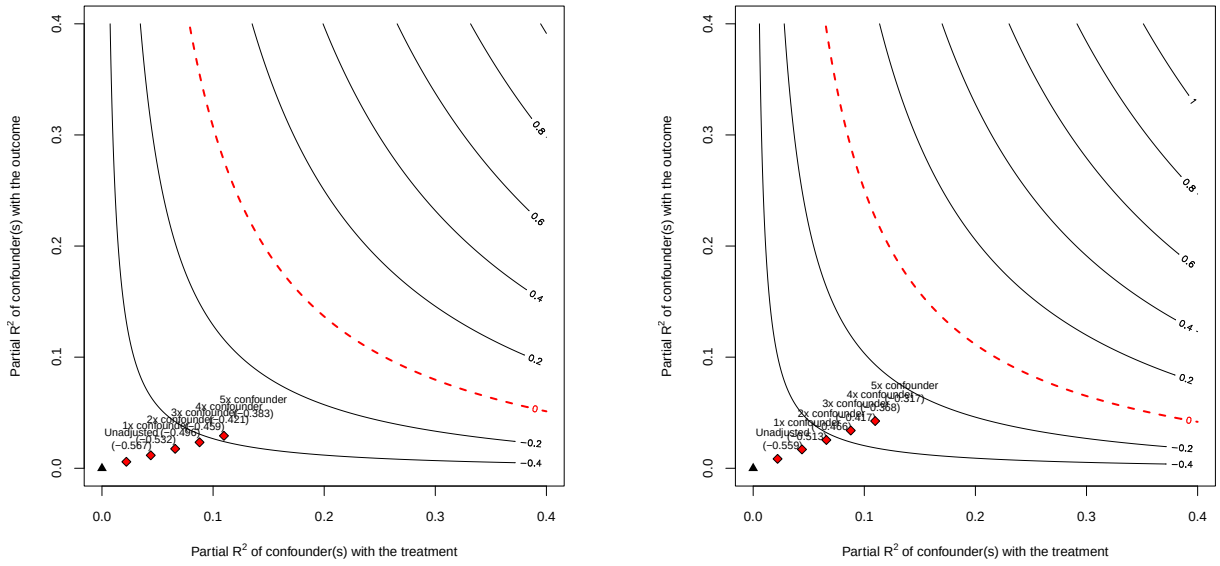


Figure 6: Sensitivity Analysis for Columns (1) and (2) of Table 3

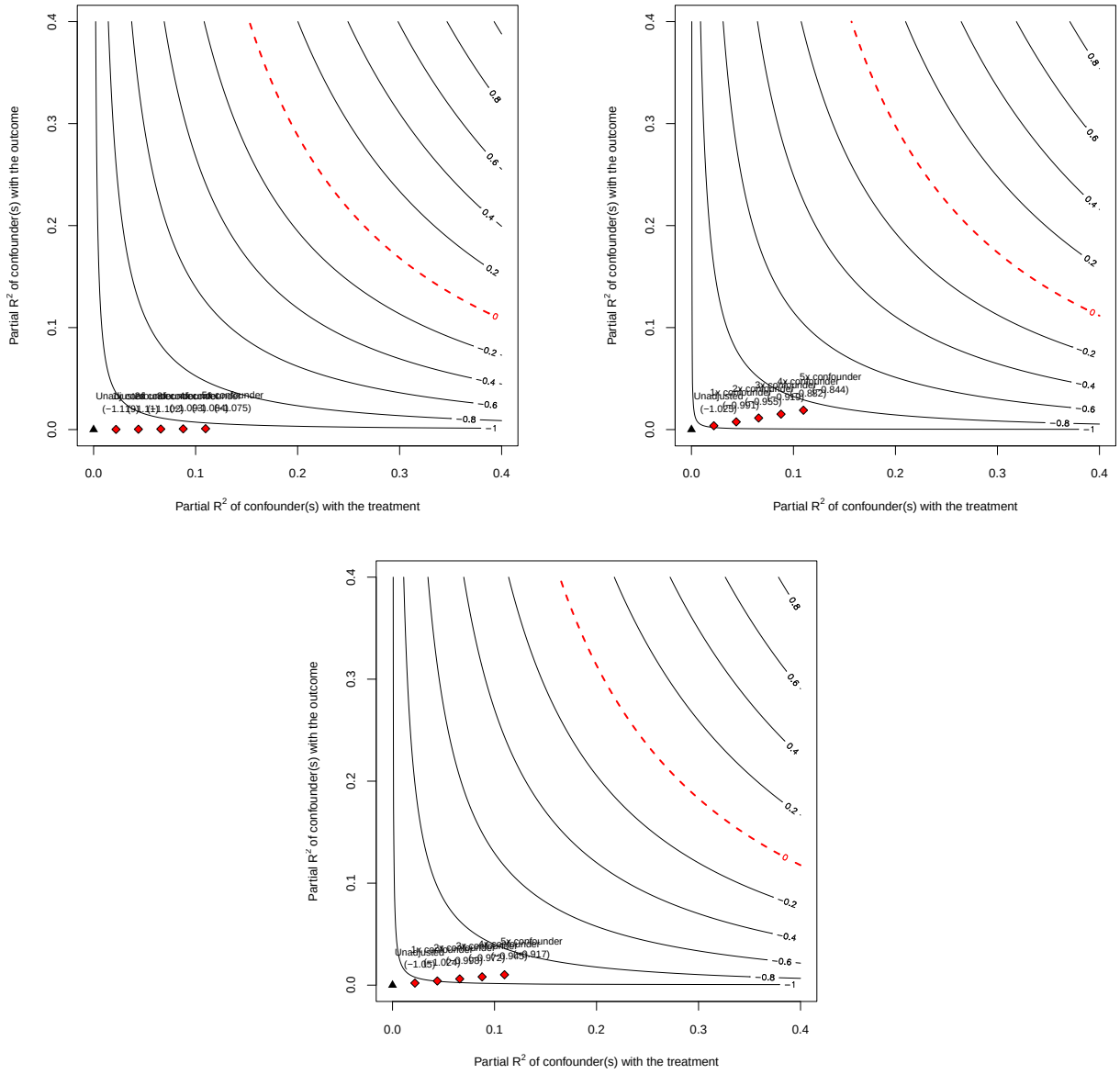


Figure 7: Sensitivity Analysis for Columns (3), (4), and (5) of Table 3

2 Data Collection

2.1 Japan

I conducted fieldwork from March to August 2025 to collect data from the treatment group (second-generation atomic bomb survivors) and the control group (second-generation descendants of the wartime generation in Kokura). I organized local research teams in Hiroshima, Nagasaki, Fukuoka, and Kokura to administer the surveys. Each team consisted of a local manager and several research assistants, as described in Table 3. The local manager was responsible for communicating with collaborating organizations and supervising the research assistants, while the research assistants—primarily local university students—conducted face-to-face interviews with research participants. I was physically present throughout all stages of the fieldwork and directly oversaw both the research teams and the data-collection process. In addition to surveys conducted in the designated cities, the research teams also traveled to adjacent areas to carry out in-person interviews.[1]

City	Local Manager	Research Assistants
Hiroshima	1 person	7 people
Nagasaki	1 person	7 people
Kokura	1 person	8 people

Table 3: Local research team

Table 4 summarizes the organizations and institutions that facilitated data collection in Hiroshima, Nagasaki, and Kokura. These partners fall into six broad categories: victim associations, local governments, political organizations, social organizations, health institutions, and an online survey company. With the support of these local partners, trained research assistants conducted in-person surveys with research participants, as shown in Figures 8 and 9. The online component of the study was administered separately by Cross Marketing, an online survey firm.

[1]For instance, the local research team based in Hiroshima City traveled to smaller municipalities within Hiroshima Prefecture to conduct in-person surveys. Likewise, the local team in Kokura visited adjacent cities—such as 福岡 (Fukuoka) and 山口 (Yamaguchi)—to carry out in-person interviews.

Table 4: Institutions collaborated with for data collection

Category	**Treatment Group**	**Control Group**
Victim organizations	Associations of descendants of atomic bomb survivors	Association for sharing wartime experiences in Kokura
Local government	City governments and affiliated civic centers and facilities	
Political organizations	Local peace organizations	
Social organizations	Local elderly organizations	
Health institutions	Local hospitals and nursing homes	
Online survey firm	Cross marketing	

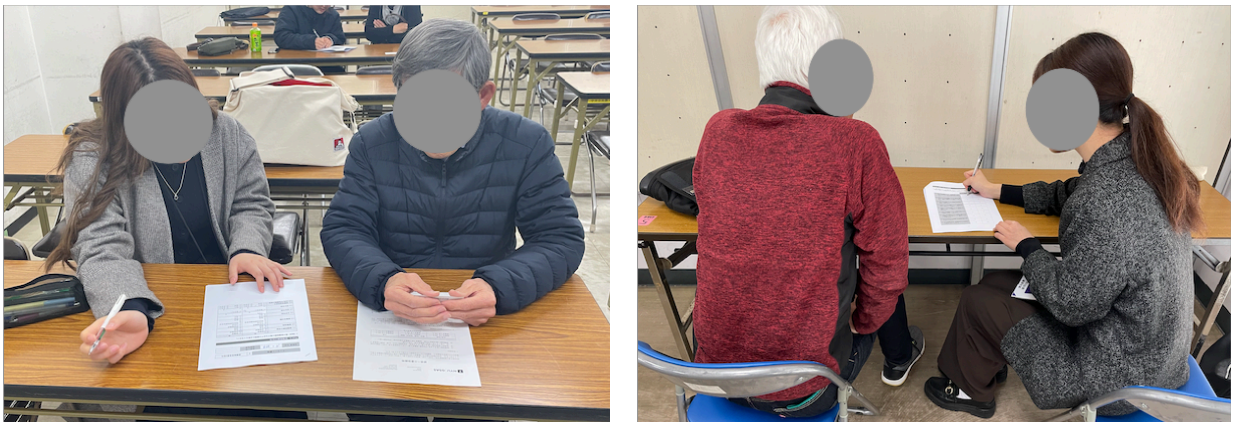


Figure 8: Data collection example (1)

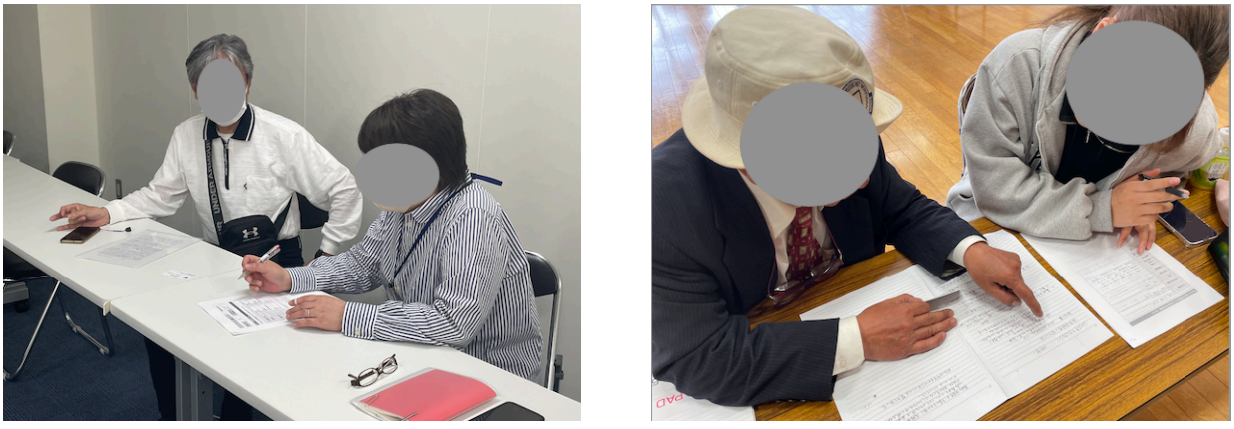


Figure 9: Data collection example (2)

To construct the control group, I developed eligibility criteria based on a simulated detonation of the Fat Man atomic bomb over the Kokura Arsenal. Following the identification strategy—a natural experiment leveraging the counterfactual targeting of Japanese cities—I specified criteria to select individuals whose parents would likely have been exposed to the bomb had it been dropped on Kokura as originally planned. To estimate the hypothetical blast radius, I used the NUKEMAP simulation tool to visualize the areas that would have been affected by a 20-kiloton airburst over Kokura. Figure 10 illustrates the projected blast radii. Based on this simulation, I recruited second-generation individuals whose parents would have been exposed to the atomic bombing had the bomb detonated over the Kokura Arsenal on August 9, 1945.

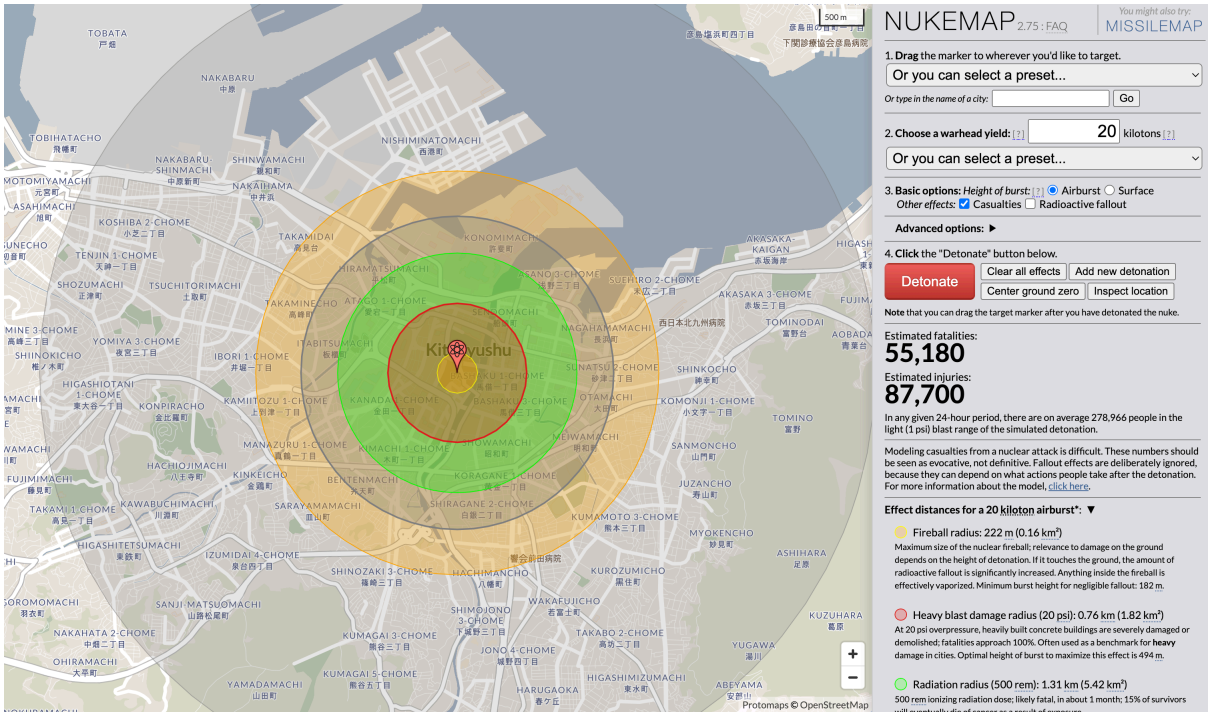


Figure 10: Simulated detonation of Fat Man over Kokura Arsenal

2.2 South Korea

I conducted field research in South Korea in August 2023. During the fieldwork, I closely collaborated with the Korean Descendants of Atomic Bomb Victims Association and its regional branches to access second-generation atomic bomb survivors. After obtaining membership

lists from the association, my research assistants and I contacted every individual on the list by phone to introduce the study and recruit participants. I then conducted in-person interviews with second-generation survivors across diverse settings, ranging from small rural villages in Hapcheon to large urban areas such as Seoul, Busan, Daegu, and Pyeongtaek. Figure 11 displays the distribution of year of birth among South Korean second-generation atomic bomb survivors.

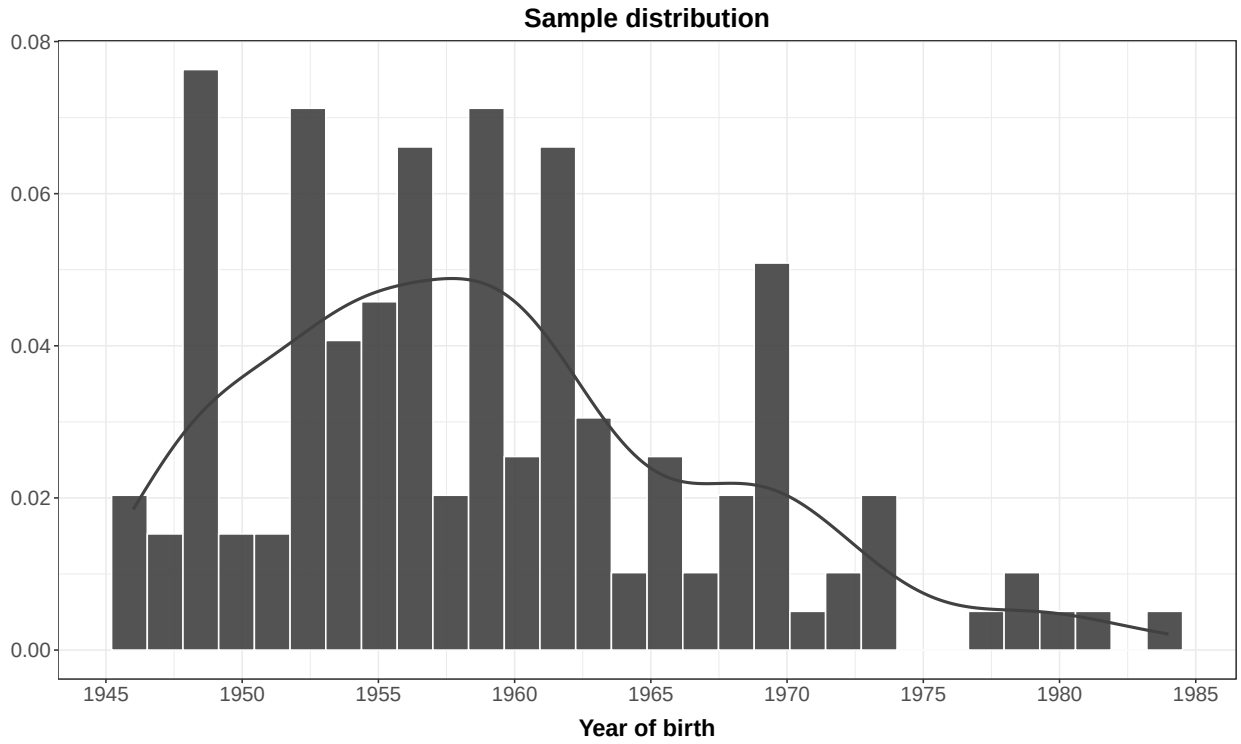


Figure 11: Sample distribution by year of birth

3 Regression Tables

3.1 Main manuscript

In the theory section, I assume explicit transmission—family conversations about the atomic bombings—as a key mechanism of intergenerational transmission. I empirically test this mechanism by examining whether parental exposure to the atomic bombings increases the frequency of family discussions about survivors'experiences and related political lessons. To do so, I compare second-generation atomic bomb survivors with second-generation descendants of the wartime generation in Kokura.

Table 5: Frequency of family discussion

	Dependent variable: family discussion on	
	wartime experience	peace & anti-nuclear weapons
	(1)	(2)
Parental exposure to the atomic bombings	3.120***	2.029***
	(0.487)	(0.511)
DV mean	6.95	6.46
Control: parental demographic	✓	✓
Control: parental socioeconomic	✓	✓
Sample size	609	609

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

3.2 Alternative explanation: selective migration

To address concerns about selective migration, I examine whether second-generation atomic bomb survivors who migrated differ systematically from those who remained in their birth cities. The empirical evidence shows no meaningful differences in anti-nuclear or anti-militarist preferences between the two groups.

Table 6: Results of selective migration

	Dependent variable				
	Atomic aversion		Anti-militarism		
	Use index	Acquisition index	Revise peace constitution	Increase defense budget	Increase self-defense force
	(1)	(2)	(3)	(4)	(5)
Selective Migration	0.221	−0.170	−0.105	−0.137	0.132
	(0.199)	(0.216)	(0.290)	(0.269)	(0.272)
DV mean	0.75	0.81	2.52	2.95	3.18
Control: parental demographic	✓	✓	✓	✓	✓
Control: parental socioeconomic	✓	✓	✓	✓	✓
Sample size	349	349	349	349	349

Note: *p<0.1; **p<0.05; ***p<0.01

3.3 Alternative explanation: memorial institution

The placebo group consists of individuals who were born, raised, and continue to reside in Hiroshima or Nagasaki but have no family ties to atomic bomb survivors. These respondents are maximally exposed to the memorial institutions in these cities—including museums, annual commemorations, and peace education—yet receive no family-based transmission of survivor experiences. If institutional transmission alone were sufficient to reproduce the attitudes observed among second-generation survivors, this placebo group should resemble them. Comparing the two groups therefore provides a falsification test of the memorial-institution alternative explanation. Any systematic differences in attitudes between second-generation survivors and the placebo group must reflect the independent role of family transmission rather than exposure to memorial institutions.

3.4 Alternative explanation: national peace institution

I examine within-group variation among South Korean second-generation atomic bomb survivors (N = 150) by regressing anti-nuclear policy preferences on the frequency of family discussions about the atomic bombings. The outcome variables are the use index and the acquisition index, where higher values indicate more pro-nuclear preferences and lower values reflect stronger anti-nuclear attitudes. The independent variable—the frequency of family discussion—is measured using a five-point scale, with higher values indicating more frequent

Table 7: Testing the memorial institution alternative explanation

	Dependent variable				
	Atomic aversion		Anti-militarism		
	Use index	Acquisition index	Revise peace constitution	Increase defense budget	Increase self-defense force
	(1)	(2)	(3)	(4)	(5)
Parental exposure to atomic bombings	−0.415***	−0.500***	−1.672***	−1.215***	−1.232***
	(0.160)	(0.181)	(0.220)	(0.190)	(0.178)
DV mean	0.66	0.76	2.75	3.08	3.31
Control: parental demographic	✓	✓	✓	✓	✓
Control: parental socioeconomic	✓	✓	✓	✓	✓
Sample size	356	356	356	356	356

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

conversations about the parent's atomic-bomb experience. To address potential reverse causality, I use an instrumental variable that captures whether the respondent's parent lost an acquaintance (another atomic bomb survivor) to bomb-related causes. Survivor testimonies indicate that such losses often prompted parents to recount their experiences to their children, making this variable a plausible predictor of family discussion frequency.

Table 8: Results from South Korean second-generation atomic bomb survivors

	Dependent variable:			
	Use index	Proliferation index	Use index	Proliferation index
	OLS	*OLS*	*2SLS*	*2SLS*
	(1)	(2)	(3)	(4)
Frequency of family discussion	−0.672***	−0.756***	−0.558	−1.421**
	(0.091)	(0.098)	(0.453)	(0.557)
Sample size	150	150	150	150
Control: demographic	✓	✓	✓	✓
Control: socioeconomic	✓	✓	✓	✓
Control: political	✓	✓	✓	✓

Note: F-statistics for 2SLS is 6.03 *p<0.1; **p<0.05; ***p<0.01

3.5 Alternative explanation: general political activation

Table 9: Results of placebom outcome test

	Dependent variable:		
	Three non-nuclear principles	Protectionist trade policy	Hosting more immigrants
	(1)	(2)	(3)
Parental exposure to atomic bombings	1.088***	−0.164	0.438***
	(0.160)	(0.117)	(0.133)
DV mean	5.36	3.13	3.74
Control: parental demographic	✓	✓	✓
Control: parental socioeconomic	✓	✓	✓
Sample size	609	609	609

Note: Robust standard errors in parentheses *p<0.1; **p<0.05; ***p<0.01

4 Survey Items

4.1 Use of nuclear weapons (preventive nuclear strikes)

(Translated from Japanese to English) Japanese and U.S. intelligence agencies estimate that North Korea currently possesses between 30 and 60 nuclear weapons, with projections suggesting this number could increase to 100 within five years. A growing nuclear arsenal would enhance North Korea's ability to issue military threats and provocations against Japan by leveraging its nuclear superiority. Furthermore, North Korea's nuclear capability could constrain U.S. military operations in Japan, thereby limiting support during times of crisis. Both Japan and the United States regard North Korea's nuclear posture as a serious threat to Japan's national security. In response, the two allies have identified five military targets housing North Korea's nuclear and missile facilities with the aim of eliminating its nuclear capabilities. Japan and the United States have developed joint preventive nuclear strike plans under their alliance framework to neutralize the threat posed by North Korea's nuclear and missile systems. The following section presents estimated North Korean civilian casualties under scenarios involving high-yield versus low-yield nuclear weapon use.

High civilian casualties condition (high-yield nuclear warheads)

Japan and the United States utilized HPAC to estimate North Korean civilian casualties resulting from preventive nuclear strikes. The HPAC simulation indicates that the use of high-yield nuclear weapons (W88 warheads with a 455-kiloton yield) would result in between **1 and 1.5 million North Korean civilian** casualties, with a 95% chance of destroying North Korean nuclear and missile facilities. Additionally, there would be no damage to Japan from radioactive fallout after the nuclear strikes.

Low civilian casualties condition (low-yield nuclear warheads)

Japan and the United States utilized HPAC to estimate North Korean civilian casualties resulting from preventive nuclear strikes. The HPAC simulation indicates that the use of low-yield nuclear weapons (B61-12 warheads with a 0.3-kiloton yield) would result in **fewer than 100 North Korean civilian** casualties, with a 95% probability of destroying North Korean nuclear facilities. Additionally, there would be no damage to South Korea from radioactive fallout after the nuclear strikes.

Manipulation check question A

Are there any indications that North Korea intends to attack Japan first in the scenario described above

(1) Yes

(2) No

Manipulation check question B

Choose the North Korean civilian casualties from the above preventive nuclear strikes described in the above scenario

(1) 1,000 to 1,500 North Korean civilian casualties

(2) 1,000,000 to 1,500,000 North Korean civilian casualties

(3) less than 100 North Korean civilian casualties

4.2 Use of nuclear weapons (preemptive nuclear strikes)

(Translated from Japanese to English) The Japanese intelligence services have detected that North Korea is preparing to launch nuclear strikes targeting major cities in Japan. Specifically, North Korea is assembling nuclear warheads with Rodong missiles at the Sakkanmol missile base in Hwangju-gun, Hwanghae Province. Faced with the imminent threat of a nuclear attack, the U.S.–Japan alliance has enacted an emergency plan to preemptively neutralize North Korea's capability to strike Japan by launching preventive strikes against North Korea. In light of these circumstances, the U.S.–Japan alliance has formulated three assessments regarding the military effectiveness of nuclear and conventional missile strikes aimed at eliminating military targets in North Korea.

	(1) Conventional missiles	(2) Nuclear missiles
Weapon type	ATACMS	B61-12
Probability of successfully destroying military targets	90%	90%

	(1) Conventional missiles	(2) Nuclear missiles
Weapon type	ATACMS	B61-12
Probability of successfully destroying military targets	60%	90%

	(1) Conventional missiles	(2) Nuclear missiles
Weapon type	ATACMS	B61-12
Probability of successfully destroying military targets	45%	90%

Manipulation check question A

Are there any indications that North Korea intends to launch nuclear strikes against Japan first in the scenario described above

(1) Yes

(2) No

Manipulation check question B

Choose the probability of each weapon system for successfully destroying the military targets in North Korea.

(1) Conventional missiles: 90% ↔ Nuclear missiles: 90%

(2) Conventional missiles: 60% ↔ Nuclear missiles: 90%

(3) Conventional missiles: 45% ↔ Nuclear missiles: 90%

4.3 Acquisition of nuclear weapons

North Korea's nuclear threats

The Japanese government has confirmed that North Korea is producing a large number of nuclear weapons. In addition, North Korea has been conducting military exercises to prepare for the use of tactical nuclear weapons targeting Japan. This suggests that North Korea is capable of launching nuclear strikes against all regions of Japan. Under these circumstances, do you support or oppose Japan developing its own nuclear weapons in response to the nuclear threat posed by North Korea?

United States' withdrawal of extended nuclear deterrence

The United States currently provides a nuclear umbrella (extended deterrence) to protect non-nuclear Japan from the nuclear threats posed by North Korea and China. However, the United States has officially announced the withdrawal of its nuclear umbrella from Japan. If this withdrawal takes place, a non-nuclear Japan would be directly exposed to nuclear threats from North Korea and China. Under these circumstances, do you support or oppose Japan developing its own nuclear weapons as a replacement for the U.S. nuclear umbrella?

South Korea's nuclear threats

The Japanese government has revealed that South Korea is secretly developing nuclear weapons. It is expected that South Korea will develop approximately 120 nuclear warheads within the next five years. If South Korea develops nuclear weapons, Japan will become the only major country in Northeast Asia without nuclear weapons. Under these circumstances, do you support or oppose Japan developing its own nuclear weapons?

China's nuclear threats

China has abandoned its previous "no first use"policy and has announced a new nuclear doctrine permitting the first use of nuclear weapons for offensive purposes against other countries, including Japan. This means that China may launch a preemptive nuclear strike against another country—Japan included—if it perceives its core national interests to be threatened. Under these circumstances, do you support or oppose Japan developing its own nuclear weapons in response to the nuclear threat posed by China?

References

Bureau of Statistics, Office of the Prime Minister. 1940*a*. *1940 Population Census of Japan. Volume I: Total Population, Sex, Age, Marital Status and Race or Nationality*. Tokyo: Bureau of Statistics, Office of the Prime Minister. Original title: 昭和 15 年国勢調査報告第一巻人口総数・男女の別・年令・配偶の関係・民族または国籍.

Bureau of Statistics, Office of the Prime Minister. 1940*b*. *1940 Population Census of Japan. Volume II: Industry and Employment Status*. Tokyo: Bureau of Statistics, Office of the Prime Minister. Original title: 昭和 15 年国勢調査報告第二巻産業・事業上の地位.

Cinelli, Carlos and Chad Hazlett. 2020. "Making sense of sensitivity: Extending omitted variable bias." *Journal of the Royal Statistical Society Series B: Statistical Methodology* 82(1):39–67.