Harms and Benefits Inventory (HBI): initial validation of a novel assessment of perceived harms and benefits of firearm policies and practices

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ABSTRACT

Introduction Understanding gun owners' perceptions of potential firearm policies' harms and benefits is critical to successful policy development and implementation. We used national survey data to develop and validate a novel instrument, the Harms and Benefits Inventory (HBI), for policy-makers and advocates to better consider the citizen perspective.

Method We conducted a nationally representative survey of American gun owners and non-owners (N=2007) using the Social Science Research Solutions probability panel. The survey included 31 candidate HBI items and questions about gun ownership and exposure, storage and carry behaviours, policy positions, and sociodemographic characteristics. Exploratory factor analyses (EFAs) were conducted on HBI items from a randomly selected subsample (N=1003) and then tested with a confirmatory factor analysis (CFA) on data from the second half of the sample (N=1004).

Results The best-fitting EFA model was upheld in the CFA and included 21 items with 5 underlying factors. Underlying factors included: (1) firearm regulation, cost and accessibility, (2) special restrictions, (3) permit and education, (4) relaxed restrictions and (5) and hobby and sport. Internal consistency was good to excellent within each of the five scales. Validity was supported by correlations between HBI scales and survey questions.

Discussion Findings support the validity of the HBI in assessing perceptions of potential harms and benefits of firearm policies and practices. Understanding perceptions of potential harms and benefits of gun policies at the time of development or implementation can improve uptake and reduce unintended consequences of these policies.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The effectiveness of firearm policies is dependent on behaviour change from gun owners and sellers. Achieving buy-in from gun owners and sellers is challenging when these policies are perceived as constraining Second Amendment Rights or compromising one's safety or freedoms. There is a gap in knowledge of these perceptions and a lack of tools available to study and understand these perceptions towards developing and implementing effective firearm policies.

WHAT THIS STUDY ADDS

⇒ The current study reports on the development and initial validity of the Harms and Benefits Inventory—a novel and policy-neutral self-report instrument designed to assess perceptions of potential harms and benefits of firearm policies. A US nationally representative survey of gun owners and non-owners was used to identify five key domains reflecting policies' perceived relevance to (1) regulation, cost, accessibility, (2) special restrictions, (3) permits and education, (4) relaxed restrictions and (5) hobby and sport.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The Harms and Benefits Inventory can be used to assess and better understand citizens' perceptions of potential harms and benefits of firearm policies and anticipated policy positions towards informing refinements and improving acceptability and uptake.

INTRODUCTION

There is a need to understand citizen voice in the context of American gun policy. Estimates suggest around one-third of Americans are firearm owners.[1 2] Firearm ownership and firearm-related injury are both at unprecedented rates and rising.[3] Whereas consensuses exist for the need to reduce such injury, there is disagreement over which policies will do so successfully.[4] For example, a Rockefeller Institute report provides evidence that gun owners and non-owners differ in their support for gun policies, especially those perceived to hinder the ability to self-defend.[5] Therefore, to achieve successful uptake, it is necessary for firearm policy discussion and development to be citizen informed. This goal is difficult to achieve for numerous reasons, and chief among them is that gun owners often doubt research reporting that restrictive firearm policies result in fewer gun injuries.[4] As such, gun owners often differ from non-gun owners in their policy support or opposition.[5] This divergence creates both a breakdown in policy discourse and reduces gun owners' uptake of policies and practices.

Importantly, firearm policies' effectiveness depends on behavioural change from gun owners and sellers. For example, evidence suggests that implementing the licensing of gun owners,[6] background checks,[7] waiting periods[8] and safe storage[9–11] all reduce firearm-related death or injury. However, each of these policies requires compliance by gun

owners (eg, willing to register guns, use federally licensed dealers and practice secure storage). To achieve effective behaviour change (eg, gun owners adopting secure firearm storage), gun laws and interventions must seek to understand how policy impacts gun owners and, when possible, obtain their cooperation.[12] [13] Of course, the converse may also be apparent but deserves stating—when public policies and interventions lack stakeholder input they can prove ineffective.[14]

While gun lobbying groups, such as the National Rifle Association, exist, these organisations do not represent the views and preferences of all gun owners. Gun owners are a diverse group of people. Their preferences may diverge from or have nuance that is not captured by large lobbying groups. To address this gap, we developed a policy-neutral tool designed to elucidate gun owners' perceptions of potential harms and benefits of firearm policies. We strived to account for both nuance of gun owners and of policies. As an illustration, multiple factors, such as how policy affects the financial cost of ownership or gun accessibility, may operate in combination to determine policy support and compliance. Some policy components may be important to one subset of gun owners and detrimental to another. For example, gun owners with children in their household may appreciate the benefits of a secure firearms storage policy, while gun owners who prioritise a quick response to a home invasion may perceive the same policy as detrimental to their safety. Harder still is balancing these diverging preferences when both objectives (child and home safety) are important to the gun owner.

The research here provides a systematic and validated means of measuring how citizens (both gun owners and non-owners) perceive potential harms and benefits of firearm policies, with an emphasis on gun owners' perceptions. Such a tool improves on what research has used heretofore (ie, non-validated 'home-grown' surveys) to assess the impact or uptake of policies or interventions.[15] While survey data are valuable, a nationally validated instrument may better facilitate cross-study comparisons of key domains across policy areas and components. To this end, the current study involves the development and initial validation of the Harms and Benefits Inventory (HBI), a novel tool designed to assess citizens' perceptions of potential harms and benefits of firearm policies and practices using a policy-neutral approach. Such a tool may help to inform the development of more widely embraced policies and interventions towards enhancing safety and reducing firearm injury and death.

METHOD
Participants
We used a nationally representative sample of US adults ages 18 and older drawn from the Social Science Research Solutions (SSRS) Probability Panel, a mixed-mode probability-based panel generalisable to the US population. SSRS panel members were recruited randomly from a dual-frame random digit dial (RDD) sample via the SSRS Omnibus survey.[16] Data collection occurred between 21 April 2022 and 15 May 2022 and yielded a sample of 2007 US adults. The sample was composed of 1004 gun owners and 1003 non-owners (see table 1).

Measures
We developed the HBI as a self-report instrument to assess perceptions of potential harms and benefits of firearm policies and practices to inform policy development and implementation. Generation of candidate items was loosely informed by Vargus *et al*, who proposed that firearm policies' impact on gun owners can be summarised by four domains: benefits, opportunities, costs

Table 1 US survey participant sociodemographic characteristics (N=2007)

	Survey respondent characteristics		
	All	**Gun owners**	**Non-owners**
Gun owning household	36.9%	-	-
Age (mean (SD))	47.96	49.38	47.13
	(17.19)	(16.30)	(17.65)
Gender			
Male	45.7%	51.7%	42.2%
Female	52.3%	47.5%	55.1%
Other	2.0%	0.8%	2.7%
Race/ethnicity			
White, non-Hispanic	63.3%	78.2%	54.7%
Black, non-Hispanic	11.9%	8.3%	14.0%
Other, non-Hispanic	7.8%	5.6%	9.0%
Hispanic	16.9%	7.8%	22.3%
Education			
Less than high school	8.1%	6.7%	9.0%
High school graduate	27.6%	30.8%	25.7%
Some college	27.3%	31.6%	24.8%
≥College degree	36.9%	30.9%	40.5%
Income			
Under US$25k	15.9%	10.2%	19.2%
US$25k–US$49k	21.7%	17.9%	23.9%
US$50k–US$74k	16.7%	18.2%	15.9%
US$75–US$99k	13.7%	16.9%	11.8%
US$100k–US$124k	11.2%	14.1%	9.5%
US$125k–US$149k	5.7%	7.4%	4.6%
US$150k–US$174k	5.0%	5.9%	4.5%
US$175k–US$199k	3.6%	4.0%	3.4%
≥US$200k	6.5%	5.4%	7.1%
Household w/ children	25.2%	22.8%	26.6%

All averages are weighted using sample weights. Due to item non-response, sample sizes differ by covariate. The sample sizes are as follows: age (N=2004), gender (N=2007), race (N=2007), education (N=2007), income (N=1997) and children in household (N=1688).

and risks.[17] Using this framework, the author team, representative of firearm policies researchers, measurement developers and experts from public health, policy and psychology) created an initial pool of 31 items that represent specific outcomes of a policy or practice (eg, 'increases the cost to purchase a gun', 'makes it more difficult for a person convicted of domestic violence to own a gun', 'allows a person with a felony conviction to obtain a gun'). Following initial item development by the author team, feedback on items and the larger survey was sought in a series of cognitive interviews composed of state police officers, gun club members, recreational gun users (including hunters from Connecticut, Maryland, Missouri, North Carolina, Tennessee and Texas), non-gun owners, and national public health and policy experts. Feedback from cognitive interviews was used to further refine the initial 31 items.

Each generated item may be perceived as either harmful or beneficial depending on the respondent's values and beliefs. For example, for some individuals, the item 'requires a permit to purchase a gun' may be perceived as beneficial in that it serves to limit or gatekeep the purchase of a gun by someone who may be at high risk of perpetrating violence, whereas for other individuals it may be perceived as harmful in that it creates a barrier to gun purchase for someone who may be a responsible

Table 2   Initial Harms and Benefits Inventory items: US representative sample (N=2007)

Items	Mean	SD	Skewness	Kurtosis
1 Increases the cost to purchase a gun	4.96	3.88	0.01	−1.46
Increases the cost of ammunition	4.74	3.90	0.09	−1.45
Increases the time it takes a person to get to and ready a gun in their home	4.66	3.73	0.12	−1.34
Reduces the number of available licensed gun dealers	4.96	3.72	0.03	−1.32
Limits the types of guns that a person can purchase	6.89	3.86	−0.82	−0.93
Makes it more difficult for a person under 18 to purchase a gun	8.68	2.59	−2.08	3.45
Requires a permit to purchase a gun	8.01	3.28	−1.52	0.91
Makes it more difficult for a person with mild mental health problems	6.96	3.40	−0.79	−0.62
Makes it more difficult for a person with serious mental health problems	9.04	2.08	−2.66	7.22
Makes it more difficult for a person with minor, non-violent legal offences	6.49	3.35	−0.56	−0.86
Makes it more difficult for a person convicted of violent misdemeanours to own a gun	7.96	2.83	−1.43	1.23
Makes it more difficult for a person convicted of domestic violence to own a gun	8.86	2.32	−2.35	5.10
Requires a person to purchase a specific device for storing a gun	6.21	3.70	−0.52	−1.13
Makes it more difficult to drive across state lines with a gun	5.38	3.72	−0.15	−1.32
Makes it more difficult to access a gun when driving	6.48	3.56	−0.60	−0.95
Makes it more difficult to access a gun on public transportation	6.84	3.38	−0.75	−0.61
Requires new gun owners to demonstrate knowledge of gun safety	8.68	2.51	−2.17	4.12
Requires gun users to receive continuing education around gun safety	7.52	3.18	−1.11	0.12
Increases government regulation of how guns are handled	6.06	3.77	−0.42	−1.27
Allows a person with a felony conviction to obtain a gun	1.91	2.97	1.53	1.25
Allows a person with a history of violent behaviour to obtain a gun	1.40	2.83	2.13	3.36
Allows a person with serious mental health problems to obtain a gun	1.39	2.82	2.16	3.52
Decreases the time it takes a person to access a gun in their home	4.74	3.56	0.06	−1.21
Increases the types of guns that a person can purchase	3.63	3.66	0.53	−1.07
Makes it easier for a person with mild mental health problems to own a gun	3.05	3.22	0.73	−0.58
Allows a person with a domestic violence conviction to obtain a gun	1.56	2.76	1.89	2.62
Allows more people to open carry their guns (carry so that they are visible to others)	4.13	3.63	0.30	−1.23
Makes it easier to purchase a gun without a permit	2.18	3.23	1.31	0.45
Makes it easier to participate in shooting sports	5.78	3.06	−0.23	−0.60
Makes it easier to participate in hobbies such as gun collection and restoration	5.71	3.13	−0.17	−0.77
Allows a person under the age of 18 to possess a gun	1.92	3.09	1.49	0.95
Some items are abbreviated for space.				

gun owner. Items are rated on a scale from 0 to 10, where 0 means completely oppose a policy or practice that would have the stated outcome (eg, require a permit to purchase a gun), 10 means completely support and 5 means neither support nor oppose. Thus, a relatively lower and higher score for a particular item reflects the degree to which a person opposes or supports, respectively, a policy or practice that has the stated impact. Said differently, a relatively lower and higher score on an item reflects the degree to which a person perceives the impact of the policy or practice as harmful or beneficial, respectively. Indeed, citizens' policy support or opposition has been directly related to perceived impact.[18 19]

Procedure

The survey included the initial 31 HBI items, as well as questions assessing sociodemographic characteristics and contextual factors. In addition to the HBI items, all survey questions were reviewed by gun owners and non-owners in a series of cognitive interviews to refine questions and optimise survey comprehension and flow. The refined survey was then reviewed by the data collection vendor (SSRS) to identify potential problems related to respondent burden, item and unit non-response, respondent comprehension, and practical challenges related to survey mode. SSRS feedback informed several iterations of revisions.

Web panellists were emailed an invitation to complete the survey online. Panellists who did not respond to the email invitation received up to two reminders by email or text message. SSRS panellists without web access were contacted via telephone and interviews were completed in English or Spanish via CATI. To maximise survey response, up to 10 contact attempts were made to potential respondents. The survey completion rate was 44.9% (completions/total invited to participate).

Data analyses

The full (N=2007) sample was randomly divided into a training dataset (N=1003) and validation dataset (N=1004) to examine and test the structure of the 31 HBI items. We conducted a series of sequential exploratory factor analyses (EFAs) using JASP software (jasp-stats.org) on HBI data from the training dataset. The purpose of this first step was to examine factor loadings, identify cross-loadings and eliminate redundant or poor performing items. Sufficiency of the sample size for EFA was supported by the Kaiser-Meyer-Olkin measure of sampling adequacy (overall KMO=0.940) and Bartlett's test of sphericity, χ^2 (210)=12 946.01, p<0.001). As suggested for factors hypothesised to correlate,[20] an oblique rotation was used. Specifically, we used promax rotation given that several HBI items had non-normal distributions. Parallel factor analysis was employed to

Table 3 Harms and Benefits Inventory exploratory factor analysis loadings: united states representative sample (N=1003)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness
Increases the cost of ammunition	1.11					0.12
Increases the cost to purchase a gun	1.07					0.14
Reduces the number of available licensed gun dealers	0.66					0.31
Makes it more difficult to drive across state lines with a gun	0.63					0.34
Increases the time it takes a person to get to and ready a gun in their home	0.60					0.46
Increases government regulation of how guns are handled	0.58					0.26
Makes it more difficult for a person convicted of violent misdemeanours, such as simple assault to own a gun		0.80				0.41
Makes it more difficult for a person with minor, non-violent legal offences to own a gun		0.66				0.47
Makes it more difficult for a person convicted of domestic violence to own a gun		0.66				0.45
Makes it more difficult for a person with serious mental health problems to own a gun		0.58				0.55
Makes it more difficult for a person with mild mental health problems to own a gun		0.57				0.53
Requires a permit to purchase a gun			0.84			0.24
Makes it easier to purchase a gun without a permit			−0.65			0.37
Requires gun users to receive continuing education around gun safety			0.65			0.40
Requires new gun owners to demonstrate knowledge of gun safety			0.63			0.46
Allows a person with a history of violent behaviour to obtain a gun				0.73		0.48
Allows a person with a domestic violence conviction to obtain a gun				0.69		0.49
Allows a person with serious mental health problems to obtain a gun				0.62		0.65
Allows a person with a felony conviction to obtain a gun				0.50		0.59
Makes it easier to participate in hobbies such as gun collection and restoration					0.84	0.24
Makes it easier to participate in shooting sports					0.76	0.33

Applied rotation method is promax. One subject from the training sample was dropped due to missing data. Items ordered by factor and highest to lowest loading.

determine the optimal number of factors. Items were retained or eliminated following several iterations. Model selection was informed by examining the root mean square error of approximation (RMSEA), a measure of absolute fit adjusting for model parsimony, with values <0.90 suggesting a good fit, as well as the Bayeasian Information Criterion (BIC), with lower values indicating the optimal balance between model fit and complexity.

We applied the factor solution from the EFA to the validation dataset using confirmatory factor analysis (CFA). Several fit indices were used to evaluate model fit. Absolute fit indices assess the overall theoretical model against the observed data or how well the model fits the data relative to no model. These indices included the RMSEA and the standardised root mean square residual (SRMR), which provides the standardised difference between the observed and predicted correlation, with a value of 0 indicating perfect fit and values <0.08 considered a good fit. Comparative fit indces, which include the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Bentler-Bonett Non-normed Fit Index (NNFI), compare a specific model to

a baseline model that specifies no meaningful relationships between the variables. Values >0.90 suggest adequate fit. Identified factors were used to create scale composites that enabled an examination of internal consistency reliability and concurrent validity using the full survey sample. While an emphasis of this paper is to understand gun owners' perceptions, comparisons were made between gun owners and non-owners—specifically whether owners and non-owners had agreement with statements about firearm possession, open carry and storage.

RESULTS

Table 1 shows that 37% of respondents lived in a gun owning household. When we compare gun owning to non-gun owning respondents, gun owners are (on average) slightly older, more likely to be male, identify as white, non-Hispanic, are more likely to have some college as their highest level of education and have higher incomes. Table 2 presents the initial 31 items of the HBI, their means and SD, as well as indicators of distribution, skewness and kurtosis.

Exploratory factor analysis

A total of 5 sequential EFAs were conducted, starting with the initial set of 31 HBI items (see tables 3 and 4). In each iteration, items with loadings ≤0.40 were eliminated in subsequent iteration (see table 4 for dropped items). In the first iteration (31 items), 7 factors were identified with 60.8% of explained variance; 2 items (5, 6) failed to load (>0.40) on any of the factors. In the second iteration (29 items), 6 factors were identified with 59.1% of explained variance; 3 items (24, 27, 31) failed to load on any of the factors. In the third iteration (26 items), 5 factors were identified with 58.7% explained variance; 1 item (23) failed to load on any of the factors. In the fourth iteration (25 items), 5 factors were identified with 59.5% explained variance; all items loaded on a single factor. However, the model

Table 4 Harms and Benefits Inventory dropped items: US representative sample (N=1003)

Limits the types of guns that a person can purchase
Makes it more difficult for a person under 18 to purchase a gun
Requires a person to purchase a specific device for storing a gun
Makes it more difficult to access a gun when driving
Makes it more difficult to access a gun on public transportation
Decreases the time it takes a person to access a gun in their home
Increases the types of guns that a person can purchase
Makes it easier for a person with mild mental health problems to own a gun
Allows more people to open carry their guns (ie, carry so that they are visible to others)
Allows a person under the age of 18 to possess a gun

Table 5 Harms and Benefits Inventory exploratory factor analysis correlations: US representative sample (N=1003)

Items	1	2	3	4	5
Factor 1: regulation, cost and accessibility	—				
Factor 2: special restrictions	0.59***	—			
Factor 3: permit and education	0.68***	0.68***	—		
Factor 4: relaxed restrictions	−0.22***	−0.51***	−0.41***	—	
Factor 5: hobby and sport	−0.70***	−0.43***	−0.49***	0.32***	—

***$p<0.001$.

fit was somewhat below acceptable standards (RMSEA=0.062, TLI=0.925, BIC=−430.46). To optimise fit and further reduce items, four items with factor loadings <0.50 (13, 15, 16, 25) were removed from the model. In the final iteration (21 items), 5 underlying factors were identified with 60.5% explained variance; all items loaded on a single factor at 0.50 or higher. Fit indices suggested adequate fit (RMSEA=0.055, TLI=0.950, BIC=−333.398).

The underlying factors include:

1. Regulation, cost and accessibility, which includes items in which the policy or practice would increase costs of firearm acquisition or ownership (eg, cost to purchase, cost of ammunition, opportunity costs associated with accessing a weapon).
2. Special restrictions, which includes policy outcomes that prevent certain individuals from purchasing or owning a firearm.
3. Permit and education, which includes policy outcomes related to licensure, demonstrated competency and ongoing education.
4. Relaxed restrictions, which reflect policy outcomes that remove restrictions and expand gun access.
5. Hobby and sport, which includes outcomes that make it easier to collect guns and participate in shooting sports.

As hypothesised, the five factors were significantly correlated. Subscales containing items that focus on restricting access were positively correlated, including regulation, cost, and accessibility, special restrictions, and permit and education, but negatively correlated with relaxed restrictions and hobby and sport, which were positively correlated (see table 5).

Confirmatory factor analysis

The EFA five-factor solution from the training dataset (N=1003) was an adequate fit when applied to the validation dataset (N=1004), as determined by several standard fit indices, including absolute fit indices (SRMR=0.05; RMSEA=0.067, 95% CI (0.063 to 0.071), p<0.0001) and comparative fit indices (CFI=0.932, TLI=0.920, NNFI=0.920).

Table 6 Harms and Benefits Inventory scales: US representative sample (N=2007)

Items	Mean	SD	Skewness	Kurtosis
Regulation, cost and accessibility	5.04	3.24	−0.09	−1.23
Special restrictions	7.89	2.09	−1.21	1.43
Permit and education	8.01	2.51	−1.43	1.33
Relaxed restrictions	1.54	2.16	1.76	3.04
Hobby and sport	5.80	2.82	−0.19	−0.48

Internal consistency

Means, SD and distributional information of the HBI subscales are presented in table 6. Internal consistency was good to excellent within each of the five factors: (1) regulation, cost and accessibility (α=0.93), (2) special restrictions (α=0.80); (3) permit and education (α=0.85); (4) relaxed restrictions (α=0.76) and (5) hobby and sport (α=0.83). Cronbach's alpha values did not meaningfully change when examined separately among gun owners and non-owners, with all values ≥0.75.

Concurrent validity

Several independent samples t-tests examined mean differences on HBI scales across sample characteristics and survey questions as a preliminary test of concurrent validity (see online supplemental tables 1–4). Gun owners and non-owners significantly differed on all HBI scales, with gun owners having smaller means than non-owners on regulation, cost, and accessibility, special restrictions, and permit and education and greater means on relaxed restrictions and hobby and sport. Similarly, in response to the question 'To what extent do you agree or disagree with the idea that any American can possess a gun?' respondents who strongly or somewhat agreed with this statement had smaller means on regulation, cost, and accessibility, and permit and education and greater means on relaxed restrictions and hobby and sport. The same pattern emerged for the question, 'To what extent do you agree or disagree that people who are lawfully able to openly carry a gun, other than law enforcement, should be allowed to do so,' while the opposite pattern emerged for the question 'To what extent do you agree or disagree that people should be required to store their gun in a locked manner (eg, in a safe, locked cabinet or with an external locking device)?'

DISCUSSION

This study examined the preliminary psychometric properties of the HBI, a novel instrument developed to assess citizen's perceptions of potential harms and benefits of firearm policies and practices with the intent to guide policy-makers, researchers and practitioners in policy development and implementation. The initial set of 31 items was generated by an expert team of firearm policy researchers and measure developers and refined through a series of cognitive interviews. Data from a nationally representative survey, which included the HBI items, firearm-related behaviour and attitude measures, and sociodemographic questions, were used to retain or eliminate items and determine the optimal factor structure for scale development. Through a series of sequential EFAs performed on data from a random split-half of the sample, 21 items were retained to support 5 factors. A CFA on data from the other random half of the sample demonstrated an adequate fit of the final EFA five-factor solution.

The five identified factors reflect support for or opposition to policies associated with greater regulation and cost and more

stringent accessibility of firearms (factor 1), greater restrictions on gun ownership or accessibility for individuals with prior convictions, legal offences, domestic violence offending or mental health challenges (factor 2), more rigorous permit and education requirements (factor 3), relaxed restrictions for individuals with a history of violence, felonies or severe mental health problems (factor 4) and fewer barriers for participation in firearm sports and hobbies (factor 5). Each of these factors demonstrated adequate internal consistency reliability. These factors capture two of the perceived benefit–risk domains proposed in Vargus *et al*[17] (a) gun owners' sense of security and peace of mind that they have a defence in the event of external threat (eg, 'increases the time it takes a person to get to and ready a gun in their home' from the regulation, cost and accessibility scale) and (b) recreation and enjoyment (eg, 'makes it easier to participate in shooting sports…hobbies such as gun collection and restoration' from the Hobby and Sport scale). Less reflected is their third domain pertaining to psychological benefits, such as self-identity, esteem and community belongingness associated with gun ownership. However, the latter domain may be less salient and more difficult to report on than the harms and benefits captured in the other domains.

We demonstrated initial support for concurrent validity of HBI subscales by comparing gun owners and non-owners, as well as respondents who agree or disagree with several firearm regulations. As expected, gun owners were more likely than non-owners to oppose policies or practices that would (a) increase regulation or cost, (b) decrease accessibility, (c) impose restrictions on individuals based on histories of violence, legal offences or mental health conditions and (d) increase educational requirements and permit usage. Gun owners were more likely than non-owners to favour policies that would relax restrictions for individuals with certain risk factors (eg, mental health conditions, legal offences, violent offending), as well as policies that would make it easier to participate in firearm hobbies or sports. The very same patterns emerged for respondents who agreed (vs disagreed) with statements that '…any American can possess a gun' and that '…people who are lawfully able to openly carry a gun, other than law enforcement, should be allowed to do so'. In contrast, respondents who agreed (vs disagreed) that '…people should be required to store their gun in a locked manner' showed the opposite pattern, with relatively higher scores on the first three subscales and lower scores on the final two subscales.

We anticipate the HBI's utility in policy development and implementation. Specifically, HBI subscale scores may be useful in studying and understanding differences in perceptions of potential harms and benefits of firearm policies by sociodemographic characteristics, region, political perspectives, etc. We believe this is particularly critical for understanding perceptions of gun owners, which represent a heterogeneous and nuanced group. For example, a higher mean score on the permit and education subscale for group A relative to group B would suggest that an individual from group A is more likely to perceive policies/practices that increase permit enforcement or educational requirements as beneficial and worthy of support relative to an individual from group B. Such information may help to identify unintended consequences of policies and practices and inform refinements towards improving acceptability and uptake more broadly. It also may reveal important misperceptions that can be proactively addressed.

Improving knowledge of perceptions and policy positions, especially among gun owners, is critical for improving firearm policy effectiveness given the reliance on stakeholder buy-in and commitment to behaviour change (eg, ensuring firearms are secure). Without these, policies and interventions fail or lack sustainability. The HBI can be used to address our knowledge gap of these nuanced perceptions. Despite the HBI's strengths, we acknowledge that all questions were acquired concurrently, preventing the evaluation of the predictive validity of the HBI. This along with efforts to test for measurement invariance among certain subpopulations of the USA (eg, race/ethnicity, political identity, region), and research that considers HBI subscales in relation to the development or dissemination of specific policies and practices are areas of future study. This future work is needed to further demonstrate the utility of the HBI.

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