

CLEARINGHOUSE **FOR MILITARY FAMILY READINESS**

Peer-to-Peer Car Sharing: Considerations for the U.S. Military Rapid Literature Review

Clearinghouse Technical Assistance Team

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Executive Summary

This report was developed in response to a request for information on peer-to-peer (P2P) car sharing in the military. Specifically, the Technical Assistance (TA) team at the Clearinghouse for Military Family Readiness at Penn State (Clearinghouse) was asked to focus on the potential risks that Service members and their families may encounter when participating in a P2P car-sharing program.

Car sharing is part of the sharing economy. The sharing economy includes business models that replace ownership of an item (e.g., car) with temporary access to that item (Münzel et al., 2020). Car-sharing services provide local cars to local users at any time and for any duration (Frenken, 2015). Trust is a key component in the sharing economy. In fact, a lack of trust is one of the most cited reasons consumers do not participate in the sharing economy (Neunhoeffler & Teubner, 2018).

There are two prominent car-sharing business models: business-to-consumer and P2P. In the P2P car-sharing model, car owners locally rent their cars through an intermediary company to individuals who need to drive a car (Münzel et al., 2020). In a P2P car-sharing program, members include the car owners who supply their cars for rent and the individuals who rent those cars.

P2P car sharing has many potential benefits (e.g., environmental, financial, social). However, for these benefits to be realized, vehicle owners and drivers must actively participate in the car-sharing programs. In addition, there are risks involved in participating in a P2P car-sharing program for the car owners and the drivers (e.g., physical, cybersecurity, financial, insurance). In addition to the risks, one major challenge to participating in a P2P car-sharing program is understanding the legal and logistical requirements of P2P car-sharing programs, and these conditions vary by state. More recently, however, many state laws (i.e., those enacted in or after 2020) follow the Peer-to-Peer Car Sharing Program Model Act that was developed by the National Council of Insurance Legislators (Poole, 2020).

This report provides information on the following elements:

- Types of car sharing;
- Potential benefits of P2P car sharing, including environmental, financial, and social benefits;
- Potential risks of P2P car sharing, including physical security, cybersecurity, financial, and insurance risks;
- Legal and logistical requirements for P2P car sharing;

- Impact of P2P car sharing on greenhouse gas emissions, traffic, and parking congestion;
- Impact of P2P car sharing on vehicle depreciation;
- Recommendations for implementing a P2P car-sharing program with military personnel; and
- Additional considerations.

Introduction

The Technical Assistance (TA) team at the Clearinghouse for Military Family Readiness at Penn State (Clearinghouse) conducted a brief, timely, yet comprehensive, literature review on peer-to-peer (P2P) car sharing in the military. Research that examines this topic was identified by searching peer-reviewed journal articles and grey literature, and an emphasis was placed on research published between 2017 and 2022. Search queries included various combinations of the following terms: *types of car sharing, peer-to-peer car sharing, peer to peer car sharing, P2P car sharing, benefits, risks, credit risks, greenhouse gases, greenhouse gases reduction, vehicle depreciation, insurance, laws (U.S.), laws in U.S. 2022, legal issues, taxes, taxes in U.S. 2022, cybersecurity, car sharing platform data breaches, and physical security.*

Types of Car Sharing

Car sharing is one type of the sharing economy (i.e., business models that replace ownership with access) (Münzel et al., 2020). Car-sharing services provide local cars to local users at any time and for any duration (Frenken, 2015). There are two prominent car-sharing business models: business-to-consumer (B2C) and P2P. B2C and P2P car-sharing models appeal to individuals who are interested in renting a car on a short-term basis from locations that are convenient to them (Dill et al., 2017). However, there are some distinctions between B2C and P2P car-sharing models.

In the B2C car-sharing model, a company owns a fleet of cars that are rented out to users. These cars can be returned to the same location where they were picked up (i.e., roundtrip) or dropped off at another location (i.e., one-way). The B2C model differs from rental car companies because the cars are offered locally, can be rented at any time, and can be rented for any duration (Münzel et al., 2020). One prominent example of the B2C car-sharing model is ZipCar.

In the P2P car-sharing model, individual car owners locally rent their cars through an intermediary company to individuals who want to rent a car (Münzel et al., 2020). The

P2P car-sharing model is distinct from the B2C model because “the members of the service are providing both the supply and the demand (Dill et al., 2017, p. vii).” In other words, the members of the service include the car owners who supply their cars for rent and the individuals who rent those cars. Two P2P car-sharing companies that operate in North America are Turo and Getaround.

This report focuses on the P2P car-sharing model and uses the following definitions (National Council of Insurance Legislators, 2021, p.2):

- **P2P car sharing:** the authorized use of a vehicle by an individual other than the vehicle’s owner through a P2P car sharing program. P2P car sharing does not mean a rental car or rental activity.
- **P2P car sharing program:** a business platform that connects vehicle owners with drivers to enable the sharing of vehicles for financial consideration. P2P car sharing program does not mean a rental car company.

Potential Benefits of P2P Car Sharing

P2P car sharing has many potential benefits. However, for these benefits to be realized, vehicle owners and drivers must actively participate in the car-sharing programs. While P2P car-sharing programs have gained popularity in recent years, participation rates, especially among car owners, are lower than projected (Wilhelms et al., 2017). Among car owners who are enrolled in a P2P car-sharing program, the availability of their cars for use by drivers may be less than optimal. For example, 27% of vehicle owners enrolled in the Getaround P2P car-sharing program in Portland, Oregon, did not rent their vehicles at all during the study period, which lasted over 1 year. Another 28% rented their vehicles less than five times during the same study period (Dill et al., 2017). For a P2P car-sharing program to reach its intended benefits, consumer (i.e., car owners and drivers) motives and barriers for participation must be understood and addressed.

This section provides information on the potential benefits of P2P car sharing for car owners and drivers. These potential benefits are listed below and are expanded in the sections that follow. Potential benefits of P2P car sharing, if fully implemented and utilized, include the following:

- Environmental benefits;
- Financial benefits; and
- Social benefits.

Environmental Benefits

Private car use is a contributor to Greenhouse Gas (GHG) emissions. P2P car sharing has been hypothesized as a solution to reducing GHG emissions, decreasing traffic congestion, and alleviating parking concerns. However, for these potential benefits to be realized, P2P car sharing must reduce car ownership and car use. More information can be found in the *Impact of P2P Car Sharing on Greenhouse Gas (GHG) Emissions, Traffic, Parking, and Highway Accidents* section of this report (see page 15).

Financial Benefits

The anticipated financial benefits for the car owners and the drivers are associated with increases in participation in P2P car-sharing programs (Hunecke et al., 2021). Shaheen et al. (2018) found that 20% of P2P car-sharing participants joined the car-sharing program to earn money by lending their vehicles. Dill et al. (2017) found the potential to earn money was cited as the biggest benefit to participation for car owners, and most drivers (85%) agreed that participation in the program allowed them to save money by not owning a car. For most car owners, the anticipated financial benefits are realized; however, for a small percent (5%), the costs associated with sharing their car were not recuperated by the amount of money they received from renting it (Schwieterman & Smith, 2020).

Financial benefits may be larger in households with low incomes. According to Schwieterman and Smith (2020), a household earning \$40,000 per year could increase their household income by 6% if they shared their car for 90 days over 1 year. P2P car sharing also has the potential to increase accessibility for unemployed individuals to obtain economic opportunities that are not reachable by other modes of transportation (e.g., bus, train, bike). For example, Schwieterman and Smith (2020) found that participation in a P2P car-sharing program in Illinois was higher in areas with residents who identified as ethnic or racial minorities and those who were unemployed.

Social Benefits

Individuals who participate in P2P car-sharing programs often cite social benefits as a reason for participation. For example, community-centered themes, such as supporting the local economy, helping those in their communities, and meeting others in the community, were reported as benefits to P2P car sharing from car owners and drivers who participated in the Getaround car-sharing program in Portland, Oregon (Dill et al., 2017).

Potential Risks of P2P Car Sharing

There is limited research in the field of risk management for car-sharing companies (Hanusik, 2020). To help fill the gap, Hanusik (2020) identified risk activities of car-sharing guests, examined the probability that those risk activities will occur, and considered the cost of those risk activities for the company. Total vehicle damage, vehicle theft, and partial vehicle damage were identified as the key risks for car-sharing companies. These risks align with what vehicle owners identify as their concerns regarding participating in a car-sharing program (i.e., potential damage to their vehicles, renters disrespecting their vehicles, or renters disrespecting their rules) (Dill et al., 2017).

This section provides information on potential risks of P2P car sharing for car-sharing hosts (i.e., car owners) and car-sharing guests (i.e., drivers). These potential risks are listed below and are expanded in the sections that follow. Potential risks of P2P car sharing for hosts and guests include the following:

- Physical risks;
- Cybersecurity risks;
- Financial risks; and
- Insurance risks.

In addition, P2P-car sharing risks that are specific to military personnel are explored.

Physical Risks

P2P car-sharing hosts may meet the car sharing guests in person to provide access to the car being shared (Schwieterman & Smith, 2020). This has some inherent risks as the hosts and guests may not personally know each other. This risk can be mitigated by meeting in public places where there are many people or by the owners providing remote access to the cars. Owners and drivers agree that arranging a time to meet and transferring the car keys were challenges to P2P car sharing (Shaheen et al., 2018); providing remote access to the car could reduce this barrier.

Car owners must also trust the drivers to take care of their car while the driver is using it. For example, car owners must trust the guest drivers not to damage their car while using it. Owners cite potential damage to vehicles (Dill et al., 2017; Shaheen et al., 2018) and renters disrespecting their vehicles or rules as the biggest risks or concerns with participating in a P2P car-sharing program (Dill et al., 2017). Another example involves fuel cost and replenishment. Thus, many hosts require guests to refill the gas tank before returning the car (Schwieterman & Smith, 2020). Car owners must trust the drivers to use the appropriate fuel when refilling the gas tank. Risks associated with this include the

drivers adding the incorrect fuel (e.g., diesel) to the gas tank or tampering with the gas tank.

A physical risk for P2P car-sharing guests is trusting that the car has been maintained properly and that there are no open recalls on the car. This responsibility lies with the car hosts and is managed within the P2P car-sharing program. This risk is mitigated by the consumer protection and public-safety provisions of most state laws that regulate P2P car sharing. More information can be found in the *Legal and Logistical Requirements for P2P Car Sharing, Consumer and Public Safety* section of this report (see page 12).

Cybersecurity Risks Related to the Cars

Inherent cybersecurity risks exist with any online transaction. Privacy invasion and data misuse are noted as barriers to P2P car sharing for some guests when the reservation is made over the internet. (Hunecke et al., 2021). These concerns are warranted given that in 2019, Car2Go's car-sharing application (app) was hacked (Vaidya & Mouftah, 2021). Moreover, in 2021, two archived German car-sharing websites that merged into BlaBlaCar in 2015 were hacked (Goud, 2022). The hacking of Car2Go's car-sharing app led to multiple cars being unlocked and, subsequently, stolen (Vaidya & Mouftah, 2021). The hacking of the archived German car-sharing websites led to the leaking of contact information for more than 600,000 customers, including 100,000 email addresses and 15,000 cellphone numbers. In addition, more than 600,000 bank account numbers were stolen (Goud, 2022).

New advances in car technology, specifically the use of connected and autonomous vehicles (CAVs) and connected and autonomous electric vehicles (CAEVs), have led to new cybersecurity challenges. Vaidya and Mouftah (2021) categorize the cybersecurity threats by the proximity of the attacker to the car. These cybersecurity threat categories include the following:

- **Physical access:** These types of attacks require physical access to the car. An example of this type of attack includes using a USB port to gain access to infotainment systems.
- **Remote access – short range:** These types of attacks require the attacker to be within proximity to the car (e.g., 10 meters). An example of this type of attack includes using radio frequencies to gain entry to a car with a keyless access and starting mechanism.
- **Remote access – long range:** These types of attack do not rely on proximity to a car and most often occur through the internet or cellular data. An example of this

type of attack is the accessing of sensitive data or taking control of cars through a mobile app (e.g., the 2019 hacking of Car2Go's mobile app).

Financial Risks

For car owners who have a lien against their car (i.e., they are making a monthly payment on their car to a financial institution or other lending service), participating in the P2P car-sharing program may be a violation of contract terms with the lienholder (National Council of Insurance Legislators [NCOIL], 2021). The potential implications of these types of violations vary based upon the terms of the contract.

Another potential financial risk related to P2P car sharing involves the concept of *prosumers*. The concept of prosumers is relatively new, and there is limited available research. Individuals who purchase an asset (e.g., a car) for both their own use and to share with others via a P2P program are described as prosumers. Although there is limited research in this area, Klein et al. (2022) found that individuals who act as prosumers versus consumers are more likely to purchase an asset (e.g., car), and they are more likely to purchase an asset that is more expensive than they normally would purchase because they believe the more expensive asset will be more desirable for the patrons. Further, when viewing car advertisements (ads), individuals, who viewed ads that highlighted the economic benefits of P2P car sharing, were more likely to purchase a car than individuals who did not view the ads (Klein et al., 2022). This prosumer mentality could lead to financial risks for the car owners if they are unable to rent their car as much as they anticipated.

Insurance Risks

An insurance risk for P2P car-sharing hosts is the potential loss of car insurance on the car that is registered in the P2P car-sharing program. Currently, only three states (i.e., California, Oregon, and Washington) have laws that prohibit private insurance companies from cancelling or failing to renew an individual's car insurance because he or she participates in a car-sharing program (Turo, 2022).

For P2P car-sharing guests, their personal vehicle insurance may not cover the use of a shared vehicle even if it covers the use of a rented vehicle (Poole, 2020). Although all states that regulate P2P car-sharing programs include insurance and liability provisions, the insurance and liability coverage varies among states. More information can be found in the *Legal and Logistical Requirements for P2P Car Sharing, Insurance and Liability* section of this report (see page 11).

Risks Specific to Military Personnel

Clearinghouse researchers did not identify any research that examines the risks of P2P car-sharing programs that are specific to military personnel. However, as noted above,

car owners must trust drivers to take care of their car while the drivers are using it. Part of this trust involves the expectation that drivers would not maliciously tamper with the car. However, the threat of a driver tampering with a car that will be driven onto a military base is a noteworthy concern. For example, a driver could add a GPS device to the car and track the car's location on base or hack into the on-board diagnostics system and make the car malfunction. Perhaps more concerning, given the potential loss of life, a terrorist could attach explosives to the car and use it as a weapon. The possibilities for nefarious behavior are not limited to the above examples. However, one way to mitigate the risks listed above would be to limit participation in the P2P car-sharing program to Service members only or Service members and their families. These limitations contrast with the traditional P2P car-sharing program that would be open to any resident or visitor to the area where the P2P car-sharing program operates.

Cybersecurity is another serious risk, and the perpetrator may not require access to a vehicle to execute his or her plan. For example, if Service members' personal information (e.g., address, driver's license, credit card numbers) and/or military service information (e.g., deployment status) are stored in the P2P car-sharing program's database, security breaches could be significant.

Legal and Logistical Requirements for P2P Car Sharing

At least 18 states have enacted laws regulating P2P car sharing: Arizona, California, Colorado, Georgia, Indiana, Kansas, Louisiana, Maine, Maryland, Nevada, Ohio, Oklahoma, Oregon, Tennessee, Texas, Virginia, Washington, and West Virginia. Thirteen of these laws went into effect within the past 3 years (i.e., 2020, 2021, or 2022), and several other states have proposed, but not passed, legislation to regulate P2P car sharing in recent years (Poole, 2020).

State laws regulating P2P car sharing usually define what P2P car sharing is, what constitutes a P2P car-sharing company, and how P2P car-sharing companies differ from car-rental companies. In addition, the following policy areas are covered in many state laws (Poole, 2020):

- Insurance and liabilities;
- Consumer protection and public safety;
- Taxes and fees assessed; and
- Airport use.

More information on each policy area is provided in this section. An overview of state-level laws that regulate P2P car sharing is provided in Table 1. This table lists the 18 states that have a P2P car-sharing law, the bill number associated with the law, a link to the bill's text, the year the law went into effect, and what the bill covers. Please use the links provided in the chart to read more about a specific law.

Table 1

State P2P Car Sharing Laws

State	Bill Link	Effective Date (Year)	Coverage ^a			
			Insurance and Liability	Consumer Protection and Public Safety	Taxes and Fees	Airport Use
Arizona	SB 1720	2021	X	X	X	
California	AB 1871	2011	X			
Colorado	AB 19-090	2020	X	X		X
Georgia	HB 337	2021	X	X		
Indiana	HB 1362	2020	X	X		X
Kansas	HB 2379	2022	X	X		
Louisiana	HB 532	2020	X	X		
Maine	S.P. 470 - L.D. 1420	2021	X	X		
Maryland	SB 743	2018	X	X	X	X
Nevada	AB 429	2021	X	X	X	
Ohio	HB 166	2020	X	X	X	X
Oklahoma	SB 355	2021	X	X	X	X
Oregon	HB 3149	2011	X			
Tennessee	HB 1593/SB 2207	2020	X	X	X	X
Texas	HB 113	2022	X	X		
Virginia	SB 735	2022	X	X	X	X
Washington	HB 2384	2012	X			
West Virginia	HCR 108	2019	X	X	X	X

Sources: National Conference of State Legislators (2020), Poole (2020), and Turo (2022).

^a Coverage information was taken from Poole (2020) for states that enacted the law in or before 2020. For states with an effective date of 2021 or 2022, the bills were used to complete the chart.

Insurance and Liability

Each state law that regulates P2P car sharing includes a provision on car insurance. Many of the newer laws (i.e., those enacted in or after 2020) follow the Peer-to-Peer Car Sharing Program Model Act (Model Act) developed by NCOIL (Poole, 2020). This model act was adopted by NCOIL in 2019 and amended in 2021. The NCOIL's Model Act addresses the following insurance-related items:

- Insurance coverage during the car-sharing period;
- Notifications of implications of a lien;
- Exclusions in motor vehicle liability insurance policies;
- Recordkeeping requirements for P2P car-sharing companies;
- Exemptions from vicarious liability;
- Contributions against indemnification; and
- Insurable interest (NCOIL, 2021, pp. 4-8).

NCOIL's Model Act can be found at: <http://ncoil.org/wp-content/uploads/2021/04/NCOIL-P2P-Car-Sharing-Model-Amended-4-18-21.pdf>

Insurance Differences Among States

While the adoption of NCOIL's Model Act by many states helps simplify the insurance requirements for P2P car-sharing across state lines, there are some notable differences among state regulations. For example, each state establishes the minimum coverage of a motor vehicle liability policy for their state. Even though the NCOIL's Model Act provides a general structure and language for state-level P2P car-sharing laws, the NCOIL's Model Act still refers to current state laws as follows:

A peer-to-peer car sharing program shall ensure that, during each car sharing period, the shared vehicle owner and the shared vehicle driver are insured under a motor vehicle liability insurance policy that provides insurance coverage in amounts no less than the minimum amounts set forth in [insert citation to applicable statute establishing state minimum coverage]...(NCOIL, 2021, p. 4).

Further, only three states (i.e., California, Oregon, and Washington) explicitly state that insurance companies cannot cancel or fail to renew an individual's car insurance because he or she participates in a car-sharing program (Turo, 2022). Thus, in 47 states, private car insurance companies can cancel a car owner's insurance if he or she participates in a P2P car-sharing program.

Consumer Protection and Public Safety

Fifteen of the eighteen states that have enacted laws, which regulate P2P car sharing, have included in these state laws consumer protection and public-safety provisions. Many of these state laws follow NCOIL's Model Act, which requires the car sharing program to do the following:

- Disclose the rights of the P2P car-sharing program to seek indemnification from the vehicle owner or driver, insurance policy limitations, and daily fees.

- Provide an emergency phone number.
- Verify the potential vehicle drivers have an active driver's license and retain this information (i.e., name, address, driver's license number, and place of issuance).
- Retain responsibility for equipment used in the P2P car sharing program, such as GPS.
- Verify there are no current safety recalls on a car prior to allowing it to be available for rent on the P2P car sharing network. During the time of enrollment, notify the shared vehicle owner of open safety recalls and make the owner aware that the vehicle cannot be made available for sharing until the recalls have been addressed (NCOIL, 2021).

State and Federal Taxes for Shared Vehicle Owners

Since P2P car sharing is a relatively new phenomenon in the United States, state legislators are still determining how to tax P2P car-sharing programs and shared vehicle owners (Palsson, 2021). According to the National Conference of State Legislators (2019), 40 states impose taxes or daily fees for rental cars. However, whether these taxes apply to P2P car-sharing programs is not legally clear (Poole, 2020).

To provide further clarification, eight of the eighteen states, which have enacted laws that regulate P2P car sharing, have included tax provisions within their state laws. The states that address taxes on car sharing are Arizona, Maryland, Nevada, Ohio, Oklahoma, Tennessee, Virginia, and West Virginia. Many of these laws require a sales tax, of varying percentages, to be collected for any trip that begins or ends within their respective state. As of May 2021, no state has implemented a P2P car-sharing tax policy that is identical to the car-rental tax policy within their state (Palsson, 2021).

In addition to state taxes, some cities and municipalities have their own ordinances regulating the taxation of car sharing services. Some of these municipalities may include P2P car sharing programs in their definition of a rental agency, and therefore these municipalities may tax P2P car sharing programs the same way as they tax traditional car-rental agencies. For example, Anchorage, Alaska, has a city ordinance that requires online car sharing platforms to “register, collect, and remit vehicle rental tax on behalf of rental agencies, which includes individuals, using a hosting platform to list their vehicles for rent” (Municipality of Anchorage, 2020, p.2).

Taxing P2P car-sharing programs can generate additional revenue for the state or municipality. However, unlike car-rental companies whose primary renters do not live in

the area they are renting a car from, in a P2P car-sharing program, all of the hosts live in the local area, and 49% of the guests are also residents (Palsson, 2021). Evidence suggests that P2P car-sharing guests who are also residents are more sensitive to prices than non-residents (Palsson, 2021). Imposing or increasing taxes on P2P car-sharing programs will increase the cost of these programs. These increases could have implications for the car-sharing guests and hosts as higher prices could force consumers who are more sensitive to prices (e.g., those with lower incomes) out of the market, and this could potentially limit the accessibility of the P2P car-sharing programs for residents. Further, since residents constitute almost 50% of P2P car-sharing guests, this could also limit the income generated through the car-sharing program for car owners.

Gig, Sharing, Access Economy Taxes

The gig, sharing, or access economy is when people earn income by providing on-demand work or services, such as renting out property (e.g., cars). Car-sharing hosts (i.e., car owners) are considered “gig workers” by the Internal Revenue Service (IRS) (IRS, 2021). Gig workers are considered self-employed. The self-employment tax rate is 15.3%, which must be paid for self-employment net earnings of \$400 or more per year (IRS, 2022). Gig workers do not have taxes automatically deducted from the income generated through the gig work. Therefore, gig workers must be proactive and pay quarterly estimated payments to the IRS, or, if they are employed elsewhere, increase the deductions on their paycheck to cover the amount of the estimated monthly payments (IRS, 2021). If car owners who participate in a P2P car-sharing program do not properly estimate the anticipated income generated by sharing their car, do not make the estimated quarterly payments, or do not accurately increase the deductions on their paycheck, they could have tax liabilities at the end of the year.

Airport Use

Eight of the eighteen states that have enacted laws, which regulate P2P car sharing, include airport-use provisions within their state laws. The states that address airport use are Colorado, Indiana, Maryland, Ohio, Oklahoma, Tennessee, Virginia, and West Virginia. In general, states that regulate P2P car sharing and airport use typically do so by requiring the P2P car-sharing program to enter into an agreement with the airports in the state. Some state laws specify that the airport-use agreements can impose fees on P2P car-sharing programs, and the airports can adopt rules that govern car sharing (Poole, 2020). This can be problematic as state laws do not specify what the rules, regulations, or fees regarding P2P car sharing and airport use entail. Imposing airport use fees on P2P car-sharing programs will increase the cost of these programs, and evidence suggests that P2P car-sharing guests who are also residents are more sensitive to prices than non-residents (Palsson, 2021). Therefore, imposing airport-use fees, depending on the amount, could limit the accessibility of P2P car-sharing programs for some residents.

Impact of P2P Car Sharing on Greenhouse Gas (GHG) Emissions, Traffic, Parking, and Highway Accidents

Private car use is a contributor to GHG emissions. P2P car sharing has been hypothesized as a solution to reducing GHG emissions, decreasing traffic congestion, and alleviating parking concerns. However, for these potential benefits to be realized, P2P car sharing must reduce car ownership and car use.

The effect of car sharing on car ownership depends on the number of individuals who forego purchasing a car because of the car-sharing program and the number of car owners who discard a car due to the car-sharing program (i.e., car shedding) (Chapman et al., 2020). Shaheen et al. (2018) found 15% of respondents joined a car-sharing program to forego purchasing a vehicle, and 3% sold a car due to their involvement in the car-sharing program. However, Nansubuga & Kowalkowski (2021) found the effect of car sharing on car shedding (i.e., reducing car ownership due to alternate means of transportation) was situationally dependent. Thus, car sharing may reduce car ownership, however, the extent of the impact is uncertain.

Impact of P2P Car Sharing on GHG Emissions

Some researchers have found car-sharing users, on average, reduce their car use. This holds true even if the carless individuals increase their car use (Chapman et al., 2020). For example, Arbeláez Vélez and Plepys (2021) found GHG emissions caused by car owners decreased after participating in a P2P car-sharing program; however, GHG emissions caused by carless individuals increased after participating in a P2P car-sharing program. Nevertheless, the net effect was a reduction in GHG emissions.

On the other hand, some studies have found that car sharing may not be as environmentally friendly as previously thought (Chapman et al., 2020). For example Jung and Koo (2018) found that car sharing could lead to an increase in GHG emissions due to carless individuals shifting from using public transportation to car use. Chapman et al. (2020) found the impact of car sharing on car use varied, and car sharing could lead to an increase or decrease in the number of kilometers traveled per user per day (i.e., they found car sharing could potentially lead to a decrease of 56 kilometers traveled per user per day or lead to an increase of 24 kilometers traveled per user per day).

Car sharing may still prove to be beneficial in reducing GHG emissions and air pollution (Chapman et al., 2020). These findings should be interpreted with caution due to the varying outcomes and methodologies employed by previous researchers (i.e., self-report assessments, prospective studies, and quasi-experimental studies).

Impact of Car Sharing on Traffic

The impact of car sharing on traffic congestion appears to be situationally dependent; therefore, no conclusion can be drawn as to the effectiveness of car sharing on traffic congestion (Nansubuga & Kowalkowski, 2021). However, car sharing may be beneficial in reducing traffic congestion (Chapman et al., 2020).

Impact of Car Sharing on Parking and Highway Accidents

Parking issues, in highly congested cities, were discussed in the literature as reasons why implementing P2P car-sharing programs may be beneficial. Parking incentives were also suggested as policy considerations for incentivizing car sharing (e.g., increasing the cost of parking, providing free parking to cars registered in a car-sharing program). However, in this literature review, Clearinghouse staff did not identify any research that evaluated the effect of P2P car sharing on parking concerns. Moreover, Clearinghouse researchers did not identify research that evaluates the effect of P2P car sharing on highway accidents.

Impact of P2P Car Sharing on Vehicle Depreciation

No research was identified that evaluates the effect of P2P car sharing on the depreciation of privately owned vehicles. This section provides information on depreciation, or “the difference between the new-vehicle purchase price and estimated trade-in value at the end of 4 years and 75,000 miles (AAA, 2021, p.4)” on privately owned vehicles.

The depreciation rate of a privately owned vehicle assumes that the car is driven 15,000 miles per year. If a vehicle is driven less than 15,000 miles per year, the depreciation rate on that vehicle is less than the anticipated depreciation rate; however, if a car is driven more than the 15,000 miles then the car will depreciate more than anticipated. An owner who is participating in a P2P car-sharing program could see a higher than average depreciation on his or her vehicle if he or she allows it to be driven more than 15,000 miles per year. However, the average driver will only decrease the value of his or her vehicle by \$374 per year if the car is driven 20,000 miles per year versus 15,000 (AAA, 2021, p.7). Note, these numbers are for privately owned vehicles, and whether participation in a P2P car-sharing program would affect these numbers is not known.

Recommendations for Implementing a P2P Car Sharing Program for Military Personnel

This section outlines recommendations for implementing a P2P car-sharing program for military personnel. These recommendations are listed below and are expanded in the sections that follow. The recommendations include the following:

1. Examine and mitigate security risks of the P2P car-sharing program;
2. Determine Service members' desires to participate in a P2P car-sharing program; and
3. Define the P2P car-sharing program structure for Service members.

Examine and Mitigate Security Risks of the P2P Car Sharing Program

As noted previously, Clearinghouse researchers did not identify research that examined the risks of P2P car-sharing programs specific to military personnel. However, there are real risks involved in a P2P car-sharing program for military personnel. The following recommendations are made to assist in examining and mitigating these security risks:

- Define who can participate in the P2P car-sharing program (e.g., Service members, military spouses, veterans, civilians, government contractors). Would different levels of participation, based on security clearances, be warranted to reduce risks?
- Determine if there is a way to ensure that a vehicle being used in the P2P car-sharing program cannot be weaponized. If not, what measures can be used to mitigate this risk?
- Assess known and potential cybersecurity threats, determine what types of user information would be appropriate to store in the P2P car-sharing app, and identify the mode of access to the car (e.g., would using remote access to vehicles pose a greater security threat than using regular keys).

Determine Service Members' Desires to Participate in a P2P Car Sharing Program

Having a sufficient supply and demand for the P2P car-sharing program is necessary for the program to operate effectively. However, there are barriers to participation among car owners and drivers that must be understood and addressed before implementing such a program. To better understand Service members' desire to participate in a P2P car-sharing program, the following recommendations are made:

- Identify Service members who live in areas with P2P car-sharing programs, and systematically examine their current participation rates in these programs. If they are not currently participating in the programs, identify the barriers. If Service

members are currently participating in the programs, identify the benefits and barriers.

- Assess Service members and their families' perceptions about P2P car sharing and evaluate their desires to participate in a P2P car-sharing program. Items for consideration include perceived benefits and motivations, perceived barriers and concerns, and perceived usage. If Service members and their families currently have one or more cars, gaining feedback on whether they would consider reducing their car ownership if they were to participate in a P2P car-sharing program would be useful. If Service members and their families are carless, gaining feedback on whether participation in a P2P car-sharing program would reduce their need to purchase a car or change their primary modes of transportation would be useful.

Define the P2P Car-Sharing Program Structure for Service Members

In a P2P car-sharing program, the car owners and drivers register to participate in the program through an intermediary company. The following recommendations are made to assist in defining the P2P car-sharing program structure:

- Consider who will provide oversight to the P2P car-sharing program and how this responsibility will be delegated to each installation. A clear plan for management and implementation of the P2P car-sharing program is particularly important in mitigating potential security risks.
- Identify a P2P car-sharing program that is suitable for use with military personnel. For example, does the Department of Defense intend to create a P2P car-sharing program specifically for Service members or will an already established P2P car-sharing program be used?
- Examine differences across installations and understand how these differences could affect a P2P car-sharing program in various locations. For example, there are different taxing structures and insurance requirements between states. Further, some states allow a private car insurance company to cancel a person's car insurance because he or she participates in a P2P car-sharing program.

Additional Considerations

One reason the Department of Defense may want to implement a P2P car-sharing is to financially benefit Service members who are deployed. However, in a P2P car-sharing program, the car owners (e.g., deployed Service members) are responsible for ensuring the car is operable and safe to drive. If a Service member is deployed, he or she cannot

complete the car safety and maintenance tasks that car owners would normally do. Therefore, if the car owner is deployed, a clear process to ensure maintenance tasks are addressed and documented is needed. These maintenance tasks may include:

- Performing general maintenance on the car (e.g., oil changes, tire rotations, putting in windshield wiper fluid, air pressure checks);
- Ensuring there is no damage to the car after renting it;
- Cleaning the car between uses;
- Renewing the car's registration and inspection regulations;
- Ensuring there are no open recalls on the car;
- Approving requests to use the car by drivers; and
- Securing long-term parking.

If supplemental protocols are established for utilizing deployed Service members' cars, an additional consideration would be to determine how to store this information. If storing Service members' deployment status on the car-sharing app, additional considerations regarding cybersecurity threats would be important to address.

Summary

This rapid literature review provides a brief, yet comprehensive, examination of the research published between 2017 – 2022 on P2P car-sharing programs. P2P car sharing is relatively new in the United States, so information is limited, and the robustness of the research found regarding P2P car sharing in the United States is difficult to gauge. Therefore, studies published in other countries are included in this literature review. This report reviews the benefits, risks, and legal requirements for P2P car sharing. It also discusses the impact of P2P car sharing on GHG emissions, traffic, parking congestion, and vehicle depreciation. Finally, recommendations for implementing a P2P car-sharing program for military personnel and additional considerations have been made.

Additional Assistance

The TA specialists at the Clearinghouse provide support to professionals as they examine and make informed decisions about which programs fit specific situations and are worth the investment. Whether connecting one with the resources and tools to conduct a needs assessment in a specific community, suggesting the best evidence-based program or practice for a certain situation, or developing an evaluation plan, the TA team of experts is a call or email away.

Please visit the Clearinghouse's website at www.militaryfamilies.psu.edu or call 1-877-382-9185 to speak with a TA specialist.

Suggested Citation

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