

Peer-to-Peer Carsharing

Exploring Public Perception and Market Characteristics in the San Francisco Bay Area, California

Ingrid Ballús-Armet, Susan A. Shaheen, Kelly Clonts, and David Weinzimmer

Peer-to-peer carsharing is an innovative approach to vehicle sharing in which vehicle owners temporarily rent their personal automobiles to others in their surrounding area. Peer-to-peer carsharing belongs to the larger sharing economy, an economic model premised on the notion of collaborative consumption as opposed to ownership. This study examined public perception of peer-to-peer carsharing and potential market characteristics through an intercept survey conducted in the San Francisco Bay Area, California. Three hundred respondents from 14 locations in San Francisco ($n = 150$) and Oakland ($n = 150$), California, were polled on their existing attitudes toward and perceptions of classic carsharing, peer-to-peer carsharing, and the sharing economy. The survey results indicate that there remains a low awareness of peer-to-peer carsharing, with fewer than 50% of San Francisco respondents and 25% of Oakland respondents having heard of the term. Approximately 25% of surveyed vehicle owners would be willing to share their personal vehicles through peer-to-peer carsharing, citing liability and trust concerns as primary deterrents. Those who drove almost every day were less open to renting through peer-to-peer, while those who used public transit at least once per week expressed a greater interest in it. Overall, the results of this study indicate considerable interest in peer-to-peer carsharing: 60% of San Francisco respondents and 75% of Oakland respondents without vehicle access would consider renting a peer-to-peer vehicle. The top three reasons for using peer-to-peer carsharing are convenience and availability, monetary savings, and expanded mobility options. Further outreach and education are needed to raise awareness of this mobility innovation.

Carsharing is an alternative to car ownership that enables individuals to enhance their mobility without the maintenance and storage costs associated with private vehicle ownership. Peer-to-peer carsharing is an innovative shared-use vehicle model under which privately owned vehicles are available for use by members in the surrounding area on an hourly or daily basis.

Peer-to-peer start-ups belong to a suite of online organizations that have helped to facilitate the growth of the “sharing economy” and “collaborative consumption” model. These online organizations provide an Internet platform through which individuals are able to share

physical items. These include websites, such as JustShareIt.com, which facilitate equipment sharing; Airbnb.com and Couchsurfing.com, which enable one to locate short-term lodging; and Zimride.com and Car.ma, which connect drivers and passengers. The proliferation of smartphone technology and social networking sites is a noteworthy cultural shift that has influenced the development of peer-to-peer carsharing. The sharing economy is developing a growing presence in society, and peer-to-peer carsharing is one of many shared-use mobility services that are focused on transportation resource sharing.

Given the recent growth and development of the peer-to-peer carsharing model, gauging the public perception of this service can further understanding of its market potential, as well as opportunities and barriers to adoption. This study evaluates the relationships between car ownership, frequency in car and public transit use, and awareness and perception of peer-to-peer carsharing through an intercept survey ($N = 300$) that was collected in the spring and summer of 2013 in Oakland and San Francisco, California. The study examines public awareness of carsharing, including similarities and differences in attitudes toward classic round-trip carsharing models, such as CityCarshare and Zipcar, and peer-to-peer carsharing services, including Getaround and RelayRides. This research identified key elements of peer-to-peer carsharing that are most attractive to users, as well as those that pose the most notable adoption barriers. The survey also considers the potential relationship between participation in the larger sharing economy (e.g., house sharing, ridesharing, carpooling, classic carsharing) and openness to peer-to-peer carsharing.

The paper has five key sections. The first section provides a literature review of carsharing and the sharing economy. Next, the survey methodology is discussed. Third, a demographic analysis of the survey population is presented. In the following two sections, the results of the intercept survey and conclusions are discussed.

LITERATURE REVIEW

While sharing resources is not a fundamentally new model of social interaction, the presence of a “sharing economy” is a growing, innovative concept. The sharing economy is an economic model based on sharing assets among groups of people rather than owning them (1). It is described by San Francisco Planning and Urban Research as “fundamentally capitalist yet simultaneously more socially and environmentally conscious,” and it is hailed by many as an opportunity to enhance the sustainability of the current economy while simultaneously yielding various additional co-benefits (e.g., emission reduction, fuel savings) (2). High levels of online connectivity, “living local” community-oriented awareness, and heightened cost consciousness and environmental issues have aided the sharing

I. Ballús-Armet, K. Clonts, and D. Weinzimmer, Institute of Transportation Studies, University of California, Berkeley, 109 McLaughlin Hall, and S. A. Shaheen, Transportation Sustainability Research Center, University of California, Berkeley, 408 McLaughlin Hall, Berkeley, CA 94720. Corresponding author: S. A. Shaheen, sshaheen@berkeley.edu.

Transportation Research Record: Journal of the Transportation Research Board, No. 2416, Transportation Research Board of the National Academies, Washington, D.C., 2014, pp. 27–36.
DOI: 10.3141/2416-04

economy in gaining traction (*1*). The sharing economy allows for the sharing of a wide range of property, such as home sharing, ridesharing, bikesharing, carsharing, and more.

Carsharing is one of the most popular subsets of the sharing economy and operates within a number of different frameworks. At present, there are three main forms of carsharing: (*a*) classic, round-trip carsharing; (*b*) one-way (or point-to-point) carsharing; and (*c*) peer-to-peer carsharing (usually round trip). A classic, round-trip carsharing organization is defined as a for-profit or nonprofit carsharing organization (CSO) that provides vehicle access on an hourly or daily basis to its members, who typically pay a monthly or annual membership fee. The CSO usually operates an online vehicle reservation system and oversees vehicles located at specified parking spaces within local neighborhoods, college campuses, or businesses. Individual carsharing vehicles are equipped with remote-access technology that allows members to access their reserved vehicle during their reservation period with a “fob” or keycard. Carsharing allocates the fixed costs of owning a vehicle over many users and reduces the inefficiency of personal vehicle ownership, since automobiles remain idle an average of 95% of the time (*3*). As of January 2013, there were more than a million carsharing users in North America alone (*4*). One-way carsharing enables a carsharing member to return a shared vehicle to a different location from where it was picked up.

Trust is critical to the success of the sharing economy and its ongoing growth. Airbnb, a site that enables individuals to share their living spaces with others, has placed an emphasis on cultivating trust among its users. After an incident in which an Airbnb host’s property was vandalized by a guest (*5*), the site launched a Trust and Safety Department and instituted a host insurance guarantee that currently insures hosts for up to US\$1 million per booking (*6, 7*). Social media integration is likewise an important tool that Airbnb uses to increase customer trust.

The carsharing and ridesharing sectors have also had a challenging time establishing trust among users. With respect to ridesharing, users are sometimes wary of riding in a vehicle belonging to someone they do not know (*8*). Some platforms have sought to address concerns around trust by limiting ridesharing to a closed environment, such as a workplace or university. Other approaches rely primarily on rating systems and integration with other social networks to establish credibility among users or instead to enable users to readily share with individuals already within their extended social networks (*9*).

Peer-to-peer carsharing, the focus of this paper, employs privately owned vehicles made temporarily available for shared use by an individual or members of a peer-to-peer company, with pickup and drop-off locations agreed on between the two parties (typically round trip). The owners of these privately shared vehicles profit from transactions with renters, although in most cases a peer-to-peer third-party company facilitates the rental. Peer-to-peer companies provide insurance and operate websites to connect vehicle owners with renters. In exchange for providing these services, peer-to-peer operators in turn keep a portion of the usage fee. Although vehicles shared within a peer-to-peer platform are generally older than those that comprise classic carsharing fleets, peer-to-peer carsharing offers a greater selection of locations, vehicle types, and daily and hourly rental prices than classic and one-way carsharing. In June 2013, there were nine personal vehicle-sharing operators (one of nine in pilot phase), three planned, and eight defunct in North America (*4*).

By directly connecting vehicle owners with would-be renters, some argue that peer-to-peer carsharing is a more direct manifestation of collaborative consumption than classic or one-way carsharing (*10*),

because it promotes the sharing of already-owned underused assets in contrast to a company-maintained vehicle fleet. In addition to facilitating the sharing of existing resources, the peer-to-peer model can significantly reduce operating costs; vehicle capital comprises almost 70% of total operating expenses for classic carsharing companies, for example (*1*). Nevertheless, peer-to-peer carsharing faces notable adoption barriers, which include insurance cost and availability, fear of sharing and lack of trust, challenges around balancing revenue and pricing, the expense of technological solutions, vehicle availability, and assurance of vehicle reliability (*1*).

Liability issues are also critically important to peer-to-peer carsharing. Personal vehicle insurance policies are generally not valid while a vehicle is being rented or leased to others, and using one’s personal car for commercial enterprises can lead to cancellation of insurance coverage in many states (*11, 12*). California, Oregon, and Washington have passed laws protecting car owners who engage in personal vehicle sharing (AB 1871, HB 3149, and HB 2384, respectively, where AB is assembly bill and HB is home bill). These laws categorize shared personal vehicles as a noncommercial use, which enables them to be insured through a secondary policy while being rented. When an owner uses his or her private vehicle, he or she is responsible for having a personal insurance policy; however, when it is being shared or rented, a peer-to-peer company provides a secondary auto insurance policy. In states where no such laws exist, owners are at risk when sharing their vehicle; they assume possible damages and liabilities on behalf of the person renting their vehicle above and beyond the peer-to-peer insurance. Furthermore, insurance companies may view personal vehicle sharing as altering the owner’s risk profile, which may result in insurance premium spikes or nonrenewal of insurance policies (*1, 12*).

There has been limited research to date on the issue of trust within the peer-to-peer carsharing model. A 2010 study found that more than half of survey respondents were reluctant to share their personal vehicles with others because of lack of trust. User rating and feedback, operator screening and selection, and integration with social networks were cited as key mechanisms to help address trust considerations (*1*). This paper seeks to expand the literature that pertains to peer-to-peer carsharing by furthering understanding of the public’s perception toward this mobility innovation and its potential adoption barriers.

METHODOLOGY

An intercept survey was designed to address the following questions: Have people heard about classic and peer-to-peer carsharing? Would people consider participating in peer-to-peer carsharing? What aspects of peer-to-peer carsharing elicit the most concern from respondents? Do current car owners differ from nonowners in their responses to what they perceive as positive and negative attributes of peer-to-peer carsharing? How do car ownership, frequency in automobile and public transit use, and demographics relate to peer-to-peer carsharing perceptions? How does openness to peer-to-peer carsharing compare with other sharing economy services, such as house sharing? This section includes a description of the survey implementation, as well as study limitations and response rate.

Survey Implementation

Public perceptions of peer-to-peer carsharing and market characteristics were explored in an on-street intercept survey between February

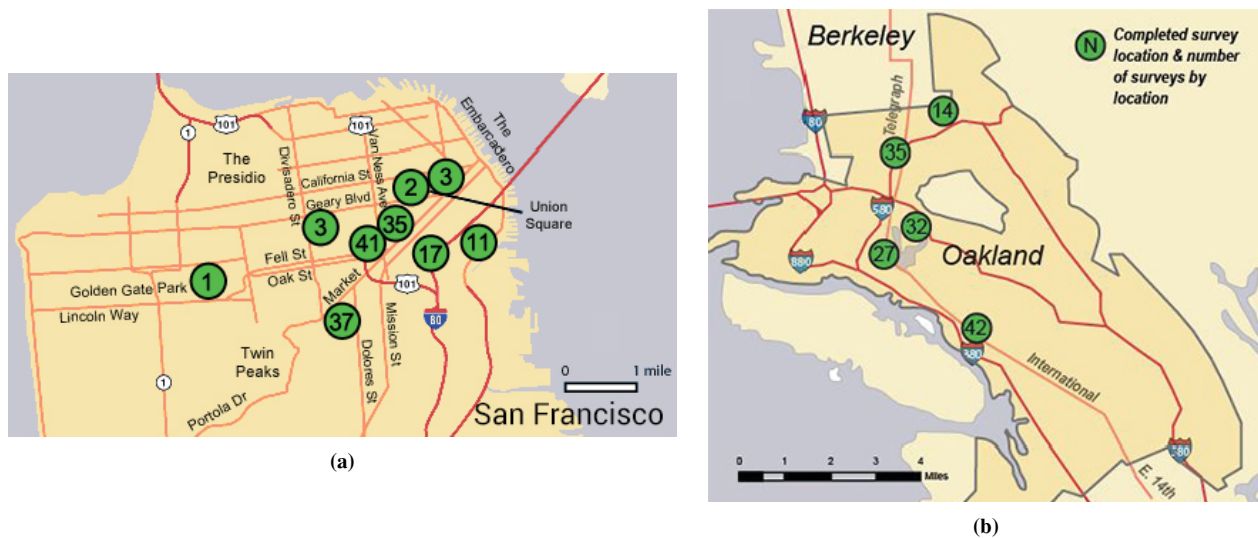


FIGURE 1 Number of surveys administered at locations in (a) San Francisco and (b) Oakland.

and March 2013 (Oakland) and June and July 2013 (San Francisco). An initial pretest of the survey format led to several modifications, including shortening the survey length. One hundred fifty surveys were administered at nine locations in San Francisco, and another 150 were collected at five locations in Oakland. Figure 1 displays the locations in San Francisco and Oakland where surveys were implemented in addition to the number of surveys conducted per location.

Survey questions were administered verbally in a 10- to 15-min intercept survey. Although the researcher's verbal inflexion, gestures, and other body language may have exerted influence on respondent answers, verbally administering the survey allowed researchers to gather information consistently and probe for further information to fully understand participant answers. Moreover, when respondents were unfamiliar with carsharing terminology, verbal interaction enabled researchers to clarify doubts and ensure understanding of new concepts.

Individuals throughout the survey were randomly selected and approached indiscriminately. No incentives for participating in the survey were provided. The number of refusals was counted and grouped according to whether respondents refused to take the survey or were unable to do so, because they were not from the geographical areas in which the surveys were administered. Check boxes were included in the survey instrument to improve the speed and consistency of the implementation, and researchers manually recorded unique answers.

The survey instrument included actual behaviors (revealed preference) and attitudes and intentions (stated preference). Respondents were asked about their driving patterns, if and what other transportation modes they used, and knowledge of and attitudes toward other resource-sharing programs.

Study Limitations and Response Rate

In this study, the survey sample would ideally reflect the characteristics of the adult population of Oakland and San Francisco; however, survey biases resulted in unequal sampling. The first bias was in regard

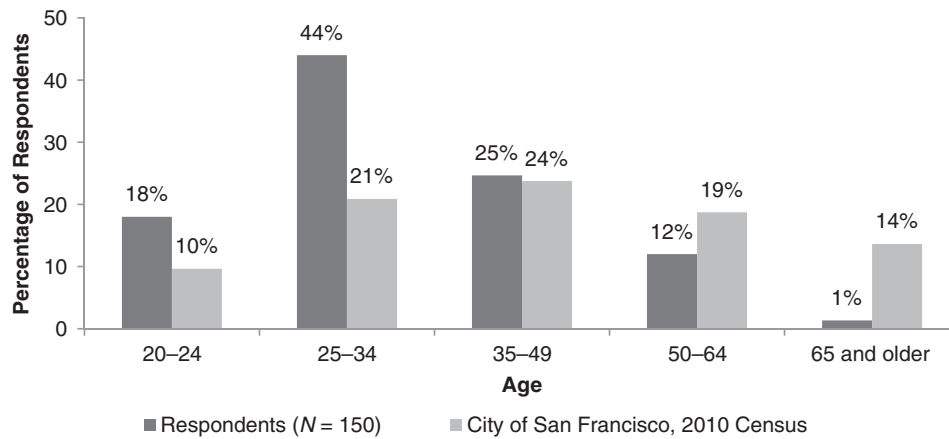
to survey location (coverage error). The surveys were conducted in public areas and near convenience stores throughout San Francisco and Oakland, which had relatively high levels of foot traffic. To gather information about travel behavior and to control for bias in locations easily accessible by foot, respondents were asked about their automobile ownership, driving frequency and purpose, and public transit use.

Some people may have been less cooperative and unwilling to participate in the survey because of language barriers or other social differences between them and the interviewers. If this nonresponse was correlated with demographics, it could result in a less demographically representative sample of the entire population. During the survey intake process, the number of rejections was tracked to partially understand the possible magnitude of nonresponse bias. A total of 603 people were approached for the survey: 244 in San Francisco and 359 in Oakland. Of these, 303 individuals declined to take the survey: 94 in San Francisco and 209 in Oakland. This number reflects a nonresponse rate of 50% overall, with 39% and 58%, respectively, in San Francisco and Oakland. The next section presents an overview of the study populations in San Francisco and Oakland, as well as a comparison of each survey sample.

DEMOGRAPHIC ANALYSIS: SAN FRANCISCO AND OAKLAND

Demographic data from the 2010 census were used for comparison against the demographics of survey respondents to determine how representative the sample was of the total population of San Francisco and Oakland. While respondents were representative of the larger population in relation to gender, significant differences existed in the representation of certain age and racial groups.

Respondents between the ages of 25 and 29 were overrepresented within San Francisco (44% of respondents versus 21% of the population), while participants 65 and older were underrepresented (1% of respondents versus 14% of the population). Additionally, African-Americans were overrepresented within San Francisco (11% of participants versus 6% of the population), while Asians were



	Respondents (N = 150)	San Francisco, 2010 Census	Significantly Different
White	53%	48%	No
Black–African American	11%	6%	Yes
American Indian–Alaska Native	0%	0%	No
Native Hawaiian and Pacific Islander	0%	0%	No
Asian	21%	33%	Yes
Hispanic, Latino, Spanish origin*	11%	15%	NA

*11% of our sample defined themselves as Hispanic, Latino, or of Spanish origin, while the U.S. Census defines this as a separate ethnic category rather than a race.

FIGURE 2 Survey sample age compared with 2010 census data for the City of San Francisco (NA = not available).

underrepresented (21% of respondents versus 33% of the population) (see Figure 2).

As with San Francisco, demographic data from the 2010 census were used to determine how indicative the demographics of survey respondents were of the larger Oakland population. Among the sample, 53% ($n = 80$) were male, while only 49% of Oakland self-reported as male in the 2010 census. There were some differences with respect to age between the population of Oakland and the sample, with participants of ages 25 to 29 overrepresented and those over 60 underrepresented. In addition, African-American and Asian populations were underrepresented in the sample (see Figure 3).

Similarities and differences exist among the demographic data collected in San Francisco and Oakland. Both cities were overrepresented for younger respondents and underrepresented for Asian respondents. On average, there were 1.68 cars per household in Oakland and 1.22 vehicles per household in San Francisco. In Oakland, members of all racial groups were more likely to own a vehicle than not, whereas, in San Francisco, Asians and Latinos were the only two groups more likely to own a vehicle.

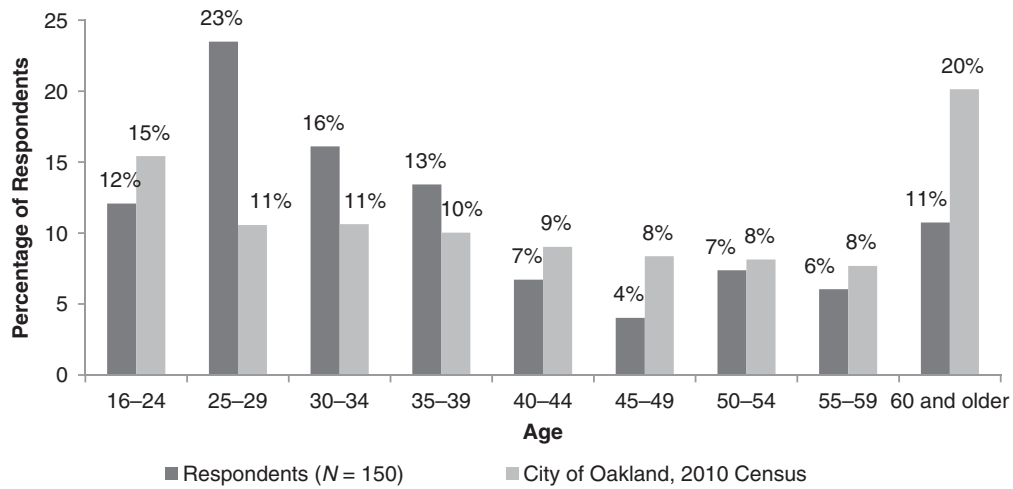
RESULTS

This section presents the survey analysis, highlighting significant differences between San Francisco and Oakland, based on awareness of carsharing terminology, travel patterns, vehicle ownership rates, and openness to participating in peer-to-peer carsharing and the sharing economy.

Awareness of Classic and Peer-to-Peer Carsharing

The San Francisco survey results show that the majority (84%) of the 150 survey respondents had heard of (includes “aware of” and even “confused about the concept”) classic carsharing, although less than half (47%) had heard of peer-to-peer carsharing (Figure 4). It is important to note that 10% of respondents were confused about the term “carsharing,” as many associated it with carpooling or ride-sharing. Awareness of both classic carsharing and peer-to-peer was higher among those without car access: 91% had heard of classic carsharing, and 40% were aware of peer-to-peer carsharing. This may suggest that people without access to an automobile have a heightened awareness of the mobility options available to them.

Awareness showed similar patterns among Oakland respondents, although it was significantly lower in magnitude. As with the respondents in San Francisco, the majority of the 150 Oakland respondents (62%) had heard of classic carsharing, while considerably fewer (24%) were aware of peer-to-peer carsharing, half the rate in San Francisco (Figure 4). Oakland respondents were similar to their San Francisco counterparts in that the 17% of Oakland respondents who were confused about the term “carsharing” had a tendency to equate it with carpooling or ridesharing. Awareness of both classic carsharing and peer-to-peer was especially low among those without vehicle access: only 53% had heard of classic carsharing, and only 13% were aware of peer-to-peer. These results differed from those of the entire sample, which suggests that people without a car in Oakland may not be fully aware of the mobility options available to them. Overall, San Francisco respondents displayed a greater awareness of classic carsharing and peer-to-peer carsharing than their



	Respondents (N = 150)	Oakland, 2010 Census	Significantly Different
White	47%	43%	No
Black–African American	19%	35%	Yes
American Indian–Alaska Native	2%	1%	No
Native Hawaiian and Pacific Islander	2%	1%	No
Asian	13%	21%	Yes
Hispanic, Latino, Spanish origin*	17%	25%	NA

*17% of the sample defined themselves as Hispanic, Latino, or of Spanish origin, but the U.S. Census defines this as a separate ethnic category rather than as a race.

FIGURE 3 Survey sample age compared with 2010 census data for the City of Oakland.

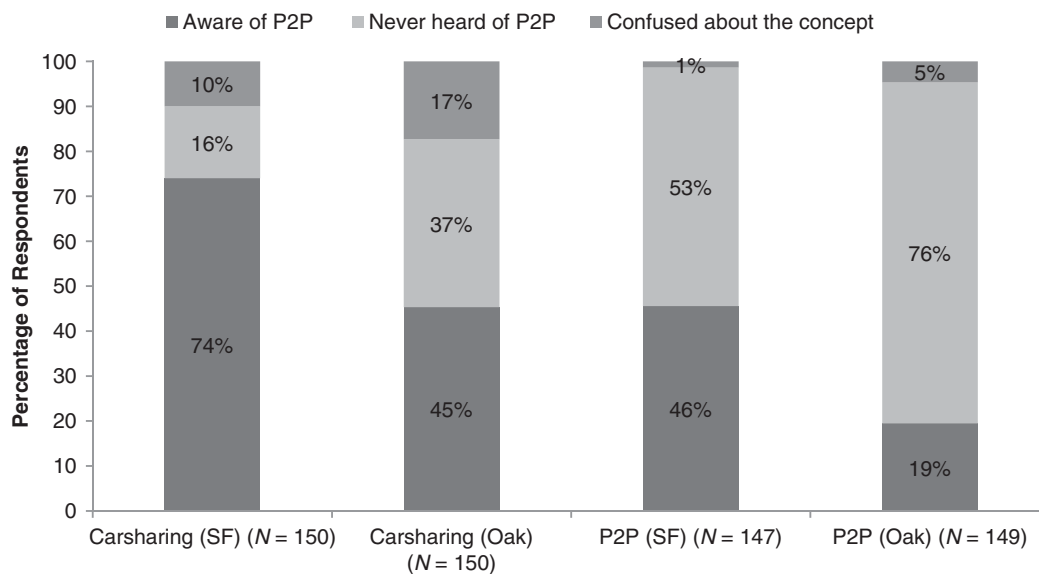


FIGURE 4 Awareness of classic and peer-to-peer (P2P) carsharing in San Francisco (SF) and Oakland (Oak).

Oakland counterparts. This can reasonably be expected, because carsharing has existed in San Francisco longer than in Oakland.

Responsiveness to Peer-to-Peer Carsharing and Resource Sharing

Seventy-one percent of San Francisco respondents had access to a vehicle, and 47% were the owners or primary users of that vehicle. Vehicle ownership and access rates in Oakland were higher: 77% had access to a vehicle, and 65% were the owners or primary users of that vehicle. These differences, coupled with greater availability of alternative transportation modes in San Francisco compared with Oakland, could explain the different effects of vehicle ownership on willingness to rent a vehicle through a peer-to-peer carsharing service in each city (Figure 5). Although vehicle ownership was not a distinctive factor for San Franciscans in this matter (60% positive responses for both subgroups), primary users and nonprimary users had very different responses in Oakland. Within the subgroup of those who did not have access to a car or were not its primary user (non-primary users), 73% stated that they would be willing to rent a vehicle through a peer-to-peer carsharing service, while only 43% of primary users would be willing to do so. On average, a little over half of the respondents would be willing to rent a vehicle through a peer-to-peer carsharing service (58%).

By contrast, the vast majority of all respondents would rent an apartment or condo from a home-sharing program such as Airbnb (80% on average), while primary users in San Francisco were distinctively more willing to do so (90%). In both cities, 27% of primary users would be willing to rent out their personal vehicle through peer-to-peer. This result may suggest that a willingness to register as a peer-to-peer vehicle provider may not vary on the basis of location.

Openness to peer-to-peer carsharing according to age followed a similar pattern in both cities, but San Francisco participant responsiveness was consistently about 10% higher. Younger San Francisco respondents (under 40) were slightly more open to renting a vehicle through peer-to-peer carsharing (67%) than their Oakland counterparts (58%). Moreover, these younger respondents were more open to renting a peer-to-peer vehicle than older respondents (60% versus 48% in San Francisco; 53% versus 44% in Oakland). Respondents who self-identified as white displayed a marked interest in peer-to-peer that surpassed that of all other racial groups in both cities. Attitudes toward peer-to-peer carsharing did not vary strongly by gender in either city.

Travel Behavior, Vehicle Ownership, and Peer-to-Peer Carsharing Interest

Respondents were grouped according to the purposes for and frequency with which they drive. Out of all San Francisco survey respondents, 24% drive nearly every day, and 77% stated they use public transportation at least once per week. Of the Oakland respondents, 45% drive nearly every day, and of this group most use their personal vehicle to commute to work. More than half of all respondents (62%) stated they use public transportation at least once per week. The public transportation usage among both cities' samples is likely biased upward by the locations in which the surveys were administered, which were typically pedestrian-friendly areas served by public transit.

A slight correlation existed between driving frequency and survey respondent willingness to consider peer-to-peer in both San Francisco and Oakland (Figure 6). Respondents who drove every day were less likely to consider peer-to-peer than those who drove once per week or once a month. Public transit users in San Francisco were almost

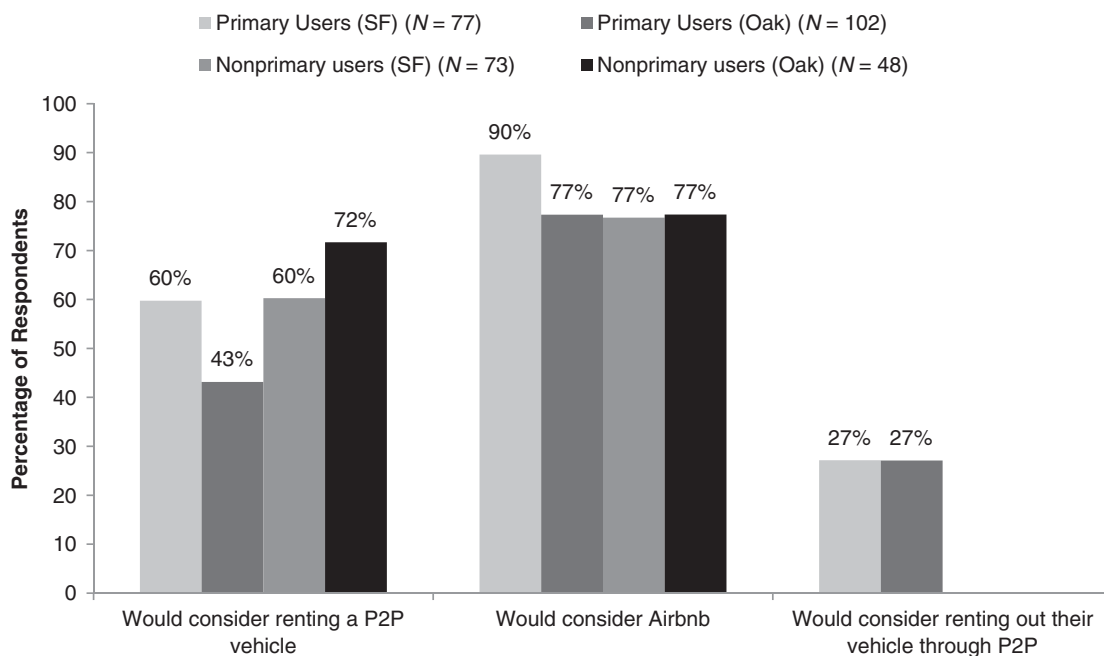


FIGURE 5 Attitudes toward peer-to-peer and sharing economy based on vehicle ownership in San Francisco and Oakland.

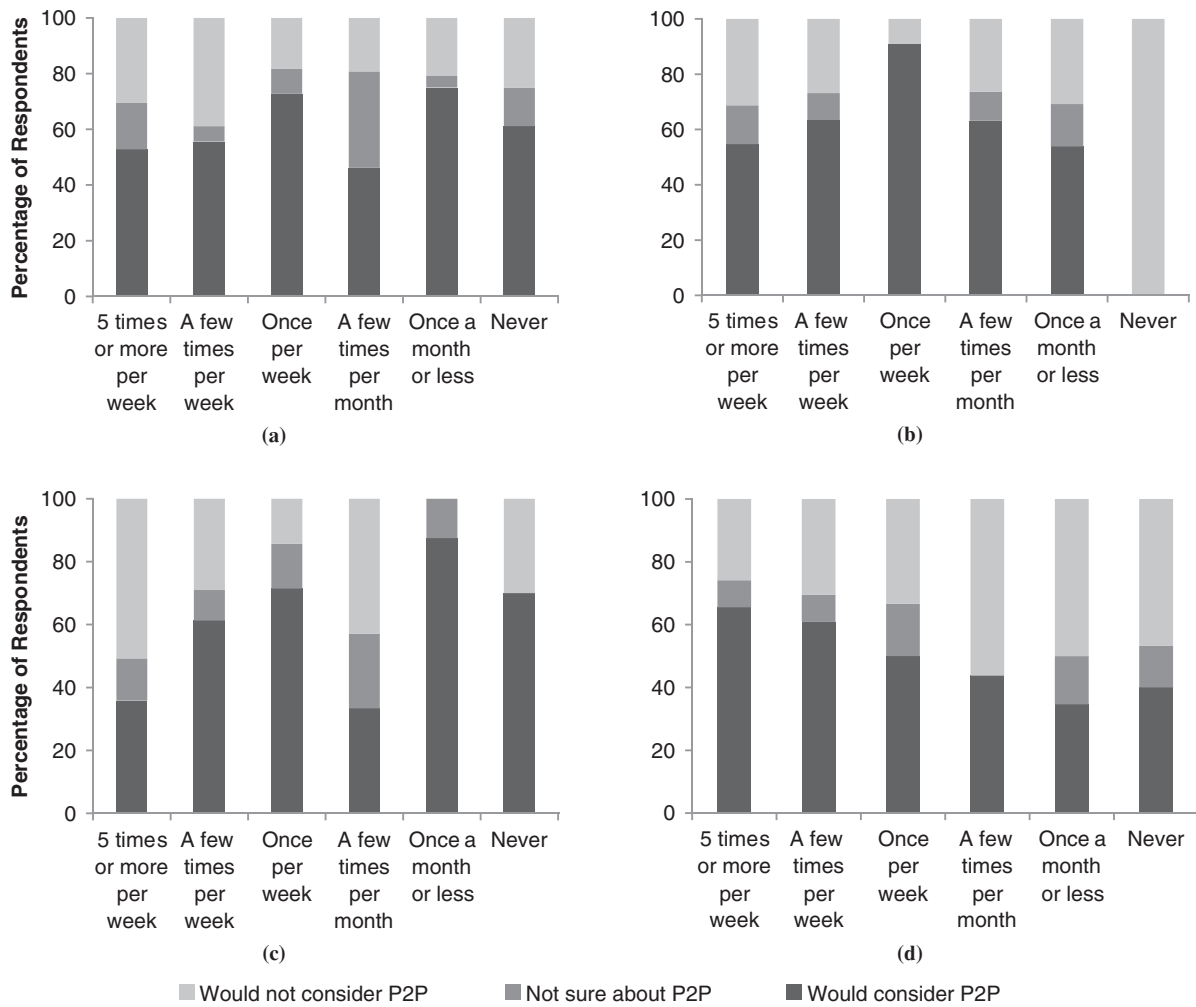


FIGURE 6 Frequency of driving in (a) San Francisco and (b) Oakland and public transit use versus openness toward peer-to-peer in (c) San Francisco and (d) Oakland ($N = 150$).

equally willing to consider peer-to-peer regardless of the frequency with which they use public transit, with the exception of occasional (once per week) riders who displayed a marked interest in peer-to-peer carsharing (91%) and those who never take public transit who showed no interest in peer-to-peer carsharing.

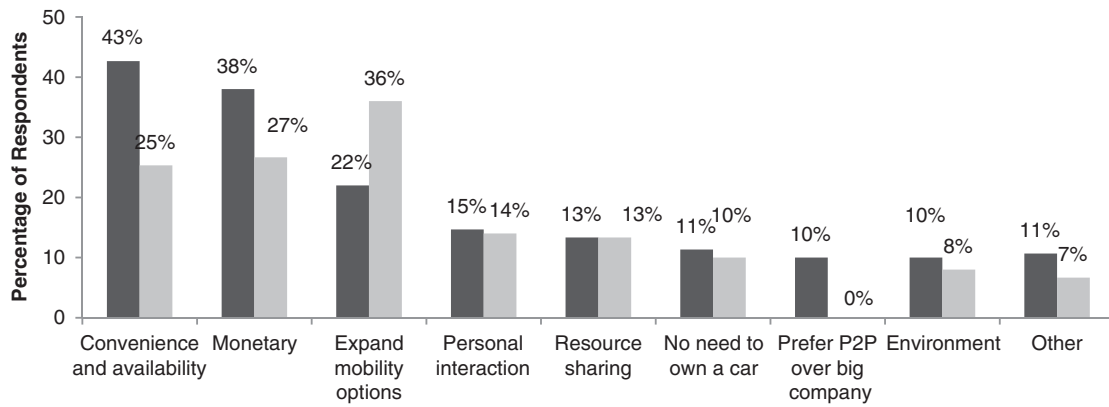
Patterns were similar in Oakland, although respondents who took public transit every day were more likely to consider peer-to-peer carsharing than weekly transit riders or than daily transit riders in San Francisco (see Figure 6). Results were varied for marginal drivers (those who drive a few times a month) and occasional public transit users (individuals who ride a few times a month or less), with lower openness possibly resulting from a disinterest in driving or the ability to do so.

Perception of Peer-to-Peer Carsharing Rental

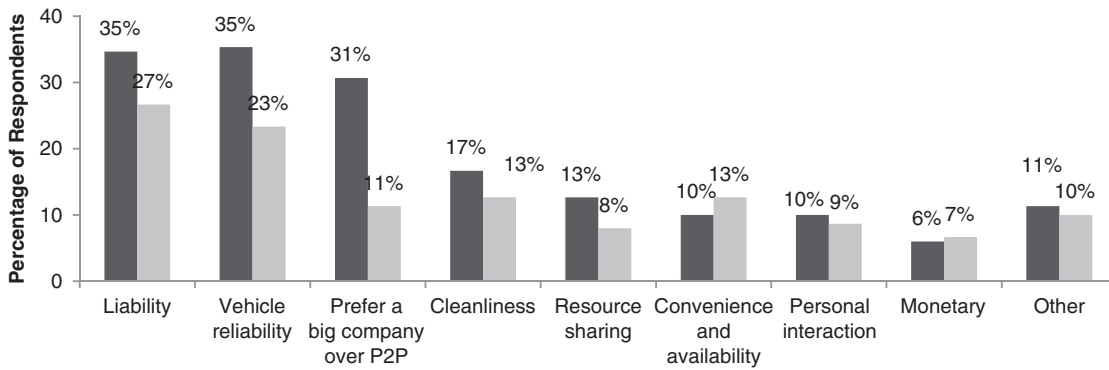
Both San Francisco and Oakland residents considered convenience and availability (the ability to select from a wide variety of vehicle locations and flexibly plan schedules) to be the main attractions of renting a vehicle from a peer-to-peer carsharing company (Figure 7a).

Economic benefits, which are those associated with not owning a car and the potentially cheaper rates of peer-to-peer carsharing compared with other rental services, were also frequently cited as a motivating factor, although significantly more frequently in San Francisco than in Oakland (22% versus 36%). Expanded mobility options was perceived as a positive attribute of peer-to-peer carsharing, although fewer respondents from San Francisco noted this as a positive factor than those from Oakland (22% versus 36%). Expanded mobility options was the most highly cited factor in Oakland, suggesting that peer-to-peer carsharing is more valuable as a mobility option in settings with less comprehensive and frequent transit options, such as Oakland, and more valuable for economic factors in settings where public transit mobility is already considerable, such as San Francisco. Personal interaction, resource sharing, environmental benefits, and being able to get around without having to own a vehicle were similar sentiments expressed throughout the total study population.

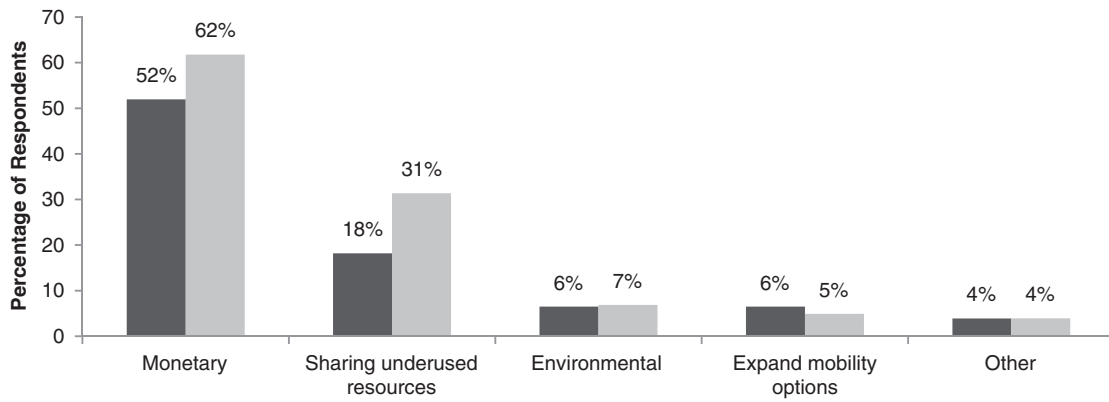
A number of San Francisco respondents (10%) preferred the structure and purpose of peer-to-peer carsharing to that of supporting a for-profit enterprise, while no Oakland respondents noted this. In contrast, 31% of San Francisco respondents and 11% of Oakland residents stated they would rather rent from an established company



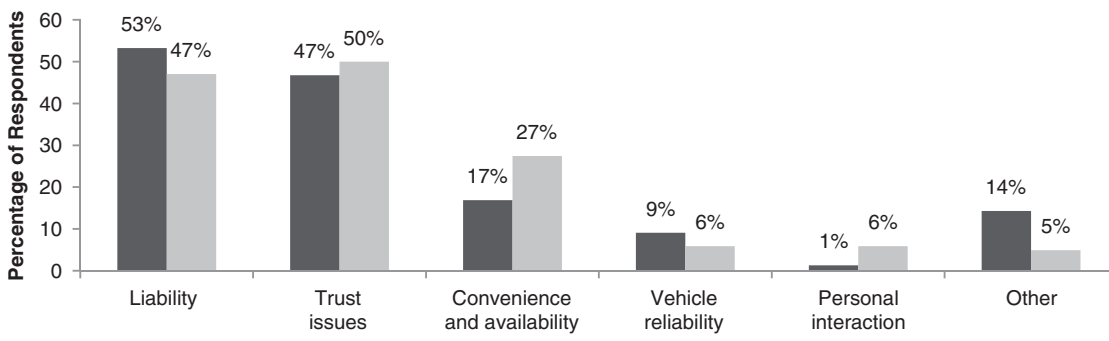
(a)



(b)



(c)



(d)

■ San Francisco ■ Oakland

FIGURE 7 Peer-to-peer carsharing as vehicle renter: (a) positive and (b) negative perceptions and as vehicle provider: (c) positive and (d) negative perceptions.

with perceived reliability than a peer-to-peer carsharing service. Cleanliness, vehicle reliability, liability, and a preference for more established companies were noted as diminishing factors of peer-to-peer carsharing (Figure 7*b*). Overall, San Francisco respondents displayed a higher overall willingness to rent peer-to-peer vehicles than their Oakland counterparts.

Overall, San Francisco respondents cited more factors when explaining their positive and negative perceptions of renting a vehicle through peer-to-peer carsharing (530 total factors cited, versus 438 in Oakland), which could be because of a higher familiarity with the concept of carsharing and peer-to-peer carsharing, as shown in Figure 4. Conversely, vehicle owners were more opinionated in Oakland (Figure 7, *c* and *d*), possibly showing a higher attachment to their vehicles because of the previously mentioned mobility differences between the two cities.

Owner Response to Peer-to-Peer Carsharing Vehicle Provision

When asked if they would consider renting out their personal vehicle to others through peer-to-peer, roughly half of the surveyed car owners in both cities (53% and 47% in San Francisco and Oakland, respectively) expressed concern about the liability issues potentially involved in doing so and admitted to harboring a lack of trust in others in regard to their personal belongings (Figure 7). These results confirm the previous literature: work is needed on insurance policies and peer-to-peer organizational strategies to build trust.

Convenience and availability were also cited as deterrents to renting out a personal vehicle through peer-to-peer. Although only 17% of San Francisco's respondents mentioned this issue, over 25% of Oakland vehicle owners cited it as a negative aspect of peer-to-peer. Other concerns noted by survey respondents about vehicle provision include aversion toward personal interaction, disinterest in resource sharing, lack of standardization throughout the peer-to-peer industry, and the fear of renting an unreliable personal vehicle to others.

Despite these considerations, more than 25% of surveyed owners (from both cities) stated they would be willing to rent out their vehicles through a peer-to-peer carsharing service. Over 50% of these respondents cited economic benefits as the motivating factor. Another motivator for owners to provide a vehicle for peer-to-peer carsharing rental was to make use of an otherwise underused asset. Respondents from Oakland (31%) seemed more interested in renting their vehicles through a peer-to-peer carsharing service than those from San Francisco (18%).

CONCLUSION

The study results indicate that there is a low awareness of peer-to-peer carsharing, particularly among those without access to a private automobile. Openness toward peer-to-peer carsharing and the sharing economy was consistent throughout both survey populations, indicating that these attitudes are likely more contingent on human behavior than sociodemographic context. The vast majority of respondents were open to using other shared-use services, such as Airbnb for the purpose of renting lodging, and a significant number of people stated they would consider renting a vehicle through a peer-to-peer operator. Of the survey respondents who owned a personal vehicle, 25% would

be willing to share their personal vehicles. The study also revealed that travel behaviors, such as driving frequency and public transit use, considerably affect an individual's openness to peer-to-peer, as more frequent drivers were generally less open to renting through peer-to-peer carsharing, while more frequent public transit users exhibited a larger interest in this option.

Despite the low level of awareness of peer-to-peer carsharing among survey respondents, many agreed that it sounded like a convenient and affordable innovative mobility approach. Vehicle owners viewed it as a good opportunity to earn extra income, while possibly helping someone else and making use of an underused asset. Both potential vehicle providers and renters, however, voiced concerns about liability, which points to the larger issue of trust. Although raising awareness of peer-to-peer carsharing and other shared-use services is unlikely to address all issues that surround and affect the sharing economy, such a strategy could heighten the visibility of peer-to-peer organizations and aid in their adoption.

In growing the market for peer-to-peer carsharing services, operators should continue to promote their services by either maintaining or enhancing the discounts and special offers that they currently extend to new members. For example, Denver's eGo CarShare partners with entities such as LivingSocial and Groupon to reach and raise awareness among a large number of individuals and to offer first-time membership at a discounted rate. Raising awareness of peer-to-peer carsharing services could also help build awareness, trust, professional standing, and reliability.

A more comprehensive insurance and policy framework would potentially also help to support peer-to-peer carsharing expansion. At present, only California, Oregon, and Washington have passed legislation to protect a vehicle owner's insurance plan when acting as a vehicle provider in a peer-to-peer carsharing service. Peer-to-peer companies, such as RelayRides and Getaround, provide insurance policies for vehicles while they are being shared, but clearer legislation detailing who is liable for the damage accrued above the limits of these insurance policies and for maintenance-related costs, which occur while a vehicle is being shared, is needed.

Online platforms that encourage trust building are emerging to address privacy and trust issues. Peer-to-peer carsharing operators should continue to foster users to develop an online reputation that further inspires consumer confidence. While linking Facebook and other social media profiles may increase credibility and trust within the sharing economy, this action also introduces privacy issues. Any policy concerning online reputation will need to be sensitive to privacy considerations about how such data are used and protected, in addition to considering the extent to which users are able to opt out of sharing personal information. Finally, more research is needed into the social and environmental impacts of peer-to-peer carsharing, as well as its market demographics and business model understanding.

ACKNOWLEDGMENTS

The authors thank the University of California Transportation Center, which supported this research, as well as Madonna Camel, Nelson Chan, Adam Eastman, Justin Panganiban, and Juliet Wilson of the Transportation Sustainability Research Center at the University of California, Berkeley, for their support. In addition, the authors thank Elizabeth Deakin and Karen Chapple of the University of California, Berkeley, for their advice in survey design.

REFERENCES

1. Shaheen, S. A., M. A. Mallery, and K. J. Kingsley. Personal Vehicle Sharing Services in North America. *Research in Transportation Business and Management*, Vol. 3, 2012, pp. 71–81.
2. San Francisco Planning and Urban Research. A Policy Agenda for the Sharing Economy. *The Urbanist*, 2012.
3. Sonuparlak, I. “Buzzers” and “Auto-preneurs” Expand Peer-to-Peer Car-Sharing in France. *The CityFix*, 2011. <http://thecityfix.com/blog/buzzers-and-auto-preneurs-expand-peer-to-peer-car-sharing-in-france-2/>. Accessed Jan. 5, 2013.
4. Shaheen, S. A., and A. Cohen. *Innovative Mobility Carsharing Outlook: Carsharing Market Overview, Analysis, and Trends—Summer Edition*, Transportation Sustainability Research Center, University of California, Berkeley, 2013. <http://tsrc.berkeley.edu/node/629>. Accessed July 29, 2013.
5. Parr, B. *Startup Crisis Control: 6 Painful Lessons from Airbnb, 2011*. Mashable. <http://www.mashable.com/2011/07/29/airbnb-pr-crisis/>. Accessed Jan. 6, 2013.
6. Swallow, E. *The Rise of the Sharing Economy*. Dell Social Innovation Challenge, 2012. <http://www.dellchallenge.org/sites/default/files/groups/33946/documents/the-rise-of-the-sharing-economy.pdf>. Accessed Feb. 21, 2013.
7. Airbnb. *Airbnb's \$1,000,000 Host Guarantee*. <https://www.airbnb.com/guarantee>. Accessed July 2, 2013.
8. Biddle, S. *When Your Smartphone Chauffeur Becomes a Stalker*. Gawker. <http://valleywag.gawker.com/when-your-smartphone-chauffeur-becomes-a-stalker-801080008>. Accessed July 2, 2013.
9. Chaube, V., A. L. Kavanaugh, and M. A. Pérez-Quiñones. Leveraging Social Networks to Embed Trust in Rideshare Programs. *Proc., 43rd Hawaii International Conference on System Sciences*, Honolulu, 2010.
10. Sands, J. *Zipcar Versus the Competition: A Comprehensive Perspective on Global Car Sharing, Part II. Seeking Alpha, 2012*. <http://seekingalpha.com/article/883521-zipcar-versus-the-competition-a-comprehensive-perspective-on-global-car-sharing-part-ii>. Accessed Feb. 21, 2013.
11. Mang, P., and W. Wilt. Insurance in the Sharing Economy. White Paper. Avarie Capital, LLC and Assured Research, LLC, March 2013.
12. Lieber, R. Share a Car, Risk Your Insurance. *New York Times*, March 16, 2012.

The contents of this paper reflect the views of the authors and do not necessarily indicate sponsor acceptance.

The Emerging and Innovative Public Transport and Technologies Committee peer-reviewed this paper.