

Social Status and Pro-Environmental Behaviour: A Systematic Review

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A thesis submitted to the University of Gloucestershire in accordance with the requirements for the degree of Master of Science by Research in the School of Natural, Social and Sports Sciences

August 2023

Word Count: 19690

Abstract

Understanding the determinants of pro-environmental behaviour (PEB) is a critical component in encouraging sustainable behaviour and limiting the climate crisis. Social status has been proposed as one potential explanatory factor. People tend to engage in behaviours which signal high social status and refrain from engaging in those which signal low social status. It has been suggested that the perceived social status signals associated with PEBs may determine whether a person decides to engage in PEBs. However, inconsistencies in terminology and measurement have led to a lack of clarity regarding whether PEBs signal higher or lower social status than equivalent non-PEBs. For this reason, the aim of the present study was to systematically consolidate and synthesise the literature investigating the social status perceptions associated with PEB. After registering the systematic review protocol, a comprehensive search of 12 databases was conducted in July 2022 to identify records that quantitatively compared the perceived social status of PEBs to non-PEBs, compared the perceived social status of different PEBs, measured the influence of individual characteristics on perceived social status of PEBs, or compared perceived social status of PEBs to performance/intended performance of PEBs. Risk of bias was assessed using The Risk of Bias In Systematic reviews (ROBIS) tool (Whiting et al., 2016) and The Generic Risk-of-Bias Measure for Systematic Reviews of Surveys (ROBUST) (Nudelman & Otto, 2020). Textual narrative synthesis was used to synthesise results. Thirty studies from 20 reports were included. Synthesis one revealed mixed evidence for whether PEBs signal higher social status than non-PEBs, with green consumption emerging as the PEB most likely to signal high social status. Synthesis two identified several PEB features that influenced the social status signals they are perceived to have, highlighting green consumption PEBs, high-effort PEBs, and visible PEBs as signalling high social status. Synthesis three identified various individual characteristics potentially impacting perceived social status of PEBs, including political orientation, age, and environmental identity. Synthesis four found inconsistent evidence for whether perceived social status of PEBs related to engagement with PEBs, suggesting this relationship depended on contextual factors. Therefore, caution should be used when employing social status in interventions encouraging PEBs to ensure their effectiveness. Limitations of the evidence include a lack of consistency in conceptualisation and measurement of social status among included studies, a reliance on intended or simulated measures of PEB and poor study quality.

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas. Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed  Date: 15/09/2023

DOI 10.46289/ZYSS2102

Acknowledgements

First, I would like to thank Dr Matthew Sitch and Dr Rachel Sumner for all their support, advice and guidance. I could not have asked for better supervisors. Thank you to Dr Danielle Stephens-Lewis for agreeing to co-supervise my project in its latter stages. Thank you to all the staff in the psychological science subject community for all your help and support during my time here.

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Introduction

There is an ever-increasing awareness of the climate crisis, from global warming and pollution to the loss of biodiversity (Intergovernmental Panel on Climate Change, 2018). As these problems are rooted in human behaviour, it is important to ensure pro-environmental behaviour change is encouraged and innovations that aid the environment are adopted by consumers.

While structural, technical and policy changes are needed to address the climate crisis (Intergovernmental Panel on Climate Change, 2022), individual behaviour change is also a vital component in solving the problem. The Committee on Climate Change (2019, p. 156) has identified that 62% of the actions necessary to reduce greenhouse gas emissions in the UK by 96% require some degree of societal or individual level behaviour change. This demonstrates the importance of individual behaviour changes in addressing the climate crisis.

Pro-Environmental Behaviour

Pro-environmental behaviour (PEB) is a type of prosocial behaviour that reduces harm to or otherwise seeks to benefit the environment (Steg & Vlek, 2009). While definitions of PEB are generally consistent, one variation is whether this behaviour must be performed with the intention to benefit or reduce harm to the environment. While many definitions do not mention an individual's motivation for engaging in PEB, some definitions state that PEB only refers to behaviours which an individual undertakes with the *intention* of benefiting (or reducing harm to) the environment (Pothitou et al., 2016; Wu et al., 2021). While many people do engage in PEB specifically with the aim of benefiting the environment, often such behaviour is undertaken for other reasons, such as monetary reasons or perceived ease (Fujii, 2006; Soares et al., 2021). The knowledge that people engage in PEBs without having pro-environmental intentions can be utilised, as it demonstrates there could be other ways to encourage behaviour which benefits the environment other than through pro-environmental intentions. As changing behaviour can prove difficult, it is important to utilise all methods available to encourage behaviour which benefits the environment. Therefore, a definition restricted to behaviours which are undertaken with the intention to benefit the environment is unnecessarily restrictive and may limit understanding that would help promote pro-environmental behaviour that is undertaken with non-pro-environmental intentions.

Increasingly, it has been shown that socially orientated motives are one of the strongest influences on PEB (Van Vugt, 2009). This body of research suggests people are concerned with the social aspects of PEB, such as whether it influences their reputation (Barclay & Barker, 2020; Bateson et al.,

2006). More specifically, evidence indicates the social status PEBs are perceived to signal may help explain engagement in PEB. For example, Delgado et al. (2015) found that participants were willing to pay a premium for an electric vehicle in order to gain social status and Hao He et al. (2019) demonstrated that appeals to behave in an environmentally friendly manner were more effective when they were endorsed by someone of high status. Further, it has been demonstrated that status motives can be activated, and this activation results in an increased likelihood of people choosing a green product option (Griskevicius et al., 2010). This demonstrates that interventions targeting social status may be effective at encouraging engagement with PEBs. Similar interventions could potentially be used to encourage other PEBs, but this would likely only be effective when the PEB signals more social status than the non-PEB alternative. This demonstrates the importance of understanding the social status signals associated with PEBs.

Defining Social Status

Social status has been defined in many different ways. For example, Willer (2009, p. 24) defines social status as “an individual’s relative standing in a group based on prestige, honor, and deference”, while Anderson, Brion, et al. (2012, p. 718) defines it as “the respect, prominence, and influence individuals enjoy in the eyes of others”. This lack of consistency in how social status is conceptualised has led to differences in how social status is measured. This can make it difficult to get a clear understanding of social status, with social status research examining different concepts. Additionally, many who claim to research social status do not provide a definition (e.g. De Nardo et al., 2017; Hardy & Van Vugt, 2006), further complicating matters.

While there are many inconsistencies in how social status is defined in the literature, in an examination of definitions there are common features in most definitions. Specifically, there are five common features in definitions of social status; (1) it is conceptualised as a form of social hierarchy, (2) conferred by observers, (3) based on the perceived social value possessed by an individual, (4) contextually defined and (5) characterised by the respect an individual receives from others. While each of these features do not appear in all definitions of social status, they are frequently included or implied. These common features are outlined below and together form a comprehensive, contemporary definition of social status.

Social Hierarchy

First, it is broadly accepted that social status is a form of social hierarchy (Bai, 2017; Nelissen & Meijers, 2011; Willer, 2009). Social hierarchy can be defined as an implicit or explicit rank order of individuals based on a valued dimension (Magee & Galinsky, 2008). Formal hierarchies are often

used in large groups or organisations, and this formalisation can be communicated through signs such as job titles, organisational charts or reporting structures (Diefenbach & Sillince, 2011; Magee & Galinsky, 2008). Informal hierarchies tend to form more spontaneously and could occur in various groups, including between friends, colleagues or classmates (Adler & Adler, 1996; Oedzes et al., 2019). This rank ordering means at least one individual must be a subordinate of another, where subordinates defer to their superiors. Social status is, therefore, one way that individuals may be ranked, with those who have lower social status tending to defer to individuals with higher social status. This deference aspect to social hierarchy may be especially relevant to social status, as this is often mentioned in definitions of social status and some suggest that deference, or voluntarily complying with another's wishes and suggestions, is how social status is afforded to an individual (Anderson et al., 2015; Brooks & Wilson, 2015; Flynn, 2003). The conceptualisation of social status as a form of social hierarchy is near ubiquitous in the literature and therefore is included in the definition.

Voluntarily Conferred by Observers

A second common feature in definitions is that social status is conferred on an individual by observers (Anderson, Brion, et al., 2012; Hays & Blader, 2017; van Prooijen et al., 2002). This means status is an outcome of observers' subjective evaluations and an individual cannot have social status if others do not confer status on them (Blader & Chen, 2014). This conferral of social status must be voluntary, and not based on fear, threat or coercion (Hays, 2013). In some definitions the voluntary nature of this conferral is explicitly stated (Anderson et al., 2015; Hays, 2013; Willer, 2009), while in others it is implied (Brooks & Wilson, 2015; Gregg et al., 2018; van Prooijen et al., 2002). Status can be conferred by showing admiration, respect, or regard towards an individual (Wee et al., 2022). This is one factor that distinguishes social status from other similar concepts, such as power or socioeconomic status, which are properties of the actor, whereas social status is entirely based on the perceptions of others. This suggests that voluntary conferral is a core feature of social status and a useful inclusion in the definition to help distinguish social status from other concepts.

Perceived Social Value

Another common feature of social status is that it tends to be conferred on individuals who are perceived as having instrumental social value (Anderson et al., 2015; Leary et al., 2014; Li et al., 2016). People are afforded social status based on whether they are perceived as possessing personal characteristics valued by a group or individual and can help with the achievement of collective goals. Many characteristics may be of value to a group for a range of reasons, but most research has been focused on two characteristics that drive social status attainment; competence and willingness to

dedicate efforts to the group goal (Leary et al., 2014; Li et al., 2016). For example, a member of a sports team may provide value by being highly skilled in that sport, thus showing competence, or by putting time and effort into helping improve the team's performance, thus helping the group achieve its goal. It is important to note here that status conferral is based on perceived value, rather than actual value. This means that social status may be afforded to an individual who projects confidence in their skills and abilities, even if they are actually unskilled. Therefore, it is perceptions of value that drive status conferral, rather than their actual value. Which characteristics are perceived as valuable will be determined by the goals of a particular group and which characteristics can help the group achieve these. Perceived social value is included in many descriptions of social status (e.g. Anderson et al., 2015; Kilduff et al., 2016; Leary et al., 2014; Li et al., 2016). For example, Blader and Chen (2014) suggest that social status is based on the social worth observers perceive an individual to have, while Anderson et al. (2020) suggest that the main way social status is attained is through demonstrating their value to the group. This suggests that social status evaluations tend to be based on perceived social value, and therefore this is included in this definition of social status.

Contextually Dependent

Fourthly, social status is contextually dependent, defined in relation to a particular group (Anderson et al., 2015; Anderson, Kraus, et al., 2012; Willer, 2009). This means that an individual may have high social status in one setting, but not in another. For example, an individual may have high social status in their friendship group, but low social status at work. Social status is context dependent because which personal characteristics are seen as valuable varies between different social environments (Henrich & Gil-White, 2001; Leary et al., 2014). For example, athletic ability is highly valued in a sports team as it helps this group achieve their goals but is unlikely to be highly valued in a work environment where it is of little use to the group in achieving their goals. While the context-dependent nature of social status is not always explicitly stated in definitions, it can clearly be seen in the methodology used to study social status. Studies tend to examine social status within a particular group or context, such as a sorority or fraternity (Anderson et al., 2001), workplace (Flynn, 2003) or students on the same course (Hays & Blader, 2017). This, along with the definitions that explicitly refer to the context dependent nature of status (Anderson et al., 2015; Anderson, Willer, et al., 2012; Brooks & Wilson, 2015; Willer, 2009) suggest that this is another key feature of social status and therefore is included in the definition.

Respect

A final commonality in definitions of social status is that it involves respect. Individuals with high status are respected, held in high regard and esteem (Anderson et al., 2015). Many definitions

explicitly reference respect (e.g. Anderson et al., 2001; Hays & Blader, 2017; Magee & Galinsky, 2008), while others include terms near synonymous with respect such as ‘honor’ (Willer, 2009), regard (van Prooijen et al., 2002) and admiration (Anderson, Kraus, et al., 2012). The frequency with which respect or words with similar meanings appear in definitions of social status suggests this is a key feature of social status and therefore is included in the definition.

Based on these consistencies in defining social status, the core features of social status are that it is *a form of social hierarchy which is contextually defined, conferred by observers on an individual based on perceived social value and characterised by the respect received from others*. This forms a useful definition for this systematic review as it allows social status to be differentiated from other related concepts, such as power, influence and socioeconomic status.

Distinguishing Social Status From Related Terms

While the common features in definitions of social status help provide some clarity of what social status is, it is important to also consider what social status is not. Some terms have been used interchangeably with social status, despite having key differences which distinguish them. Clearly explaining how each of these concepts differs from social status helps to clarify the landscape and reduce confusion. Social status is not ‘prominence’, ‘socioeconomic status’, ‘power’, nor ‘prestige’, each of which shall be reviewed in turn. A summary of these characteristics and how they are distinct from social status can be found in Table 1.

Prominence and Influence

One factor that is related to but distinct from social status is prominence, where an individual receives more attention than others and is highly visible (Magee & Galinsky, 2008). Some definitions of social status include prominence and it is likely related to social status, with high status individuals receiving more attention than lower status individuals (Anderson et al., 2001; Bai, 2017). However, while these concepts are related, having one does not necessarily guarantee the other; at times low status itself can bring attention and visibility on an individual, with marginalised group members being vulnerable to hypervisibility and tending to have lower social status (Buchanan & Settles, 2019; Magee & Galinsky, 2008). Separating the concept of social status from that of prominence is more useful for the study of both. This ensures the antecedents and outcomes of both these factors can be studied separately, allowing for any differences between the two to be identified. Most definitions of social status do not refer to prominence or attention, further supporting the view that prominence is not a key feature of social status (Brooks & Wilson, 2015; Flynn, 2003; Hays & Blader, 2017; Willer, 2009).

Similarly, some definitions of social status include references to influence (Bai, 2017; Blader & Chen, 2014; Uren et al., 2019). While there is often overlap between those who have social status and those who have influence, influence can be achieved in many ways other than through social status, such as by using intimidation or aggression to gain power, resulting in influence (Cheng et al., 2013). This means that even if an individual has influence, this does not necessarily mean they have social status. Indeed, influence is often conceptualised as a consequence of social status, rather than part of social status itself (Li et al., 2016; Magee & Galinsky, 2008). This separation of influence from social status allows for causes and consequences of each to be studied separately, which prevents the two concepts from being conflated.

Socioeconomic Status

Another concept that has often been conflated with social status is socioeconomic status. Socioeconomic status is usually based on an individual's income, education, and occupation (Manstead, 2018). This differs substantially from social status which is based on observers' evaluations of an individual's social value. Therefore, someone with high socioeconomic status may have low social status if their income, education, or occupation is not of value to a particular social group, and equally someone with low socioeconomic status may have other characteristics of value which gives them high social status in another group. This means it is possible to have high social status without high socioeconomic status or vice versa. Additionally, as a person's income, education and occupation do not vary based on the context an individual finds themselves in. This makes socioeconomic status a more stable measure in comparison to social status, which by definition can vary greatly between contexts. While socioeconomic status and social status are distinct concepts, they are likely related. In many situations a high socioeconomic status may be of value, as often money, education and high socioeconomic status occupations can be helpful in achieving many goals, so high socioeconomic status may often be an antecedent of social status (Anderson et al., 2015). For this reason, it is important to distinguish these two concepts while acknowledging each may influence the other.

Table 1: *Related Concepts Which are Distinct From Social Status*

Concept	Definition	Key distinction from social status
Prominence	An individual receives more attention than others and is highly visible (Magee & Galinsky, 2008)	Low status and high status can both bring attention and visibility.
Influence	The ability to modify others' behaviours, thoughts, and feelings (Cheng et al., 2013).	Influence can be achieved in many ways other than through social status, such as by using intimidation or aggression to gain power, resulting in influence.
Socioeconomic status	An individual's income, education, and occupation (Manstead, 2018).	Socioeconomic status is only based on income, education and occupation, whereas social status can be based on a wider variety of characteristics that are of value, and income, education and occupation may not always be valued and therefore may not always result in high social status. Additionally, socioeconomic status is stable across situation/group, whereas social status can vary across situations/groups.
Power	The control over resources an individual possesses (Anderson et al., 2015; Magee & Galinsky, 2008).	Power is based on resource control, while social status is based on perceived social value.
Dominance	The use of coercion and intimidation to induce fear to attain social rank (Cheng et al., 2013).	Dominance is based on fear, force or threat, whereas social status is voluntarily conferred on an individual, without fear, force or threat.

Power

Social status should also be distinguished from power (Magee & Galinsky, 2008). Power tends to be defined as the control over resources an individual possesses (Anderson et al., 2015; Magee & Galinsky, 2008). This contrasts to the definition of social status as conferred on a person based on their perceived social value. Although social status and power have distinct definitions, they have some similar outcomes (such as influence and rank) which may be why the two are often conflated (Li et al., 2016). While social status and power have some shared outcomes, there are also important differences in outcomes, especially in relation to cognition and behaviour. For example, Blader et al. (2016) found that power and status had different effects on perspective taking, with high power tending to diminish perspective taking, while high status tends to enhance perspective taking. While power and social status are distinct, it is important to understand how they may relate to each other. It has been suggested that social status and power can be causally related, and each may reinforce the other (Magee & Galinsky, 2008). Possessing power may be perceived as valuable and therefore lead to social status gains. Similarly, those who have high social status may gain more control over resources and thus social status can lead to power. This shows that while social status and power are distinct, they may influence each other and so when studying social status, it is important to consider any interactive effect of power.

Dominance

A final concept often confused with social status is dominance. Dominance is the use of coercion and intimidation to induce fear to attain social rank (Cheng et al., 2013). This is in direct opposition of social status, which is conferred based on perceived value, not fear, force or threat as dominance is. One reason dominance is sometimes viewed as a route to status despite this incompatibility is the use of “status” as a term synonymous with social rank or hierarchy within the dominance-prestige framework (Cheng et al., 2013; Henrich & Gil-White, 2001). While Cheng et al. (2013) specify that prestige and dominance can be used to gain social rank and influence, others using the framework use the term “status” interchangeably with social rank, hierarchy and/or influence (Bai, 2017; Cheng et al., 2010). This use of the term status can lead to some confusion, and it is important not to conflate this broader meaning of status with the more specific definition used in the current research. This variation in the conceptualisation of status likely stems from differences between disciplines in how the term status has been used historically, with evolutionary psychology and biology using a much broader definition of status than social psychology (Cheng et al., 2013). The

present research focuses on the more specific definition of social status generally used within social psychology, rather than the broader definition used in other disciplines.

Another potential area of confusion is the similarity between how social status is defined in the current research and the definition of prestige in the dominance-prestige framework. Prestige is defined as “social rank that is granted to individuals who are recognised and respected for their skills, success or knowledge” (Cheng et al., 2013, p. 105). While not entirely synonymous with social status, it fits most of the key criteria; it is a form of social rank, it is conferred by observers, it is likely based on perceived value and has respect as a key component. Often, it is suggested that the concept of prestige is interchangeable with social status (Anderson et al., 2015; Cheng et al., 2013). Due to the similarities between prestige and social status, any research examining the role of prestige in relation to PEB will likely provide some relevant and interesting insights into the relationship between social status and PEB. While these two terms are near synonymous, I have chosen to use the term social status over prestige, as this is the more common term within environmental psychology (Griskevicius et al., 2010; Uren et al., 2019).

This examination of the prestige-dominance framework in relation to social status shows the ways in which this framework has the potential to be useful in understanding how social status relates to PEB. Research examining the dominance element is unlikely to be useful, due to the conceptual differences between social status and dominance, but research examining the prestige element may provide useful insights, due to the similarity with social status.

Social Status as a Motivator of Behaviour

Social status has been conceptualised as a fundamental human motive (Anderson et al., 2015). A psychological motive is considered fundamental when its attainment affects long term psychological function, wellbeing and health, induces goal directed behaviour, serves as an end goal in and of itself and is universally observed in individuals regardless of culture, age, gender or personality. Increased social status is associated with several benefits such as increased access to resources, better health, and more reproductive success (Anderson et al., 2015), meeting the requirement of affecting psychological functioning, wellbeing and health. Desire for status is seen across cultures, age, gender and personality, and generally has been established as meeting the criteria to be classed as a fundamental human motive (Elis, 1994, as cited in Anderson et al., 2015; Anderson & Kilduff, 2009). As social status is a fundamental human motive, this means that individuals strive to gain social status. While the desire for social status is universal, it is important to note that individuals may still desire social status to varying degrees, and what/who is perceived as high or low social status may

differ by culture, age, gender and personality, and thus how people seek to gain status may differ between individuals.

As people are motivated to gain social status and social status is based on the evaluations of observers, undertaking certain behaviours can lead observers to evaluate the actor as higher status (Blader & Chen, 2014). These behaviours can be said to signal social status. As individuals are aware of these signals, either consciously or unconsciously, they may perform behaviours which signal high social status in an attempt to increase their social status (Brooks & Wilson, 2015), and refrain from performing behaviours which signal lower social status. This leads to the assumption that individuals are more likely to engage in behaviours which signal high social status and less likely to engage in behaviours which signal low social status. There is a wide variety of behaviours which have been shown to signal social status, including displays of luxury consumption and financially costly behaviours (Nelissen & Meijers, 2011), posting frequently on social media (W. Wang et al., 2021), nonverbal expressions of emotion (Shariff et al., 2012), engaging in prosocial or altruistic behaviour (Hardy & Van Vugt, 2006) and performing PEBs (Delgado et al., 2015; Johnson et al., 2018).

Relationship Between Social Status and Pro-Environmental Behaviour

While there is evidence suggesting that PEBs can signal high social status, it has been suggested there may be some variability in the amount of social status PEBs signal, with some signalling high social status and others signalling low social status (Uren et al., 2021). Therefore, the amount of social status that a PEB signals may influence whether an individual chooses to perform this behaviour. Further understanding whether and when social status is associated with PEBs will help develop understanding of what determines whether someone engages in PEB. This may also prove useful when developing interventions, as if people are more likely to perform PEBs which signal high status then interventions could focus on increasing the perceived social status of PEBs to increase PEB performance.

Historically, many PEBs have been perceived as low status, as they often required fewer resources and went against social norms, both of which tend to make a behaviour lower status (Sadalla & Krull, 1995; Uren et al., 2019). However, awareness of the climate crisis has risen over time, resulting in a change in social norms and the meanings attached to PEBs, leading to (at least some) PEBs being viewed as high status (Brooks & Wilson, 2015). Griskevicius et al. (2010) support this, finding that when status motives were primed participants were more likely to pick green products compared to those who had not been primed, even when the green option was more expensive or less functional than the non-green alternatives. This suggests that some PEBs are viewed at status enhancing. There

are multiple theories that can explain why PEBs may signal social status, particularly costly signalling theory (Grafen, 1990; Zahavi, 1975) and the moral virtue theory of status attainment (Bai (2017)). See

Table 2 for a summary of each theory.

Costly Signalling Theory

Costly signalling theory (Grafen, 1990; Zahavi, 1975) provides a framework for understanding why individuals engage in prosocial or altruistic behaviour, such as PEB, in an attempt to gain or maintain social status. Costly signalling theory posits that behaviours convey social status when they are costly for the actor. These costs are often financial, but can also refer to costs in time, effort or knowledge (Uren et al., 2019). Performing these costly behaviours can lead to gaining social status as it signals access to resources which are perceived as valuable. As social status is conferred based on perceived value, engaging in these costly acts can lead to status gains. This suggests that people may engage in PEB as a form of conspicuous consumption, where they perform such costly behaviour due to the social status it signals in an attempt to increase their own status (Patsiaouras & Fitchett, 2012). As many PEBs are costly in either time, effort, knowledge or money, this means a desire for status may motivate engagement in PEB.

In the domain of prosocial behaviour there is support for costly signalling theory. Acts of generosity and prosociality are rewarded with increased status among the Meriam of Torres Strait in Australia (Smith & Bird, 2000) and similar patterns have been seen in other societies (Boone, 1998). This same pattern can be seen in Western societies where prosocial acts, such as public donations, can lead to gains in status (Anderson & Kilduff, 2009; Harbaugh, 1998). Additionally, in the domain of PEB there is support for costly signalling theory; those primed to think of status favour an environmental

Table 2. *Summary of Social Status Theories*

Name	Key reference	Overview
Costly signalling theory	Grafen (1990); Zahavi (1975)	Behaviours which are costly to the actor signal social status, as it suggests access to resources and therefore potential value.
Moral virtue theory	Bai (2017)	Virtuous behaviour signal social status, as this elicits an expectation that the individual will act in self-sacrificing ways that will benefit others.

product over a conventional alternative, even if it is less efficient or functional (Griskevicius et al., 2010), and individuals are willing to pay a premium for an electric vehicle due to the status signals it conveys (Delgado et al., 2015). This suggests pro-environmental actions can act as costly signals of social status and therefore individuals may engage in such behaviours to increase their social status.

Moral Virtue and Social Status

An alternative explanation for why PEBs could lead to increased status is the virtuous nature of these behaviours. Bai (2017) defines virtue as “characteristics of a person that are morally praiseworthy” (Haidt & Joseph, 2004, p. 61, in Bai, 2017) and outlines how virtue is signalled by engaging in moral behaviour (e.g., behaviour which demonstrate voluntary self-sacrifice for others, beyond conformity to social norms). Previous research has suggested morality only moderates the relationship between competence and status attainment (Cheng et al., 2013; Ridgeway, 1982), but more recent research has suggested that morality may be an independent, direct route to status. There is evidence that people make distinct evaluations of others’ competence and warmth, with the warmth dimensions encompassing someone’s intention for good, and competence capturing perceived ability (Cuddy et al., 2008). As social status is based on observers’ evaluations, it can therefore be assumed that these evaluations could be based on either competence or warmth, with both being independent routes to status. As warmth is based on an individual’s perceived intention for good, this provides support that morality is a way individuals can gain social status. Further support that morality is a route to gain social status comes from research on heroism. Heroism can be defined as activities which are voluntarily engaged in, in service to others in need, with recognition of possible risks, where the actors is willing to accept a sacrifice without expecting external gain (Franco et al., 2011). Heroes are some of the highest status members in society, and this status tends to stem from moral acts, regardless of competence (Franco et al., 2011). While acts of heroism are by their nature uncommon, the same pattern can be seen in more ordinary situations, such as perceived generosity being associated with high status (Flynn, 2003) and experimental studies showing moral behaviour increases status (Hardy & Van Vugt, 2006; Willer, 2009). This further supports the notion that morality may be a route through which behaviour can lead to status gains, meaning if PEBs are perceived as moral, this may lead to them signalling social status. It has frequently been suggested that PEBs are constructed as moral behaviours (Gatersleben et al., 2019; Nicolai et al., 2022; Turaga et al., 2010). However, there is individual variation as to the extent that PEBs are constructed as moral behaviours (Krettenauer & Lefebvre, 2021) and there is evidence that some PEBs may be viewed as more moral than others (Krettenauer & Lefebvre, 2021). Further, as there is cultural variation as to what is considered moral behaviour (Graham et al., 2016), there may be cultural variation regarding to extent to which PEBs are seen as moral.

Costly signalling theory may provide some explanation for why moral behaviour leads to status gains; while moral behaviour does not necessarily signal access to resources, it does signal desirable traits, such as group commitment (Hardy & Van Vugt, 2006), and it may be these signals that are perceived as valuable, leading to increased status. This would mean virtue is one way an individual can signal value, along with competence and dedication to the group goal. However, the moral virtue theory of status attainment (Bai, 2017) proposed that virtuous behaviour is a distinct route to gaining status. Bai (2017) defines virtue as “characteristics of a person that are morally praiseworthy” (p208) and states that behaviour is only classed as virtuous when it is voluntary self-sacrificing beyond the normative standard. This model builds on the dominance-prestige framework and proposes three routes to status which each have a different underlying cognitive mechanism, with competence and virtue being distinct routes to status rather than intertwined components of the prestige route. Bai suggests dominance leads to status through fear, competence leads to status through respect and virtue leads to status through admiration. Both the competence-respect and the virtue-admiration routes may be useful in providing a framework to understand the social status perceptions associated with PEBs.

Bai (2017) outlines the cognitive processes underlying how virtue leads to status. He proposes that virtuous acts induce the perception that the actor will sacrifice their own interests to uphold moral ideals and elicit pleasurable feelings. This process, which likely operates at a subconscious or unconscious level, results in an expectation that the actor will help advance the good of others, and conferring status on this actor is in the observer’s best interest. Furthermore, competence also leads to status by demonstrating experience of skill, which leads an observer to respect this skill and believe the actor will contribute to tasks and allow others to learn from them, and thus it is in the observer’s interest to confer status on the actor (Bai, 2017).

Bai et al. (2020) provides support for these routes to status, conducting several studies and finding that virtue-admiration and competence-respect are typically strongly positively correlated, but independently predict status conferral, and both these routes are distinct from dominance-fear. This provides initial evidence supporting the moral virtue theory, but further testing of the model is needed and currently no studies have tested whether this theory is related to PEB.

It is important to note that Bai (2017; 2020) follows the conceptualisation of status used in the dominance-prestige framework, rather than the more specific conceptualisation used in the current work. In the dominance-prestige framework, prestige is very similar to the conceptualisation of social status used in the current research, while dominance is viewed as a different dimension of social hierarchy. Initial testing of the moral virtue theory clearly shows that virtue-admiration and

competence-respect are positively correlated to each other, while they are both negatively correlated with dominance-fear. Therefore, within the conceptualisations used in the current study, it is possible that competence and virtue both lead to social status, while dominance results in another form of social hierarchy. However, it may be possible that while virtue-admiration is similar to competence-respect, it may not lead to the current conceptualisation of social status, but instead to a third form of social hierarchy.

Additionally, there is a lack of evidence supporting the notion that respect and admiration are distinct cognitive mechanisms through which status is conferred. While Bai et al. (2020) presents evidence supporting the notion that competence-respect and virtue-admiration are distinct routes to status conferral, in their studies there is no separation between competence and respect or between virtue and admiration. This means that while there is evidence suggesting behaving competently and behaving virtuously do independently lead to status gains, there is still no evidence suggesting that admiration and respect are two different concepts providing two different mechanisms through which status can be achieved.

There is some evidence that respect and admiration are distinct, with admiration referring to an act or achievement, while respect refers to the whole individual (Kondoh & Okanoya, 2022; Nakatani et al., 2019). Nakatani et al. (2019) found respect and admiration differently modulate brain activity in the anterior temporal lobe and Kondoh and Okanoya (2022) found that admiring a lecturer did not improve exam scores, but admiring a lecturer did improve exam scores. However, evidence for this effect has thus far only come from Japan and has not been replicated in other countries and cultures. It is possible that the same effect would not be seen among those who speak other languages or are from other countries; for example, Han and Ma (2014) found that social cognitive processes produce different in brain activity between East Asians and Westerners, and therefore it is possible the neurological distinction between admiration and respect may not exist in every culture. Further, there are linguistic differences between cultures. There is not a direct single translation for respect or admiration in Japanese, with there being at least five terms related to respect and admiration in these studies (Kondoh & Okanoya, 2022). This suggests there are cultural differences in the conceptualisation of these concepts and therefore it is possible these distinctions between admiration and respect may not be universal. Further, conceptualisations of respect and admiration are usually very similar, with definitions of respect often referring to admiration and vice versa (Hongwei He et al., 2019; Li & Fischer, 2007 as cited in Peplak & Malti, 2017). This makes it difficult to justify admiration and respect as distinct mechanisms without evidence supporting this proposal. Indeed (Bai, 2017) notes there appears to be overlap between the mechanisms underlying these two routes to status and other research has indicated that morally positive behaviours elicit both respect

and admiration (Körner et al., 2016). This means further research is needed to establish whether respect and admiration are distinct mechanisms in the conferral of social status, or whether they are the same mechanism.

While the moral virtue theory needs further testing to support the notion that virtue is a distinct route to status and further explanation is needed as to how status achieved through each of the three routes may differ, it does present an interesting alternative to costly signalling theory. The moral virtue theory and costly signalling theory would lead to two different expectations as to which PEB will signal high status. Costly signalling theory would suggest PEBs will only be perceived to signal high social status when it is costly to an actor and signals access to resources which are perceived as valuable. In contrast, moral virtue theory would suggest that behaviours which are perceived as virtuous beyond the moral norm would be perceived to signal high social status. It is important to note that moral virtue theory does also include the competence route to status, and therefore PEBs which signal an actor's competence would also be expected to signal status. There may be some overlap, as a behaviour would be most costly to the actor and perceived as virtuous, however there will also be behaviours which are costly but not virtuous and vice versa. Therefore, both theories may potentially prove useful in understanding when and why PEBs signal social status.

While costly signalling theory and the moral virtue theory of attainment may provide explanations for how PEBs leads to gains in status, there is still a lack of research thoroughly exploring whether and under what circumstances PEBs signal social status, and whether people are more likely to perform high status PEBs. Of particular interest here is how the type of PEB in question may influence social status perceptions, and how a person's sociodemographic factors and environmental orientation could influence these perceptions.

Classification of Pro-Environmental Behaviour

Many categorisations have been proposed to further understand PEB. Table 3 shows an overview of these classifications. Firstly, pro-environmental behaviours can be categorised by how financially costly they are. While some PEBs can be expensive, others can be relatively affordable, or even save money. For example, buying second hand clothes is a low-cost sustainable option for purchasing clothes, while buying new, sustainably produced clothes tends to be a high-cost sustainable option. This is an important dimension to consider, as research has indicated that high-cost PEBs tend to signal higher status than low-cost PEBs (Uren et al., 2021). For this reason, in the present research the cost of PEBs will be considered as a factor that may determine the social status signal associated with PEB. Secondly, PEBs can be categorised based on their visibility (Brick et al., 2017). Many PEBs tend to be performed in the private sphere, such as in person's home. These behaviours are only

visible to those the individual lives with, such as how much energy someone uses or whether they use environmentally friendly household products. In contrast, highly visible behaviours are those performed in public settings, and therefore are visible to many more people. Examples of public sphere behaviours include attending an environmental protest or using a reusable coffee cup. Research has shown that visibility can influence engagement with pro-social behaviour (Brick et al., 2017). This can be seen through the watching eye effect, where images of eyes result in individuals behaving more pro-socially, such as being more likely to give to charity (Nettle et al., 2013) and less likely to litter (Ernest-Jones et al., 2011). As social status is conferred by observers, it is possible the perceived social status signals of PEBs may only impact behaviours which are visible to others to allow the possibility of status conferral.

It is possible there is an interaction between visibility, social status and PEBs, with individuals being more likely to perform high status PEBs, but only when they are visible and can signal social status to others. Therefore, in the present study, consideration will be given as to whether the visibility of a PEB results in differences in the social status the PEB is perceived to have and whether this influences the relationship between perceived social status of a PEB and performance of that PEB.

Additionally, PEBs can be categorised into curtailment and efficiency behaviour (Suárez-Varela & Dinar, 2020). Curtailment behaviours tend to be repetitive, low or no cost behaviours that involve cutting back to create an environmental benefit. Examples include reducing the amount of heating you use, repairing clothes, or taking shorter showers. Conversely, efficiency behaviours tend to refer to one-off behaviours, which are often costly and improve efficiency of resource use, allowing environmental benefits without any reduction to an individual's quality of life. Examples include insulating one's home or buying durable clothing. This distinction has been shown to be important as curtailment and efficiency behaviours tend to have different predictors. For example, Casaló et al. (2019) found that objective knowledge predicted efficiency behaviours, but not curtailment behaviours. In relation to social status De Nardo et al. (2017) found that efficiency behaviours signal higher status than curtailment behaviours. This demonstrates that this categorisation of PEB is important to consider when examining the social status signals of PEBs. Therefore, in the present study it will be considered whether different effects are found for curtailment and efficiency behaviours. A similar classification of PEBs is green consumption and reduced consumption. Green consumption generally refers to reducing environmental impact through purchasing products that increase the efficiency of resources use or are made more sustainably than conventional products (Brooks & Wilson, 2015; Testa et al., 2021). This could include behaviours such as purchasing clothing made of recycled material or buying a more efficient boiler. This makes green consumption a form of efficiency behaviour, as they improve the efficiency of resources use either during the

manufacturing process or while being used. This can also be referred to as green buying. Reduced consumption refers to minimising the consumption of resources and refraining from purchasing products (Brooks & Wilson, 2015; Egea & de Frutos, 2013; Whitmarsh et al., 2017). This could include behaviours such as only buying new clothing when it is needed or minimising the amount of water you use. This makes reduced consumption a form of curtailment behaviour as these behaviours generally involve cutting back, are repetitive and low or no cost.

PEB can also be categorised into intent and impact orientated PEBs (Moser & Kleinhückelkotten, 2018; Stern, 2000). Intent oriented PEBs are those that an individual undertakes with an intention to benefit the environment in some way. Impact orientated behaviours are those that actually have a meaningful impact on the environment. This distinction is important as the behaviours that individuals undertake with an intention to benefit the environment in reality are not always the behaviours that can benefit or reduce harm to the environment. For example, while using a cotton tote bag in replacement of single use plastic carrier bags may be perceived as a behaviour which benefits the environment, research suggests that a cotton tote bag would have to be used over 7000 times to provide the same environmental performance as a single use plastic bag (The Danish Environmental Protection Agency, 2018). This demonstrates how behaviours undertaken with the intention to benefit the environment may not actually do so. Therefore, when examining the relationship between social status and PEB it is important to consider whether intent or impact orientated behaviours have been studied. If only intent orientated PEBs have been studied, this will limit the usefulness of such findings. This is especially important to consider, as intent-orientated and impact-orientated PEBs have been shown to have different predictors (Moser & Kleinhückelkotten, 2018). Therefore, it is possible the relationship between PEB and social status may be influenced by whether the PEB in question is impact-orientated or intent-orientated. Therefore, the present research will consider whether the included studies examine impact or intent orientated PEBs and whether this influences the social status perceptions associated with various PEBs.

Table 3. PEB Classifications

Type of behaviour	Definition
Curtailment behaviours	Repetitive, low or no cost behaviours, that involve cutting back to create an environmental benefit
Efficiency behaviours	One-off behaviours which are often costly and improve the efficiency of resource use, allowing environmental benefits without any reduction to quality of life
Green consumption	Purchasing products that increase the efficiency of resource use or are made more sustainably than conventional products
Reduced consumption	Minimising the consumption of resources and purchasing of products
Intent-oriented behaviours	Behaviours undertaken with the intention to benefit the environment
Impact-orientated behaviours	Behaviours that have a meaningful, positive impact on the environment
High-cost behaviours	Behaviours which are financially costly
Low-cost behaviours	Behaviours which have a low or no financial cost
High visibility behaviours	Behaviours which are highly visible to others and tend to be performed in the public sphere
Low visibility behaviours	Behaviours which are not usually visible to many other people and tend to be performed in the private sphere (e.g. at home)

Role of Individual Characteristics

In addition to the influence PEB characteristics may have on social status-PEB relationships, it is possible that characteristics of the individual potentially engaging in a PEB may influence social status-PEB relationships. This could include sociodemographic factors, such as age or gender, as well as an their environmental orientation, such as whether they have a high environmental self-identity, among other factors.

Differences in performance of PEB based on various sociodemographic factors has been documented, including age (Casaló & Escario, 2018; Gifford & Nilsson, 2014), gender (Kennedy & Dzialo, 2015; Swim et al., 2020), nationality (Bonera et al., 2017) and socioeconomic status (Kennedy

et al., 2015). It is possible this could be due to these sociodemographic factors influencing whether and which PEBs are perceived to signal social status. Therefore, these potential differences were explored in the current study.

An additional individual characteristic that may influence PEB-social status relationships is an individual's environmental orientation. Research has shown that an individual's environmental self-identity, environmental concern and biospheric values (i.e., the importance an individual places on caring about nature and the environment; Stern & Dietz, 1994; X. Wang et al., 2021) can relate to their engagement in PEB (Gatersleben et al., 2014; Kautish & Sharma, 2020; Steg & Vlek, 2009). This could be because those with an environmental orientation perceive PEBs to signal higher status, and therefore are more likely to engage in these behaviours than those without an environmental orientation. Therefore, where possible the present research considered whether an individual's environmental orientation influences the amount of social status a PEB is considered to signal.

In addition to these individual characteristics, it is possible that there may be cultural differences in whether PEBs are perceived as signalling high or low social status. It is expected there are cultural differences in which characteristics and behaviours are valued and thus lead to social status attribution (Anderson et al., 2015). Sociocultural values have been identified as influencing individuals' willingness to engage in PEB (Chwialkowska et al., 2020), showing that perceptions of PEBs differ by culture. It is possible that these cultural differences in PEB engagement could be due to cultural differences in the perceived social status of PEB.

Social Status as a Behaviour Change Strategy to Increase PEB

As people are motivated by social status, this can be leveraged by interventions attempting to change behaviour. One way through which interventions could utilise social status to change behaviour is through increasing the social status signals of a behaviour or product by utilising the halo effect (Thorndike, 1920). This can be done through endorsements from high status individuals, such as celebrities or influencers (Wadhera & Chawla, 2017). This type of intervention can be effective as social status of the endorser can be transferred to the endorsed activities (Hao He et al., 2019). An alternative way to increase the social status of PEBs is through charging a premium price for them, as costly behaviours tend to signal more social status, thus potentially increasing engagement with the behaviour (Nelissen & Meijers, 2011). Another way understanding of social status could be utilised to change behaviour is through activating social status motives (Bol & Leiby, 2022; Griskevicius et al., 2010). This is where individuals are primed in some way to remind them of their desire for social status, and to thus make decisions which will increase their social status. Interventions like this would only be effective when the behaviour that is being encourage signals

high social status. In research studies status motives have usually been activated by having participants read a short story (Bol & Leiby, 2022; Griskevicius et al., 2010) or a word list containing status-related words (Puska et al., 2018), but could be activated by other cues, such as luxurious surroundings or reminders of rivalry and competition (Knechel & Leiby, 2016).

In order for interventions such as these to be effective at encouraging PEBs, a better understanding of the relationship between social status and PEB is needed for multiple reasons. Firstly, interventions increasing the social status of PEBs will only be effective if increased social status is associated with increased engagement with PEB. Secondly, which PEBs are currently low in status need to be identified, as these are the behaviours which would most benefit from status increasing interventions. Third, priming status motives will only be effective if PEBs signal more social status than non-PEBs, otherwise these interventions could result in non-PEB engagement. For this reason, it is important to investigate whether PEBs consistently signal more social status than non-PEBs. Finally, status priming interventions are likely to be most effective for individuals who generally perceive PEBs to signal higher social status, meaning it is important to investigate individual characteristics that may influence the amount of social status PEBs are perceived to signal to identify groups for which this type of intervention may be especially effective for.

Current Research

The aim of the present research is to better understand the social status signals associated with PEBs. Due to the lack of consistency in the definition and measurement of social status, along with the difficulty in locating relevant articles, it is difficult to draw conclusions about how social status relates to PEB. Therefore, I consolidated and synthesise the literature investigating the social status perceptions associated with PEB via a systematic review. This will help establish how social status perceptions relate to PEB and whether interventions aiming to increase the amount of social status that PEBs are perceived to signal may be effective at increasing PEB engagement.

The objective of the review was to answer three research questions:

1. Do PEBs tend to signal more social status than non-PEBs? This provides baseline information as to whether there are differences in the amount of social status PEBs are perceived to signal compared to non-PEBs.
2. What factors influence the amount of social status PEBs are perceived to signal? This involved considering both whether PEB characteristics influence the amount of social status they are perceived to signal and whether an individual's characteristics, such as

sociodemographic characteristics or environmental orientation, influence the amount of social status they perceive PEBs to signal.

3. Does the perceived social status of a PEB influence engagement with the PEB? This established whether social status perceptions influence behaviour, and therefore provide information as to whether interventions aiming to increase social status perceptions may be effective at increasing PEB engagement.

Method

In alignment with best practice guidance, and in order to allow replication, PRISMA guidelines (Page et al., 2021) were followed in conducting and reporting the systematic review (see Appendix A for PRISMA checklist). This review was registered on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/4JPWD>) to promote transparency in the conduct of the review.

Search Strategy

A systematic search was conducted to identify studies that examined the relationship between social status and PEB. Electronic searches were conducted in three interfaces (EBSCOhost, ProQuest and Web of Science) to search 12 databases, the names and date coverage of which are given in Table 4. These databases were chosen as they were accessible, and included topics which were likely to include articles related to PEB and social status.

The following search query was used to search each interface on 18/07/2022, adapted accordingly for each interface (see Appendix B for each query string):

((pro-environmental behaviour) OR (environmentally significant behaviour) OR (environmental practice) OR (sustainable behaviour) OR (environmentally friendly behaviour) OR (green consumer behaviour)) AND (("social status") OR (prestige))

This search combines terms related to PEB with either social status or prestige. Synonyms for PEB were identified based on the reviewer's prior knowledge of the field and by examining the related terms used by other systematic reviews. While a search for "status" as opposed to "social status" may have provided a more comprehensive search, due to the frequent use of "status" in contexts not relating to social status (e.g. marital status, socioeconomic status, status quo etc.) this was not feasible in the scope of this review. Various search term combinations were trialled, and redundant terms removed. For 11/12 databases, fields searched included titles, keywords and abstracts. For Humanities Source it was not possible to use this combination so only abstracts and keywords were searched. No date, language, or publication type limits were applied to the search.

In addition, forward citation searching was conducted using Google Scholar to search for relevant articles, which cited included articles on 12/12/22 and 14/12/22; and backward citation searching was conducted by examining the reference list of all included articles. This was conducted to identify any articles that may have not been included in the initial database search. In particular, it was hoped that this method would pick up on any relevant articles which refer to social status as simply

“status”, which would not have been included in the initial search. Where feasible all works that cited an included article were title/abstract screened, followed by a full text screening.

Table 4. *Databases Searched, the Interface Through Which Each Database was Searched and the Date Coverage for Each Database*

Data base	Coverage
EBSCOhost	
Environment Complete	1888 to present
GreenFILE,	Not provided
Humanities Source	Not provided
PsychArticles,	1894 to present
Psychology and Behavioural Science Collection	Not provided
PsychInfo,	1600s to present
SocINDEX	1908 to present
ProQuest	
ABI/INFORM Global	Not provided
British Periodicals	1681 to 1939
Periodicals Archive Online	Not provided
Publicly Available Content Database	Not provided
Web of Science	
Web of Science Core Collection	1900 to present

Eligibility Criteria

The three research questions were used to form the following inclusion criteria. Firstly, studies had to include a measure or manipulation of PEB and social status. In line with definitions of PEB and social status, these measurements or manipulations should be at an individual level, rather than at an organisational, household, or other level. Measurement/manipulation of PEB could be actual, intended, or simulated behaviour. Secondly, studies must quantitatively compare the perceived social status of PEBs to non-PEBs, or compare the perceived social status of different PEBs, or measure the influence of individual characteristics on perceived social status of PEBs, or compare perceived social status of PEBs to performance/intended performance of PEBs. Third, included studies must be primary research. Fourth, studies must be published in a peer reviewed journal

article to maintain the quality of included studies. Fifth, studies must have adult (age 18 or over) participants. Sixth, studies must be published in English.

All articles were available through open access or institutional access.

Selection Process

Duplicates were removed using Endnote (The EndNote Team, 2013). Titles and abstracts were screened against eligibility criteria, followed by a full text screening, to determine which records meet the criteria. Screening was conducted in Rayyan (Ouzzani et al., 2016). At title/abstract screening 19% of records were independently screened by a second reviewer and at full text screening 13% of records were independently screened by a second reviewer. Reviewers were blinded from seeing other reviewers' decisions at both stages. Any discrepancies were resolved through discussion.

Data Extraction

An online data extraction form was created to collate extracted information (see Appendix C), which was then exported to an Excel spreadsheet. This was a change from the preregistration where it was stated that an Excel spreadsheet would be used for data collection. An online form was used as a more user-friendly method of data collection and because it easily allowed blinding of extractors' decisions.

The first section of this form involved extracting bibliographic information, participant demographics, definitions of PEB and social status, and the design used. Extractors then determined whether the study was comparing social status perceptions of PEBs to non-PEBs, comparing the perceived social status of different PEBs, measuring the influence of individual characteristics on perceived social status of PEBs or comparing perceived social status of PEBs to performance/intended performance of PEBs. If the study was comparing social status perceptions of different PEBs, then the social status measure, the PEB used, the non-PEB used, and key finding and related p values, effect sizes and directions were extracted. If the study was measuring the influence of individual characteristics on perceived social status of PEBs then details about the individual characteristics, the social status measure used, and key findings and related p values, effect sizes and directions were extracted. If the study was comparing perceived social status of PEBs to performance/intended performance of PEBs then the social status perception measure, behaviour measures, and key findings and related p values, effect sizes and directions were extracted. At this stage all effect sizes were extracted in the format reported in the study.

This extraction form was piloted with a small selection of the included articles and found to be suitable and was then used for all studies. Data was then exported into an Excel document. A second extractor independently extracted 10% of the included studies. No meaningful systematic inconsistencies between extractors were identified.

Risk of Bias Assessment

The Risk of Bias In Systematic reviews (ROBIS) tool (Whiting et al., 2016) was used to assess reporting bias. The Generic Risk-of-Bias Measure for Systematic Reviews of Surveys (ROBUST) (Nudelman & Otto, 2020) was used to assess bias in individual studies.

A second reviewer independently assessed 10% of the studies for risk of bias in individual studies. No meaningful systematic inconsistencies were identified.

Evidence Synthesis

Due to substantial methodological heterogeneity in included studies, a narrative synthesis was conducted. Textual narrative synthesis (Lucas et al., 2007) was used to synthesise the results of included studies. The synthesis follows applicable PRISMA guidelines and textual narrative synthesis guidance set out by Lucas et al. (2007) and Thomas and Harden (2008), in terms of the conduct and reporting of the synthesis. This method of analysis is appropriate for synthesising diverse research evidence. Textual narrative synthesis involves three steps. Firstly, studies were arranged into more homogenous sub-groups to aid synthesis of diverse types of evidence. Studies were included in multiple sub-groups where various aspects of the study provide relevant information for different sub-groups. While the wider context of this study was informed by social status theory and this theory was used to understand and contextualise findings, these sub-groups were not specifically theoretically informed. The second step of this process involved producing a study commentary, by summarising key aspects of each study included. This included study characteristics, information about the measurement/manipulation of social status and PEB, and key findings. The final step of this process involved a subgroup analysis, where differences and similarities of studies in each sub-group were discussed to draw conclusions and explore possible causes of heterogeneity among study results.

Results

Study Selection

A total of 665 records were identified via database searches. Of these, 114 records were duplicates and a further 443 were excluded at title/abstract screening. Of the 108 records that underwent full text screening 15 were eligible for inclusion. Backwards and forwards citation searching identified 82 potentially relevant records. Full screening indicated that four met all inclusion criteria and were subsequently included. These studies were not picked up in the initial search as they did not use the term “social status” or “prestige” in the title, abstract or key words. There were six additional studies that appeared to meet the inclusion criteria but were excluded from the final review for the following reasons. Acheampong (2017) examined social status as one item in the measure of social norms, and therefore it was not possible to examine the influence of social status alone on cycling adoption. Reimers et al. (2017) was excluded from the review for the same reason. Elliott (2013) included a measure of both social status and PEB, but examined whether an individual’s social status influences engagement with PEB, rather than whether the social status signals of PEBs influence engagement with PEBs, and therefore it did not meet the inclusion criteria. Luomala et al. (2020) and Puska et al. (2018) were both excluded as they measure prosocial status, which is a more specific concept than social status. Nordfjærn et al. (2016) was excluded because there was not a separate measure of social status of pro-environmental transport and non-pro-environmental transport, but rather one item to measure the social status associated with all modes of transport. This resulted in a total of 19 articles being included. Seven of these articles included multiple studies which met the inclusion criteria, resulting in 29 eligible studies. Figure 1 outlines the article search, screening, and selection stages of this process.

Description of Included Studies

Characteristics of each included study can be found in Table 5. Twenty-three of the included studies were experimental in design, four were cross section, one was descriptive, and one was longitudinal. Studies were conducted in a range of countries in Europe (N = 9), Asia (N = 4), North America (N = 15), and Australia (N = 2). The largest number of studies came from the USA. No included studies were conducted in Africa or South America. On average studies had 353 participants, with studies having sample sizes ranging from 68 to 2425 participants. Included studies examined a range of PEBs, including green consumption, curtailment behaviours, efficiency behaviours, waste behaviour and sustainable transport.

In line with textual narrative synthesis, studies were grouped into subgroups based on which research question they were relevant to. Studies examining factors that influence the amount of social status PEBs are perceived to signal were split into two syntheses, one that related to characteristics of the PEB and one related to characteristics of the perceiver. This resulted in four syntheses:

Synthesis One: Studies comparing the perceived social status of PEBs to non-PEBs.

Synthesis Two: Studies comparing the perceived social status of different (types of) PEB.

Synthesis Three: Studies measuring the influence of individual characteristics on the perceived social status of PEBs.

Synthesis Four: Studies comparing the perceived social status of PEBs to actual/intended/simulated performance of PEBs.

Figure 1. PRISMA Flow Chart

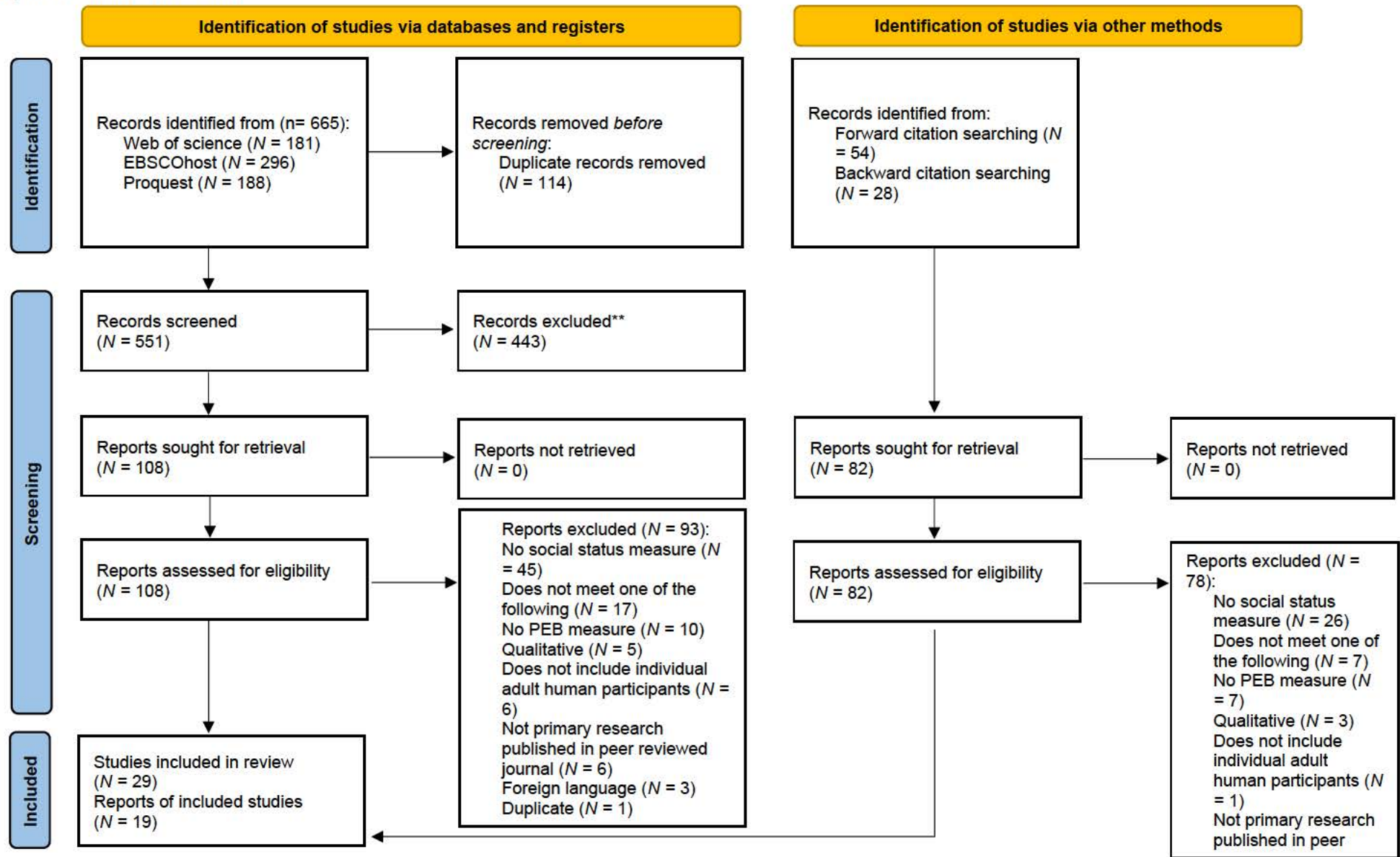


Table 5. *Study Characteristics*

Citation	Design	Sample	Country	Social status definition
Abrar et al. (2021)	Cross-sectional	<i>N</i> = 347 Age not reported 48% male, 52% female	Pakistan*	Social status was operationalised in a self-presentational context and defined as behaviours of an individual to strive for a higher reputation and recognition from others.
Berger (2019) experiment 1	Experimental/quasi-experimental	<i>N</i> = 150 Age <i>M</i> = 40.0, <i>SD</i> = 14.83 59% female	Switzerland*	Social status, definition not provided
Brooks and Wilson (2015) study 1	Experimental/quasi-experimental	<i>N</i> = 442 Age not reported 55% female, 45% male	USA*	One's relative standing or rank in a group that has been awarded by others based on prestige and deference, and which typically, although not always, correlates with wealth or other socioeconomic indicators.
Brooks and Wilson (2015) study 2	Experimental/quasi-experimental	<i>N</i> = 442 Age not reported 55% female, 45% male	USA*	As in study 1
De Nardo et al. (2017)	Descriptive	<i>N</i> = 71 Age <i>M</i> = 48.7 56% males, 44% females	USA*	Status, definition not provided
DiDonato and Jakubiak (2016)	Experimental/quasi-experimental	<i>N</i> = 531 M age = 33.21, <i>SD</i> = 12.89 63% female	USA^	Status, definition not provided
Griskevicius et al. (2010) experiment 1	Experimental/quasi-experimental	<i>N</i> = 168 Age not reported 39% men, 61% women	USA ^	Status, definition not provided
Griskevicius et al. (2010) experiment 2	Experimental/quasi-experimental	<i>N</i> = 93 Age not reported 62% men, 38% women	As in study 1	Status, definition not provided
Griskevicius et al. (2010) study 3	Experimental/quasi-experimental	<i>N</i> = 156 Age not reported	As in study 1	Status, definition not provided

Citation	Design	Sample	Country	Social status definition
Hao He et al. (2019) experiment 1	Experimental/quasi-experimental	32% men, 68% women $N = 114$ Age not reported 34% male, 66% female	South Central China*	Social status, defined as the relative standing a person holds within a social hierarchy.
Hao He et al. (2019) experiment 2	Experimental/quasi-experimental	$N = 78$ Age not reported 36% male, 64% female	South China*	As experiment 1
Hao He et al. (2019) experiment 3	Experimental/quasi-experimental	$N = 331$ Age range = 19-58 53% male, 47% female	South China*	As experiment 1
Keech et al. (2020) study 1	Experimental/quasi-experimental	$N = 87$ Age $M = 20$ 48% female	USA^	Prestige, definition not provided.
Keech et al. (2020) study 3	Experimental/quasi-experimental	$N = 195$ Age $M = 35.6$ 63% male	As in study 1.	Prestige, definition not provided.
Kennedy and Horne (2019) study 1	Experimental/quasi-experimental	$N = 400$ Age $M = 49.9$, $SD = 17.5$ 47% men, 53% women	Canada^	Social status, definition not provided
Kohlová and Urban (2020) study 1	Experimental/quasi-experimental	$N = 259$ Age $M = 33.1$, $SD = 13.3$ 79% female	Czechia*	The position of an individual in the hierarchy of social relations which is not something objectively given but is always the perception of others
Kohlová and Urban (2020) study 2	Experimental/quasi-experimental	$N = 280$ Age $M = 44.6$, $SD = 12.3$ 48% males	Czechia*	As in study 1
Kohlová and Urban (2020) study 3	Experimental/quasi-experimental	$N = 703$ Age $M = 42.61$, $SD = 12.94$ 47% males	Czechia*	As in study 1
Liao et al. (2022) study 2	Experimental/quasi-experimental	$N = 120$ Age $M = 21.19$, $SD = 2.17$ 44% male, 56% female	China^	Social status, definition not provided

Citation	Design	Sample	Country	Social status definition
Nayum and Nordfjaern (2021)	Cross-sectional	$N = 424$ Age $M = 22.65$, $SD = 2.21$ 53% female, 47% male	Norway*	Social status, definition not provided
Pinto et al. (2019) study 1	Experimental/quasi-experimental	$N = 101$ Age $M = 39.5$; $SD = 12.39$ 52% men	North America* Portugal^	Status, definition not provided.
Pinto et al. (2019) study 2	Experimental/quasi-experimental	$N = 201$. Age $M = 39.9$, $SD = 12.7$ 51% men	North America* Portugal^	Status, definition not provided.
Puska et al. (2016) study 1	Experimental/quasi-experimental	$N = 85$ Age $M = 36.8$ 100% male	A European capital* Finland^	Status, definition not provided
Puska et al. (2016) study 2	Experimental/quasi-experimental	$N = 68$ Age $M = 42.4$ 100% male	Finland^	Status, definition not provided
Rahman et al. (2020) study 1	Experimental/quasi-experimental	$N = 413$ Age not reported Gender not reported	USA^	Status signifies the position or rank in society granted to an individual by others.
Ton et al. (2020)	Longitudinal	$N = 2425$ Age not reported Gender not reported	The Netherlands*	Prestige, definition not provided
Uren et al. (2021)	Cross-sectional	$N = 601$ Community age $M = 34.34$, $SD = 12.96$. Community sample males = 43.40%, females = 55.50% Student age $M = 21.08$, $SD = 4.08$. Student sample males = 34%, females = 64%	Australia*	Three key features of social status: prominence, respect, and influence.
Welte and Anastasio (2010) study 2	Experimental/quasi-experimental	$N = 188$ Age range = 18-22 74% women, 26% men	USA*	Status, definition not provided

Citation	Design	Sample	Country	Social status definition
Yeoh and Paladino (2013)	Cross-sectional	<i>N</i> = 753 Average age between 31 and 40 61% female	Australia*	Prestige, definition not provided

N's shown are final N after exclusions (where reported). M and SD for age are reported where available. Where these are not available age ranges are reported. Percentage gender/sex are reported. * = country of data collection as specified in methods; ^ = country of first author institutional affiliation.

Table 6. *Studies Included in Each Synthesis*

Citation	Synthesis One	Synthesis Two	Synthesis Three	Synthesis Four
Abrar et al. (2021)				✓
Berger (2019) experiment 1	✓			
Brooks and Wilson (2015) study 1	✓	✓	✓	
Brooks and Wilson (2015) study 2	✓			
De Nardo et al. (2017)		✓		
DiDonato and Jakubiak (2016)	✓	✓		
Griskevicius et al. (2010) experiment 1	✓			
Griskevicius et al. (2010) experiment 2	✓			
Griskevicius et al. (2010) study 3	✓	✓		
Hao He et al. (2019) experiment 1				✓
Hao He et al. (2019) experiment 2				✓
Hao He et al. (2019) experiment 3				✓
Keech et al. (2020) study 1	✓			
Keech et al. (2020) study 3			✓	
Kennedy and Horne (2019) study 1	✓	✓	✓	
Kohlová and Urban (2020) study 1	✓			
Kohlová and Urban (2020) study 2	✓	✓		
Kohlová and Urban (2020) study 3	✓			
Liao et al. (2022) study 2				✓
Nayum and Nordfjaern (2021)			✓	
Pinto et al. (2019) study 1		✓		
Pinto et al. (2019) study 2		✓	✓	
Puska et al. (2016) study 1	✓			
Puska et al. (2016) study 2	✓			
Rahman et al. (2020) study 1	✓			
Ton et al. (2020)	✓	✓		
Uren et al. (2021)		✓	✓	
Welte and Anastasio (2010) study 2	✓		✓	
Yeoh and Paladino (2013)				✓

Table 7. *Risk of Bias Assessment Using Nudelman and Otto (2020) Generic Risk-of-Bias Measure*

Citation	Is the sampling frame largely representative of the studies population?	Were appropriate methods utilized for participant recruitment?	Is the exclusion rate of participants acceptable?	Is the final sample size sufficient (post hoc power over .8?)?	Are the characteristics of the sample reported (demographic variables)?	Do the relevant measures have adequate reliability (Cronbach's Alpha > .07)?	Were the procedures included in the study conducted in a controlled setting?	Are data cleaning and management procedures reported and/or acceptable?	Overall score
Abrar et al. (2021)	Population not specified	No	No	Not calculable	No	Yes	No	Yes	2/8
Berger (2019) experiment 1	Population not specified	No	No	No	Yes	Single item	No	No	1/8
Brooks and Wilson (2015) study 1	Population not specified	No	Yes	Not calculable	No	Single item	No	Yes	2/8
Brooks and Wilson (2015) study 2	Population not specified	No	Yes	Not calculable	No	Single item	No	Yes	2/8
De Nardo et al. (2017)	Population not specified	No	No	Not applicable	Yes	No scales	No	No	1/8
DiDonato and Jakubiak (2016)	No	No	No	No	Yes	Yes	No	No	2/8
Griskevicius et al. (2010) experiment 1	Population not specified	No	No	No	No	No scales	Yes	No	1/8
Griskevicius et al. (2010) experiment 2	Population not specified	No	No	Yes	No	No scales	Yes	No	2/8

Citation	Is the sampling frame largely representative of the studies population?	Were appropriate methods utilized for participant recruitment?	Is the exclusion rate of participants acceptable?	Is the final sample size sufficient (post hoc power over .8?)?	Are the characteristics of the sample reported (demographic variables)?	Do the relevant measures have adequate reliability (Cronbach's Alpha > .07)?	Were the procedures included in the study conducted in a controlled setting?	Are data cleaning and management procedures reported and/or acceptable?	Overall score
Griskevicius et al. (2010) study 3	Population not specified	No	No	No	No	No scales	Yes	No	1/8
Hao He et al. (2019) experiment 1	Population not specified	No	Yes	Yes	No	Yes	No	Yes	3/8
Hao He et al. (2019) experiment 2	Population not specified	No	Yes	Yes	No	Yes	No	Yes	4/8
Hao He et al. (2019) experiment 3	Population not specified	No	Yes	Yes	Yes	Yes	No	Yes	5/8
Keech et al. (2020) study 1	Population not specified	No	No	Yes	Yes	Single item	No	No	2/8
Keech et al. (2020) study 3	Population not specified	No	No	Yes	Yes	Yes	No	No	3/8
Kennedy and Horne (2019) study 1	Yes	No	No	Mixed	Yes	Single item	No	No	2/8
Kohlová and Urban (2020) study 1	No	No	No	Not calculable	Yes	No	No	No	1/8
Kohlová and Urban (2020) study 2	Population not specified	No	Yes	Not calculable	Yes	No	No	No	2/8

Citation	Is the sampling frame largely representative of the studies population?	Were appropriate methods utilized for participant recruitment?	Is the exclusion rate of participants acceptable?	Is the final sample size sufficient (post hoc power over .8?)?	Are the characteristics of the sample reported (demographic variables)?	Do the relevant measures have adequate reliability (Cronbach's Alpha > .07)?	Were the procedures included in the study conducted in a controlled setting?	Are data cleaning and management procedures reported and/or acceptable?	Overall score
Kohlová and Urban (2020) study 3	Population not specified	No	Yes	Not calculable	Yes	Single item	No	No	2/8
Liao et al. (2022) study 2	Population not specified	No	No	Yes	Yes	No scales	Yes	No	3/8
Nayum and Nordfjaern (2021)	Population not specified	No	Yes	Not calculable	Yes	No	No	Yes	3/8
Pinto et al. (2019) study 1	Population not specified	No	No	Not calculable	Yes	Yes	No	No	2/8
Pinto et al. (2019) study 2	Population not specified	No	No	Not calculable	Yes	Yes	No	No	2/8
Puska et al. (2016) study 1	Population not specified	No	No	Yes	Yes	Yes	No	No	3/8
Puska et al. (2016) study 2	Population not specified	No	No	No	Yes	Yes	No	No	2/8
Rahman et al. (2020) study 1	Population not specified	No	No	Not calculable	No	Single item	No	No	0/8
Ton et al. (2020)	Yes	No	Yes	Not calculable	No	Single item	No	Yes	3/8
Uren et al. (2021)	Population not specified	No	Yes	Not calculable	Yes	Yes	No	Yes	4/8
Welte and Anastasio (2010) study 2	Population not specified	No	No	Not calculable	Yes	Single item	No	No	1/8

Citation	Is the sampling frame largely representative of the studies population?	Were appropriate methods utilized for participant recruitment?	Is the exclusion rate of participants acceptable?	Is the final sample size sufficient (post hoc power over .8?)?	Are the characteristics of the sample reported (demographic variables)?	Do the relevant measures have adequate reliability (Cronbach's Alpha > .07)?	Were the procedures included in the study conducted in a controlled setting?	Are data cleaning and management procedures reported and/or acceptable?	Overall score
Yeoh and Paladino (2013)	Population not specified	Yes	Yes	Yes	Not reported well	Yes	No	Yes	5/8

Table 6 shows which studies were included in each synthesis. Risk of bias assessments for each study is shown in Table 7. Risk of bias in the review was assessed using ROBIS, showing low concern for bias in the review (Whiting et al., 2016; appendix D). Where statistics were missing (e.g., *Ms*, *SDs*, effect sizes, *p* values) these were calculated when appropriate data were available. When appropriate data were not available, the corresponding author of the study was contacted to request this information. In a change from the preregistration, effect sizes were not converted. This was because there were diverse statistical analyses used in included studies, resulting many different effect sizes which could not be appropriately converted into one common measure.

Synthesis One: Studies Measuring the Perceived Social Status of PEBs Compared to non-PEBs

Seventeen of the included studies compared the perceived social status of PEBs to the perceived social status of non-PEBs. Results of these studies are summarised in Table 8. Of these studies, five indicated that PEBs signal more social status than non-PEBs (DiDonato & Jakubiak, 2016; Kohlová & Urban, 2020, study 1, study 2, study 3; Puska et al., 2016, study 1), two indicated PEBs signal less social status than non-PEBs (Keech et al., 2020, study 1; Rahman et al., 2020, study 2), four found there was no difference in the amount of social status PEBs and non-PEBs were perceived to signal (Berger, 2019, experiment 1; Puska et al., 2016, study 2; Ton et al., 2020; Welte & Anastasio, 2010, study 2) and six studies found mixed findings (Brooks & Wilson, 2015, study 1, study 2; Griskevicius et al., 2010, study 1, study 2, study 3; Kennedy & Horne, 2019, study 1).

One potential explanation for the heterogeneity in these findings is the variety in the type of PEBs studied, as these included various types of green consumption, reduced consumption, waste behaviours and methods of transportation. All studies that found PEBs signalled more social status than non-PEBs looked at green consumption, which may suggest this is the behaviour which most consistently signals social status. However, there are some studies that investigated green consumption that did not find that PEBs signalled higher status than non-PEBs. For example, Griskevicius et al. (2010, study 1) found that purchasing an environmentally friendly car or household cleaner signalled more social status than non-environmental friendly alternatives, however there was no difference in the amount of social status an environmentally friendly dishwasher signalled compared to a non-environmentally friendly alternative. One potential explanation for this is how public or private the purchase or use of the product is. While use of a car is very public and household cleaners are frequently purchased in public, dishwashers are only occasionally purchased and both use and purchase are likely to be in private settings. This is in line

Table 8. *Results of Studies Comparing the Perceived Social Status of PEBs to non-PEBs (Synthesis One)*

Citation	Measure of social status	PEB/non-PEB used	Findings
Berger (2019) experiment 1	One item on a 5-point scale to measure the confederate's status.	Organic and non-organic.	There was no significant difference in status ratings of a confederate wearing an organic t-shirt compared to a confederate wearing an unlabelled t-shirt ($t = 0.70$, $p > .1$, $d = 0.120$).
Brooks and Wilson (2015) study 1	7-point scale to measure status of actor.	Five scenario categories; Null (only baseline behaviours), Environmental (a clearly environmental behaviour), Ambiguous (a behaviour which could be PEB or could not be), Luxury (a non-PEB) and control (not PEB or luxury). Three different baseline consumption reducing (insulating, taking the bus or repairing clothes).	Null signals less status than environmental (Beta = -0.45 , 95% CI = $(-0.55, -0.35)$, $p < 0.001$). Ambiguous less status than environmental (Beta = -0.31 , 95% CI = $(-0.41, -0.21)$, $p < 0.001$). Luxury signals more status than environmental (Beta = 0.30 , 95% CI = $(-0.40, -0.20)$, $p < 0.001$). Control less status than environmental (Beta = -0.35 , 95% CI = $(-0.45, -0.25)$, $p < 0.001$).
Brooks and Wilson (2015) study 2	7-point scale to rate appropriateness of behaviours to signal they were above average socioeconomic status.	Twelve consumption reducing behaviours (e.g. riding a bike) and twelve equivalent consumption intensive behaviours (e.g. driving a car).	Biking to store was less appropriate than driving to the store ($\beta = -1.27$, 95% CI $(0.94, 1.60)$, $p < .001$). Using a rake was less appropriate than using a leaf blower ($\beta = -1.48$, 95% CI $(1.13, 1.83)$, $p < .001$) Making household cleaning products was less appropriate than buying household cleaning products ($\beta = -1.07$, 95% CI $(0.70, 1.44)$, $p < .001$). Eating vegetarian was not significantly different to eating meat and fish ($\beta = -0.09$, 95% CI $(-0.28, 0.46)$, $P > .05$). Hanging cloths on a laundry line was less appropriate than using a clothes dryer ($\beta = -1.70$, 95% CI $(1.37, 2.03)$, $p < .001$). Growing food at home was less appropriate than buying food from the store ($\beta = -0.44$, 95% CI $(0.07, 0.81)$, $P < .05$). Taking the bus to the store was less appropriate than driving to the store ($\beta = -4.09$, 95% CI $(3.76, 4.42)$, $p < .001$). Using reusable bags was more appropriate than using paper or plastic bags ($\beta = 0.78$, 95% CI $(0.39, 1.17)$, $p < .001$).

Citation	Measure of social status	PEB/non-PEB used	Findings
			Avoiding the use of chemical pesticides was no different to using chemical pesticides ($\beta = 0.30$, 95% <i>CI</i> = (– 0.09, 0.69), $P > .05$) Buying used clothes was less appropriate than buying new clothes – ($\beta = 3.68$, 95% <i>CI</i> = (3.29, 4.07), $p < .001$). Buying used furniture was less appropriate than buying only new furniture ($\beta = - 3.82$, 95% <i>CI</i> = (3.47, 4.17), $p < .001$). Repairing household items was less appropriate than buying new household items ($\beta = - 2.92$, 95% <i>CI</i> (2.53, 3.31), $p < .001$).
DiDonato and Jakubiak (2016)	Three items rated on a 7-point scale were used to measure status.	Target made green purchases or luxury purchases.	Significant main effect for purchasing decisions, those who made the eco-friendly purchase ($M = 5.82$, $SD = 0.97$) were perceived as higher status than luxury purchasers ($M = 5.12$, $SD = 1.22$), $p < .001$.
Griskevicius et al. (2010) experiment 1	Status motive elicited by reading a short story.	Participants asked to choose between a green option and a non-green option for three products.	In the control condition 37.2% of participants chose the green car over the non-green car, while 54.5% of participants chose it in the status condition, $\chi^2(1, N = 168) = 4.56$, $p = .033$, $\phi = .165$. In the control condition 25.7% of participants chose the green cleaner over the non-green cleaner, compared to 41.8% in the status condition ($\chi^2(1, N = 168) = 4.52$, $p = .034$, $\phi = .164$). In the control condition 34.5% of participants chose the green dishwasher, compared to 49.1% in the status condition, but this difference was not significant ($\chi^2(1, N = 168) = 3.30$, $p = .069$, $\phi = .140$) When all three products were combined into a composite a one-way analysis of variance (ANOVA) on the product composite showed a significant effect of status, $F(1, 166) = 8.53$, $p = .004$, $d = 0.47$.
Griskevicius et al. (2010) experiment 2	As in study 1.	As in study 1, with product preferences were indicated on a 9-point scale. Participants were randomly allocated to a private condition or public condition.	Two-way ANOVA showed a significant interaction ($F(1, 89) = 8.13$, $p = .005$, $\eta^2 = .084$). When shopping in public, status motives increased preferences for green products compared to the control condition ($F(1, 89) = 5.38$, $p = .023$, $d = 0.48$). When shopping in private, status motives marginally decreased preferences for green products relative to such preferences in the control condition ($F(1, 89) = 2.97$, $p = .058$, $d = 0.41$). Main effect for motive (status/control) was not reported.

Citation	Measure of social status	PEB/non-PEB used	Findings
Griskevicius, Griskevicius et al. (2010) study 3*	As in study 1	As in study 2. Relative price was additionally manipulated.	A two-way ANOVA showed a significant interaction between status and relative price. When green products were more expensive, status motives increased desire for green products ($F(1, 152) = 4.35, p = .039, d = 0.33$). When green products were cheaper, status motives did not influence desire for green products ($F(1, 152) = 2.55, p = .11, d = 0.25$).
Keech et al. (2020) study 1	One item on a 7-point scale to measure the prestige of a diamond ring.	Description of a lab grown (PEB) or mined (non-PEB) diamond.	Participants in the lab-grown condition ($M = 3.57$) thought the ring was less prestigious compared to those in a mined condition ($M = 4.51$) ($F(1,85) = 13.199, p < 0.001, d = 0.78$).
Kennedy and Horne (2019) study 1	Identification of a rung on a 10-rung ladder that corresponded to perceptions of a target's standing in the community.	Vignettes describing green consumption, reduced consumption and no green behaviour.	Liberal participants granted the same status to reduced consumption as to no PEB ($b = .0132, SE = .345, P > .05$). Conservative participants granted higher status to no PEB compared to reduced consumption ($b = .671, SE = .309, P < .05$).
Kohlová and Urban (2020) Study 1	One item on a 5-point scale ranging from as a direct measure of social status. Three items on 5-point scales as a compound measure of social status.	Hypothetical shopping list with 6/9 green products or 2/9 green products.	A green consumption profile had a positive effect on social status assessed with direct measure ($\beta = -0.61, OR = 1.85, 95\% CI = 1.02, 3.34, z = 2.04, p = .042$) and a non-direct measure status ($b = 0.35, 95\% CI [0.11, 0.59], t(259) = 2.80, p = .005, \beta = 0.23$).
Kohlová and Urban (2020) Study 2	As in study 1.	As in study 1.	Significant positive effect of green consumption profile on direct measure of social status ($B = 1.06, OR = 2.88, 95\% CI = [1.42, 5.84], z = 2.94, p = .003$) and non-direct measure of social status ($b = 0.48, 95\% CI [0.20, 0.74], t(259) = 3.35, p = .001, \beta = 0.31$).
Kohlová and Urban (2020) Study 3	As in study 1, direct measure only.	As in study 1, but with 6/6 green products or 0/6 green products.	Green consumption profiles were perceived as significantly higher status than conventional profiles ($B = 0.85, OR = 2.35, 95\% CI [1.49, 3.70], z = 3.69, p < .001$).

Citation	Measure of social status	PEB/non-PEB used	Findings
Puska et al. (2016) study 1	Two items on a 7-point Likert scale asking whether the target was respected and honoured.	Target wearing organic labelled or non-labelled t-shirt.	The target wearing organic labelled shirt received higher status ratings ($M = 4.65$, $SD = 0.75$) than the target with a plain t-shirt ($M = 4.01$, $SD = 1.30$) ($F(1, 82) = 7.736$, $p = 0.007$, $d = 0.61$).
Puska et al. (2016) study 2	As in study 1	As in study 1	There was no significant difference in perceived status between those who were shown the picture of the target wearing the organic t-shirt ($M = .44$, $SD = 1.26$) and those who were shown the male with the plain t-shirt ($M = 4.91$, $SD = 1.09$) ($F(1, 67) = 2.484$, $p = 0.120$, $d = 0.38$)
Rahman et al. (2020) study 1	Story to elicit status motives.	Purchase intention of a green hotel and a luxury hotel.	No significant differences between purchase intentions in the control condition ($t(202) = 1.97$, $p = 0.51$), but there was a significant difference between purchase intentions regarding a green hotel ($M = 5.01$, $SD = 1.76$) and a conventional hotel ($M = 5.61$, $SD = 1.55$) in the status condition ($t(209) = 4.15$, $p < .01$).
Ton et al. (2020)	One item on a 5-point scale to measure prestige.	Participants rated five modes of transport: car, bicycle, walking, train, and bus/tram/metro.	Participants on average disagreed with the statement that any of the modes of transport (car, train, bus/tram/metro or bicycle) induced prestige (results only visually reported, not significance tested).
Welte and Anastasio (2010) study 2	One item on a 9-point scale.	List of morning activities, including paper recycling, composting, both behaviours, or neither behaviour.	No significant effects of Conservation condition were found ($F(3, 172) = 1.151$, $p = .330$).

with Brick et al. (2017) who suggest visibility can encourage engagement with PEB. The mixed findings in Griskevicius et al. (2010, study 2) further support this explanation of heterogeneity, as they found public PEBs signalled more social status than public non-PEBs, but there was no difference in perceived social status for private behaviours.

Another possible explanation for heterogeneity is the features of the non-PEB in question. Brooks and Wilson (2015) found that while PEBs signalled more social status than standard non-PEBs, luxury non-PEBs were perceived to signal more social status than PEBs. This could explain why Rahman et al. (2020) found no difference in the social status signals of pro-environmental hotels compared to luxury hotels. However, DiDonato and Jakubiak (2016) compared the social status signals of pro-environmental car and dishwasher purchases to luxury equivalent products and found the pro-environmental products signalled more social status than the luxury products, so this cannot explain all heterogeneity. It is also important to note there was diversity in measures/manipulations of social status and PEB which could explain some heterogeneity. Measurements/manipulations of social status included use of stories to elicit status motives, direct measures of social status on various scales and multi-item compound measures of social status. These measures/manipulations were rarely validated, meaning they may be measuring slightly different things or different elements of social status, resulting in heterogeneity. Measures of PEB included descriptions of hypothetical shopping lists, product choices and daily activities, photographs of individuals with organic labelled t-shirts, hypothetical product preferences for a variety of PEBs, and written descriptions of products, modes of transport and other PEBs. It has been noted that there are not always strong correlations between different measures of PEB (Markle, 2013). This lack of consistency in PEB measures may explain some of the heterogeneity in the findings. Additionally, different PEBs have different psychological correlates (Whitmarsh & O'Neill, 2010) and it is possible that this extends to social status, with different PEBs having different social status signals. This diversity in the design of studies makes it difficult to compare studies and determine the circumstances under which PEBs signal more or less social status.

Risk of Bias

Risk of bias revealed substantial concerns regarding the quality of the data. Especially notable was the lack of studies utilising appropriate sampling methods, reporting of exclusion rates, utilising controlled settings, and reporting of data cleaning and management strategies. None of the included studies used sampling methods which would minimise bias, such as random sampling, instead using opportunity samples, students participating in the research for course credit or online platforms such as Amazon Mechanical Turk to recruit participants. Amazon Mechanical Turk has been

demonstrated to result in poor quality data (Eyal et al., 2021) and using student samples and opportunity samples are not representative of wider populations (Sarstedt et al., 2018; Shen et al., 2011), which may introduce bias into these studies. Most of the included studies did not report the number of participants who were excluded from data analysis or excluded more than 10% of participants. This may lead to bias due to differences between included and excluded participants (Nudelman & Otto, 2020). Fourteen of the included studies did not conduct the study in a controlled environment, which increases the potential for confounding variables to influence results (Verma, 2019).

Synthesis Two: Studies Comparing the Perceived Social Status of Different PEBs

Ten studies compared the perceived social status of different PEBs. Results of these studies are summarised in Table 9. Four studies looked at the financial cost of PEBs (DiDonato & Jakubiak, 2016; Griskevicius et al., 2010, study 3; Kohlová & Urban, 2020, study 2; Uren et al., 2021), three studies looked at green consumption compared to reduced consumption or efficiency behaviours compared to curtailment behaviours (Brooks & Wilson, 2015; De Nardo et al., 2017; Kennedy & Horne, 2019), two studies looked at recycling and green buying (Pinto et al., 2019 study 1; study 2), one study looked at curtailment, efficiency and activism PEBs as well as the visibility and effort of PEBs (Uren et al., 2021), and one study looked at different modes of transportation (Ton et al., 2020).

Financial Cost

Two studies found that the cost/relative cost of PEBs did not influence how much social status they signalled (DiDonato & Jakubiak, 2016; Kohlová & Urban, 2020, study 2) and two studies found that PEBs signal more social status when they are high in cost/relative cost (Griskevicius et al., 2010, study 3; Uren et al., 2021).

One potential explanation for this heterogeneity in findings is the measurement/manipulations of social status and PEB used. Both Kohlová and Urban (2020) and DiDonato and Jakubiak (2016) investigated whether participants rated the social status of a hypothetical consumer performing a PEB differently based on the price of the PEB. In contrast, Uren et al. (2021) examined the social status attributed to a PEB itself, rather than a person performing the PEB. Griskevicius et al. (2010) looked at whether those who have an activated status motive (i.e., who have been primed to be motivated by status, and therefore choose the higher status option) have an increased desire for relatively more expensive PEBs compared to those without activated status motives. It is possible that PEBs themselves may signal more social status when they are more expensive, but individuals

Table 9. Results of Studies Comparing the Perceived Social Status of PEBs (Synthesis Two)

Citation	Measure of social status	PEBs compared	Findings
Brooks and Wilson (2015) study 1	Participants rating actor on a 7-point scale.	Insulating, taking the bus and repairing clothes.	Insulation ($M = 4.25$, $SD = 0.96$) was non-significant in perceived status compared to taking the bus ($M = 3.99$, $SD = 0.84$) ($\text{Beta} = -0.04$, $95\% \text{ CI} = (-0.16, 0.08)$, $p > .05$). Repairing clothes ($M = 4.11$, $SD = 0.81$) was higher in perceived status than taking the bus ($\text{Beta} = 0.14$, $98\% \text{ CI} (0.02, 0.26)$, $p > .05$).
De Nardo et al. (2017)	Participants were asked to Q-sort behaviours from -3 (low status) to +3 (High status)	Nine curtailment PEBs, eight efficiency PEBs and two neutral PEBs.	M and SD status ratings for each curtailment (C), efficiency (E) and neutral (N) behaviour: Solar $M = 2.42$ $SD = 0.82$ E Renewable energy $M = 1.58$ $SD = 2.21$ E Local food $M = 1.27$ $SD = 1.03$ E Fuel-efficient car $M = 1.25$ $SD = 1.07$ E Protest $M = 0.51$ $SD = 1.16$ N Vegetarian diet $M = 0.51$ $SD = 0.86$ C Donate clothes $M = 0.37$ $SD = 1.11$ N Light bulbs $M = 0.31$ $SD = 0.92$ E Compost $M = 0.20$ $SD = 1.04$ C Wall insulation $M = 0.18$ $SD = 1.09$ E Bags $M = -0.07$ $SD = 1.00$ C Tire pressure $M = -0.34$ $SD = 0.91$ E Bike $M = -0.39$ $SD = 1.09$ C Turn down heat $M = -0.70$ $SD = 1.10$ C Wash $M = -0.76$ $SD = 0.90$ C Shower $M = -1.00$ $SD = 0.91$ C Bus $M = -1.38$ $SD = 1.01$ C Insulate windows $M = -1.59$ $SD = 1.13$ E Repair clothes $M = -2.10$ $SD = 1.00$ C
DiDonato and Jakubiak (2016)	Three items on a 7-point scale to measure status.	Relative price of eco-friendly product compared to luxury product.	No significant main effect for price ($p < .10$, $\eta_p^2 = .01$). There was no significant interaction between price and green/luxury choice ($p > .10$, $\eta_p^2 = .01$).

Citation	Measure of social status	PEBs compared	Findings
Griskevicius et al. (2010) study 3	In the status condition, participants read a short story to elicit status motives. In the control condition participants read a similar story designed to elicit similar levels of effect.	Relative price of green products compared to non-green products.	A two-way ANOVA showed a significant interaction between status motive and price on product choice $F(1, 152) = 6.78, p = .01, \eta_p^2 = .043$. When green products were more expensive, status motives increased desire for green products ($F(1, 152) = 4.35, p = .039, d = 0.33$). When green products were cheaper, desire for products did not vary based on status motives ($F(1, 152) = 2.55, p = .11, d = 0.25$).
Kennedy and Horne (2019) study 1	Identification of a rung on a 10-rung ladder that corresponded to perceptions of targets standing in the community.	Vignettes describing reduced consumption, green consumption, or no green behaviour.	Liberal participants granted higher status to green consumption compared to reduced consumption ($b = .680, SE = .298, P > .05$). Conservative participants granted higher status to green consumption compared to reduced consumption ($b = .879, SE = .326, P < .01$).
Kohlová and Urban (2020) Study 2	One item on a 5-point scale as a direct measure of social status. Three items on 5-point scales as compound measure of social status.	Shopping lists with high-cost green consumption, low-cost green consumption or reduced-cost green consumption.	No significant effect of price on direct ($B = -0.02, OR = 0.98, 95\% CI = [0.48, 2.02], z = -0.05, p = .963$) or compound ($b = 0.11, 95\% CI [-0.16, 0.38], t(259) = 0.83, p = .410, \beta = 0.07$) measure of social status. No significant interaction between price and green consumption profile on direct ($B = 0.13, OR = 1.14, 95\% CI = [0.42, 3.09], z = 0.26, p = .797$) or compound measure of social status ($b = 0.10, 95\% CI [-0.29, 0.49], t(259) = 0.52, p = .601, \beta = 0.07$).
Pinto et al. (2019) study 1	Two items on a 7-point scale to measure competitive altruism motivated by status.	Recycling scenario or green buying scenario.	Participants indicated a similar level of competitive altruism as motivating recycling and green buying ($F(1, 99) = 0.06; ns$; $M_{recycling} = 3.84$ and $M_{greenbuying} = 3.90$)
Pinto et al. (2019) study 2	As in study 1.	As in study 1, with an additional part to the scenario which manipulated identity goals.	No significant main effect for PEB type ($F(1, 199) = 0.62; ns$). Significant interaction between PEB type and identity goals ($F(1, 197) = 4.10; p < 0.05$). Post hoc contrasts showed participants with salient collectivistic goals indicated higher levels of competitive altruism motivating green buying compared to recycling ($F(1, 197) =$

Citation	Measure of social status	PEBs compared	Findings
Ton et al. (2020)	One item on a 5-point scale to measure prestige.	Bicycle, walking, train and bus/tram/metro.	3.98; $p < 0.05$; Mrecycling = 3.45; Mgreenbuying = 4.05). Participants with salient individualistic goals reported similar levels of competitive altruism motivating recycling and green buying ($F(1, 197) = 0.73$; ns; Mrecycling = 4.06; Mgreenbuying = 3.81). Participants on average disagreed with the statement that any of the modes of transport induced prestige (results only visually reported, not significance tested)
Uren et al. (2021)	Participants rated PEBs on their perceived social status from 0 to 100.	High/low cost, high/low effort and high/low visibility PEBs and efficiency, curtailment and activism PEBs.	PEBs that were high in cost, effort, and visibility received significantly higher ratings of perceived social status than those that were low in cost, effort, and visibility respectively: cost $F(1, 9608) = 202.30$, $p < .001$, $\eta_p^2 = .021$; effort $F(1, 9608) = 30.19$, $p < .001$, $\eta_p^2 = .003$; and visibility $F(1, 9608) = 49.31$, $p < .001$, $\eta_p^2 = .005$. There was a significant interactions between cost and visibility, $F(2, 9608) = 29.46$, $p < .001$, and effort and visibility, $F(2, 9608) = 14.35$, $p < .001$, but not cost and effort, $F(2, 9608) = .000$, $p = .983$. The three-way interaction was also significant, $F(1, 9608) = 10.82$, $p < .001$, $\eta_p^2 = .001$. The relationship between cost and social status is moderated by visibility (there is a stronger relationship between cost and social status when behaviours are visible). The same pattern of results occurs for effort and visibility, the relationship between effort and social status is stronger when behaviours are visible. There was a significant difference between behaviour types ($F(2, 1800) = 18.08$, $p < .001$, $\eta^2 = .02$). Post hoc tests using Tukey's HSD (honestly significant difference) showed that efficiency behaviours held more social status ($M = 62.16$, $SD = 17.24$) than both activism ($M = 56.45$, $SD = 18.77$) and curtailment ($M = 56.98$, $SD = 18.20$) behaviours.

who perform PEBs are perceived as having the same amount of status regardless of the cost of the PEB. It is also important to note that DiDonato and Jakubiak's (2016) analysis was underpowered, so it is possible with a larger sample size a significant effect may have been found.

Curtailment/Efficiency

Of the studies that compared reduced consumption to green consumption or curtailment behaviours to efficiency behaviours, three studies found that efficiency behaviours/green buying tended to signal more social status than curtailment behaviours/reduced consumption (De Nardo et al., 2017; Kennedy & Horne, 2019; Uren et al., 2021). One study found there was no difference in the social status signals of curtailment and efficiency behaviours (Brooks & Wilson, 2015, study 1).

While efficiency behaviours generally signal more social status than curtailment behaviours, it is likely that not all efficiency behaviours signal more social status than all curtailment behaviours. This could explain the difference in findings, as it may be that insulating windows does not signal very much social status for an efficiency behaviour. The findings from De Nardo et al. (2017) support this idea, as they found that insulating windows signalled the least social status of all efficiency behaviours and in fact signalled less social status than many curtailment behaviours. Therefore, it is likely that curtailment behaviours on average signal less social status than efficiency behaviours, but there is variation within these categories. Although, it should be noted that De Nardo et al. (2017) did not subject their data to significance testing, so it cannot be determined whether the differences found were more than would be expected due to chance.

Green Buying and Recycling

Of the two studies comparing recycling to green buying, one found that there was no difference in perceived social status of the two behaviours (Pinto et al., 2019 study 1). Whereas the second study found no global effect, but when collectivist goals were made salient, green buying was perceived as signalling higher status than recycling, while when individualistic goals were made salient both PEB types were perceived to signal the same amount of social status (Pinto et al., 2019 study 2). This suggests that green buying signals more social status than recycling, but only when collectivist goals are salient.

Modes of Transport

Ton et al.'s (2020) study comparing different sustainable modes of transport found no difference in the amount of social status taking the train, taking the bus/tram/metro, walking or cycling signalled. It should be noted that the differences in social status signals between these modes was not significance tested.

Effort and Visibility

Uren et al. (2021) examined the social status signals of high/low effort PEBs and high/low visibility PEBs, finding that high effort PEBs signalled more social status than low effort PEBs and that high visibility signalled more social status than PEBs with lower visibility.

Risk of Bias

The risk of bias of the studies included in synthesis two studies showed substantial concerns regarding the lack of appropriate recruitment methods, controlled settings utilisation and reporting of data cleaning and management strategies. None of the included studies used random sampling to recruit participants, instead relying on online platforms, such as Amazon Mechanical Turk and YouGov, or student samples, therefore introducing a risk of bias. The lack of controlled settings and lack of data management procedures reported raise concerns similar to in synthesis One. While some of the included studies reported an adequate Cronbach's alpha, indicating some scales have internal consistency, very rarely was any further validation of the scales presented. As other forms of reliability (such as stability and equivalence and validity (such as construct and content validity) have usually not been considered, this raises concerns regarding whether these measures are consistently and accurately measuring social status (Heale & Twycross, 2015).

Synthesis Three: Studies Measuring the Influence of Individual Characteristics on the Perceived Social Status of PEBs

Seven of the included studies measured the influence of individual characteristics on perceived social status. Results of these studies are summarised in Table 10. These studies examined the relationship between perceived social status and gender, age, individualistic and collectivist goals, materialism, liberalism and conservatism, environmental identity and environmental orientation.

Gender

Two studies explored the relationship between gender and perceived social status of PEBs. Nayum and Nordfjaern (2021) found that women perceived public transport to signal higher social status than men. Welte and Anastasio (2010) looked at recycling and composting and found there was no difference in the amount of social status women and men perceived these behaviours to signal. This mixed evidence suggests that the relationship between gender and the perceived social status of PEBs may depend on the PEB in question, with there being gender differences in the amount of social status public transport is perceived to signal, but not recycling or composting. Both of these studies also used different measurements of social status, which may account for contradictory findings.

Table 10. *Results of Studies Measuring the Influence of Individual Characteristics on the Perceived Social Status of PEBs (Synthesis Three)*

Citation	Measure of social status	Individual characteristic	PEB used	Findings
Brooks and Wilson (2015) study 1	Participants rated an actor on a scale from high status (1) to low status (7).	Environmental orientation.	A clearly environmental behaviour.	There was no significant difference in how environmentally oriented respondents rated environmental actor's status compared to how non-environmentally orientated respondents rated environmental actors' status.
Keech et al. (2020) study 3	One item on a 5-point scale (1 = strongly disagree, 5 = strongly agree) to measure social status.	Materialism	Lab grown leather band	There was a significant main effect for materialism on social status ($b = 0.337$, $t = 4.98$, $p < 0.001$).
Kennedy and Horne (2019) study 1	Identification of a rung on a 10-rung ladder corresponding to perceptions of a targets standing in the community.	Political orientation (liberal or conservative).	Reduced consumption.	Liberal participants granted the same status to reduced consumption as to no PEB ($b = .0132$, $SE = .345$, $P > .05$). Conservative participants granted higher status to no PEB compared to reduced consumption ($b = .671$, $SE = .309$, $P < .05$).
Nayum and Nordfjaern (2021)	Measured by identifying a rung on a 10-rung ladder that corresponded to perceptions of targets standing in the community.	Age and sex.	Intention to use public transport.	Age had a significant effect on social status attributed to public transport use ($\beta = 0.12$, $p \leq 0.05$). There were significant gender differences on social status attributed to public transport use ($\beta = 0.21$, $p \leq 0.001$), with male students attributing more lower social status towards public transport use than female students.
Pinto et al. (2019) study 2	Two items on a 7-point scale (to measure competitive	Identity goals (collectivist/individualistic).	Recycling and green buying.	There was no significant main effect of identity goal on social status ratings of PEBs ($F(1, 199) = 0.57$, ns). Significant interaction between PEB type and identity goals ($F(1, 197) = 4.10$; $p < 0.05$). Post hoc tests look at the difference between green

Citation	Measure of social status	Individual characteristic	PEB used	Findings
Uren et al. (2021)	altruism motivated by status. Participants rated 16 PEBs on their perceived social status, ranging from 0 to 100.	Public and private environmental identity.	Activism, curtailment and efficiency behaviours.	buying and recycling split by identity goals, rather than difference between collectivist and individualistic goals split by behaviour type. Public and private identity accounted for a significant amount of the variance in social status ratings of activism ($R^2 = .19$), curtailment ($R^2 = .18$), and efficiency behaviours ($R^2 = .18$). Self-identity accounts for unique variance in social status ratings for activism ($B = 3.17$, 95% $CI = [1.29, 5.05]$, $\beta = .17$, $sR^2 = .01$, $p < .001$), curtailment ($B = 3.75$, 95% $CI = [1.91, 5.59]$, $\beta = .21$, $sR^2 = .03$, $p < .001$) and efficiency behaviour ($B = 3.78$, 95% $CI = [2.04, 5.51]$) $\beta = .22$, $sR^2 = .02$, $p < .001$). Public-identity accounts for unique variance in social status ratings for activism ($B = 4.84$, 95% $CI = [3.19, 6.48]$, $\beta = .30$, $sR^2 = .05$, $p < .001$), curtailment ($B = 3.88$, 95% $CI = [2.26, 5.49]$, $\beta = .25$, $sR^2 = .04$, $p < .001$) and efficiency ($B = 3.56$, 95% $CI = [2.04, 5.08]$, $\beta = .24$, $sR^2 = .03$, $p < .001$) behaviour.
Welte and Anastasio (2010) study 2	One item on a 9-point scale.	Gender	Paper recycling and/or composting.	There was no significant main effect of participant gender on social status rating of targets and there was no significant interactive effect, when controlling for environmental perspective.

Age

One study examined the relationship between age and the perceived social status of PEBs. Nayum and Nordfjaern (2021) found a significant, positive relationship between age and the amount of social status attributed to public transportation, where high social status scores indicate a perception that public transport is low in social status. This suggests older participants tended to perceive public transport as lower in social status than younger participants. Further research is needed to determine whether this relationship can be seen in other PEBs.

Collectivist and Individualistic Goals

One study explored whether having individualistic or collectivist goals impacted the perceived social status of recycling and green buying. Pinto et al. (2019, study 2) found no main effect of goals, suggesting holding collectivist or individualistic goals does not impact the perceived social status of PEB. However, they did find a significant interaction effect, meaning that when each behaviour is looked at individually, collectivist/individualistic goals may influence perceived social status, but this interaction was not further explored to confirm direction of this effect. Further studies are needed to confirm whether this relationship holds across PEBs.

Materialism

One study (Keech et al., 2020) examined the relationship between materialism and perceived social status of lab grown leather. They found materialism significantly, positively predicted perceived social status of lab grown leather, suggesting those who scored higher in materialism tended to perceive lab grown leather to signal more social status than those who scored lower in materialism. Further studies are needed to determine whether this relationship is consistent across PEBs.

Liberalism and Conservatism

One study (Kennedy & Horne, 2019, study 1) analysed whether liberals and conservatives differed in the social status they granted PEBs. They found that while liberals granted the same amount of status to reduced consumption and no PEB, conservatives granted less status to reduced consumption compared to no PEB. This suggests that liberals grant relatively higher status to reduced consumption compared to conservatives. Once more, further research is needed to confirm whether this effect is seen in other PEBs.

Environmental Identity

One study (Uren et al., 2021) examined the relationship between environmental identity and the perceived social status of curtailment, efficiency and activism PEBs. They found that both private and

public environmental identity positively predicted the amount of social status each behaviour type was perceived to signal. This suggests that those with higher environmental identities are more likely to perceive PEBs as signalling social status compared to those with lower environmental identities.

Environmental Orientation

One study (Brooks & Wilson, 2015) found that participants with an environmental orientation did not significantly differ from those without an environmental orientation in how much social status they granted an actor engaging in a PEB. Brooks and Wilson (2015) assessed environmental orientation by whether the participant was enrolled on an environmental focused university programme (such as ecology, environmental studies, environment and natural resources, or landscape architecture), however they did not assess whether this accurately captured environmental orientation.

Risk of Bias

There are substantial limitations regarding the quality of studies included in synthesis three. In particular, none of the studies reported recruitment methods that would minimise bias (e.g., random sampling), which could introduce bias as in synthesis one and two, and none of the studies were conducted in a controlled setting, potentially resulting in confounding variables influencing the results.

Synthesis Four: Studies Comparing the Perceived Social Status of PEBs to Actual/Intended/Simulated Performance of PEBs

Six studies explored whether the amount of social status PEBs were perceived to signal related to performance of PEBs. Results of these studies are summarised in Table 11. Four studies (Hao He et al., 2019, experiment 1, experiment 2, experiment 3; Liao et al., 2022, study 2) found perceived social status of PEBs was related to engagement with PEBs under certain circumstances. Hao He et al. (2019, experiment 1, experiment 2, experiment 3) found that increasing the perceived social status of PEBs resulted in an increased intention to engage in PEB when paired with an injunctive norm (i.e., a description that this is a socially approved behaviour), but resulted in decreased intention with paired with a descriptive norm (i.e., a description that this is a common behaviour). Liao et al. (2022, study 2) found a significant interaction between social status and the behaviour of a confederate on participants' PEB, but the exact nature of this interaction was unclear. Two studies (Abrar et al., 2021; Yeoh & Paladino, 2013) found negative relationships between perceived social status of PEBs and engagement with PEBs, finding negative relationships between social status of

Table 11. Results of Studies Comparing the Perceived Social Status of PEBs to Performance of PEBs (Synthesis Four)

Citation	Measure of social status	PEB measure	Findings
Abrar et al. (2021)	Eight/six items on a scale were used to measure social status.	Three items on a 7-point scale to measure green purchase intention.	There was no significant direct effect of social status on purchase intention towards green apparel ($\beta = -0.073$, $t = 1.847$, $p > 0.05$). The indirect effect through attitude was negative and significant ($\beta = -0.108$, $t = 3.361$, $p < 0.05$), showing full mediation through attitude. The indirect effect of social status on purchase intention towards green apparel through social norm was non-significant ($\beta = 0.016$, $t = 1.794$). The indirect effect of social status on purchase intention towards green apparel through perceived behavioural control was non-significant ($\beta = 0.017$, $t = 1.625$).
Hao He et al. (2019) experiment 1	A poster encouraging environmentally friendly behaviour endorsed by a celebrity or an ordinary consumer.	Two items on a 7-point scale to measure intention regarding setting air conditioning temperatures.	Controlling for environmental knowledge and gender, there was no significant main effect of endorser social status on intention to act (M celebrity = 4.54, $SD = .88$; M ordinary consumer = 4.47, $SD = .83$; $F(1, 108) = .003$, $p = .96$, $\eta_p^2 < .001$). The interaction effect of endorser social status and social norm appeals was significant for intention to act ($F(1, 108) = 16.63$, $p < .001$, $\eta_p^2 = .133$). Follow up t-tests* showed when messages were framed descriptively, those in the high status condition showed lower intention ($M = 8.32$, $SD = 1.61$) than those in the low status condition ($M = 9.56$, $SD = 1.76$) $t(53) = -2.71$, $p = 0.009$, $d = -0.73$, but when messages were framed injunctively, those in the high status condition showed higher intention ($M = 9.79$, $SD = 1.59$) than those in the low status condition ($M = 8.40$, $SD = 1.38$) $t(57) = 3.60$, $p < .001$, $d = 0.94$. These were both significant to .025 (Bonferroni corrected alpha level).
Hao He et al. (2019) experiment 2	As in study 1, with a nationally excellent student or a ordinary student as the endorser.	As in experiment 1	Endorsers social status did not significantly influence participants intention to act (excellent $M = 4.65$, $SD = 1.15$; ordinary $M = 4.56$, $SD = 1.08$; $F(1, 72) = .49$, $p = .488$, $\eta_p^2 = .007$). There was a significant interaction between social status and social norm appeals on intentions to act ($F(1, 72) = 11.43$, $p = .001$, $\eta_p^2 = .137$). Follow up t-tests* showed when messages were frames descriptively, those in the high status conditions showed lower intention ($M = 8.37$, $SD = 1.64$) than those in those in the low status condition ($M = 9.85$, $SD = 1.76$) $t(37) = -2.72$, $p = .010$, $d = -0.87$, but when messages were frames injunctively, those in the high status conditions showed higher intention ($M = 10.20$, $SD = 2.51$) than those in those in the low status condition ($M = 8.37$, $SD = 2.34$) $t(37) = 2.36$, $p = .024$, $d = 0.76$. These were both significant to .025 (Bonferroni corrected alpha level).

Citation	Measure of social status	PEB measure	Findings
Hao He et al. (2019) experiment 3	As in study 1, with a hotel manager or hotel receptionist as the endorser.	As in experiment 1	There was no significant main effect of endorser social status on intention to act (manager $M = 4.72$, $SD = 1.19$; receptionist $M = 4.68$, $SD = 1.25$; $F(1, 324) = .83$, $p = .362$, $\eta_p^2 = .003$). There was a significant interaction between endorser social status and social norm appeal on intention to act ($F(1, 324) = 38.68$, $p < .001$, $\eta_p^2 = .107$). Follow up t-tests* showed when messages were frames descriptively, those in the high status conditions showed lower intention ($M = 8.85$, $SD = 2.46$) than those in those in the low status condition ($M = 9.99$, $SD = 2.26$) $t(167) = -3.14$, $p = .002$, $d = -0.48$, but when messages were frames injunctively, those in the high status conditions showed higher intention ($M = 10.06$, $SD = 2.14$) than those in those in the low status condition ($M = 8.70$, $SD = 2.56$) $t(160) = 3.698$, $p < .001$, $d = 0.58$. These were both significant to .025 (Bonferroni corrected alpha level).
Liao et al. (2022) study 2	A confederate indicated they were a teacher or a student.	Whether an individual chooses to print using new paper or reusing old paper	No significant main effect of status on green item choice. Significant interaction effect between the social green preference grouping and the status of the SGP transmitter ($F(1,113) = 31.76$, $P < 0.001$, $\eta_p^2 = 0.43$). Simple analysis shows that when the status of the green transmitter is higher, the effect of the social green preference grouping is significant ($F(1,113) = 131.76$, $P < 0.001$, $\eta_p^2 = 0.54$).
Yeoh and Paladino (2013)	Product prestige.	One item on a 5-point scale to measure the actual purchase of green products.	Product prestige was negatively associated with green purchasing behaviour ($B = -0.0117$, $t = -2.945$, $P = 0.003$). Mediation analysis showed that the relationship between product prestige and green purchasing behaviour mediated by green purchasing attitudes was not significant ($SE = 0.008$, $B = -0.053$, $t = -1.442$, $p = .150$), suggesting the relationship between product prestige and green purchasing behaviour is fully mediated by attitude.

* = these results were not include in the main text of Hao He et al. (2019), but were calculated from the provided data.

green apparel and intention to purchase green apparel, and prestige of green products and intention to purchase green products respectively.

One potential explanation for the heterogeneity in these findings is the difference in measurement/manipulation of social status. Liao et al. (2022, study 2) and Hao He et al. (2019, experiment 1, experiment 2, experiment 3) manipulated a confederate or actor's social status and then measured whether this influenced participants' engagement in behaviour, whereas Abrar et al. (2021) and Yeoh and Paladino (2013) had participants rate the social status of PEBs. It is possible that participants' explicit perceptions of social status do not predict engagement with PEB, but more subtle perceptions of social status may be related to engagement with PEBs. This means when choosing whether or not to engage in a PEB, people may not consciously consider whether this behaviour will increase or decrease their social status during their decision-making process, but social status evaluations may subconsciously influence their decisions. This may further explain the heterogeneity in findings as each study examined different behaviours, including setting air conditioning temperatures (Hao He et al., 2019, experiment 1, experiment 2, experiment 3) use of recycled or new paper (Liao et al. (2022), eco-friendly clothing purchase intention (Abrar et al., 2021), and green product purchases (Yeoh & Paladino, 2013). Additionally, the findings from Liao et al. (2022, study 2) and Hao He et al. (2019, experiment 1, experiment 2, experiment 3) suggest that the wider context is important and it is likely that the relationship between perceived social status of PEBs and engagement with PEBs is dependent on other variables.

Risk of Bias

There are moderate concerns regarding the quality of included studies. The most frequent cause for concern is that studies were not conducted in a controlled environment, which means there is more potential for confounding variables to impact the results. This synthesis raised less risk of bias concerns, as most studies had acceptable exclusion rates, reporting using reliable scales and reported appropriate data management and cleaning procedures.

Overall, these results suggest that the perceived social status of PEBs can relate to engagement with PEBs, but the direction of this relationship likely depends on other contextual and psychological factors.

Discussion

The aim of this thesis was to conduct a systematic review to further understand the social status signals associated with PEB. In order to carry out this review, a robust and practical definition of social status was formulated, which can further aid operationalisation of this concept in future related work. This registered review included a broad range of studies that examined both social status and PEB, including: studies comparing the social status of PEBs to non-PEBs; studies exploring the influence of characteristics of both individuals and PEBs to the social status attributed to PEBs; and studies examining the relationship between perceived social status of PEBs and engagement with PEBs.

The first research question this review investigated was whether PEBs signal more or less social status than non-PEBs. Synthesis one indicated mixed evidence, with PEBs sometimes signalling more social status than non-PEBs. Potential explanations for this heterogeneity are outlined below. The second research question sought to understand what determines the social status perceptions of PEBs. Synthesis two and three indicate both PEB features and individual characteristics may influence the perceived social status of PEBs. The final research question concerned whether the amount of social status PEBs signal was related to engagement with PEBs. Synthesis four indicated mixed findings, showing that the social status of PEBs likely related to engagement with PEBs under certain conditions.

PEB Characteristics as an Explanation of the Amount of Social Status PEBs are Perceived to Signal

The results from the first synthesis indicated mixed findings relating to whether PEBs signal more or less social status than non-PEBs. Potential explanations for these mixed findings were identified in explorations of heterogeneity and from the findings from synthesis two, which explored the impact of PEB characteristics on the perceived social status of non-PEBs.

The first possible explanation of the variability in the amount of social status that PEBs signal is whether the PEB in question is a form of green consumption (e.g., a behaviour which reduces environmental impact through purchasing products). All the studies in synthesis one that found PEBs always signalled more social status than non-PEBs looking at green consumption, suggesting these are the types of PEBs which are most likely to signal more social status than non-PEBs. Further, the results of synthesis two indicate that green buying and efficiency behaviours tended to signal more social status than reduced consumption or curtailment behaviours. As green buying is a form of green consumption, and efficiency behaviours are very similar to reduced consumption, this further supports the idea that green consumption PEBs are the type of PEB most likely to signal high social

status. One reason green consumption behaviour may be most likely to signal social status is that such behaviours are more clearly a choice compared to curtailment behaviours and reduced consumption. De Nardo et al. (2017) found that participants often described the social status of a PEB to be related to whether it was perceived as a choice, with low status behaviours perceived as a necessity, rather than a choice. Additionally, green consumption behaviour is often visible to others, either when the purchase is made or when the product is used (e.g., buying a low waste product in a shop or using a reusable shopping bag). As visible PEBs have been shown to signal more social status than less visible PEBs (Uren et al., 2021), the visibility of green consumption may explain why these PEBs seem to be most likely to signal high social status. A further explanation for the high status of green consumption is the cost of these behaviours. As green consumption PEBs tend to be more financially costly than other PEBs (Brooks & Wilson, 2015), this may signal access to resources, leading to the attribution of higher social status to these PEBs, in line with costly signalling theory (McAndrew, 2018; Zahavi, 1975).

The suggestion that the cost of green consumption may be why these PEBs signalled the most social status is partially supported by findings from synthesis two, as some of the included studies found that more expensive PEBs signal more social status than less expensive PEBs. However, other studies found there was no observed effect of cost on perceived social status. As these results are not consistent, this suggests that how the cost of PEBs influences their perceived social status may depend on the specific PEB in question or other features of the PEB, such as how visible the PEB is. It is also worth considering that both the studies that found the cost of PEB did not influence perceived social status asked participants to rate the social status of a hypothetical consumer (i.e., considering another), whereas the two studies that found more costly PEBs signal more social status either asked participants to rate the PEB itself or utilised a social status manipulation (i.e., considering themselves). Therefore, it is possible the methods used to assess the social status of PEBs may influence the results. For example, as social status is subjective and based on perceived social value (which varies by situation) it is possible that what an individual believes will increase their own social status is different to what they believe signals another person as high status. This could explain why the studies using measures asking participants to rate a hypothetical consumer found different results compared to studies using other measures of social status. Future research should consider comparing these different methods to determine whether this accounts for the heterogeneity in results, and why self-reference appears to be more salient or otherwise quite different to other-reference in this context.

Another explanation for why some PEBs signal social status and others do not is the visibility of PEBs. The results of synthesis two indicate that highly visible PEBs (i.e., those that tend to be performed in

situations where other people can see them) signalled more social status than PEBs which were low in visibility (i.e., those that tend to be performed where other people cannot see them). This is a compelling explanation for variability in the perceived social status of PEBs, as social status is conferred on an individual by observers (Hays & Blader, 2017), and so behaviours which are visible to more people have more potential for status conferral (Uren et al., 2021). This could also explain some of the heterogeneity in synthesis one, but it is often difficult to classify the PEBs as high or low visibility, as often the PEBs could exist in either a public or private setting. For example, green consumption can be a highly visible behaviour if the purchase is made in person and/or the purchase will be utilised in a public setting (like an electric vehicle), but equally can be low in visibility if the purchase is made online and the product is something that will only be used in private settings (like sourcing household utilities from green energy companies). Synthesis two additionally identified effort as a potential explanation for variability in the amount of social status PEBs are perceived to signal, with high effort PEBs signalling more social status than those low in effort. This could be because high effort PEBs (e.g., installing solar panels or attending a protest) signal access to resources such as time or competence, identifying them as costly. According to costly signalling theory, this would explain why high effort behaviours signal more social status than low effort behaviours, as access to resources, including resources such as time and competence, is assumed to indicate social status (Leary et al., 2014; Zahavi, 1975).

Within the corpus of literature, one study explored the perceived social status of various sustainable forms of transport (Ton et al., 2020). This study found there was no difference in perceived social status of taking the train, taking the bus/tram/metro, walking, or cycling, with all these modes of transport perceived as low in social status. As none of these behaviours are high cost this may explain why they were perceived as low in social status. It is important to note that this research did not consider the social status of electric cars, whereas previous research has indicated that social status may be a motivator for purchasing electric cars (Sexton & Sexton, 2014). It is possible that electric cars signal more social status than other sustainable transport options due to the high cost of electric cars (Scorrano et al., 2020). An alternative explanation is that cars are private transport, and this privacy may be what signals increased social status compared to public transport. This is supported by evidence indicating that cars provide a range of psychosocial benefits that public transport lacks (Hiscock et al., 2002), meaning it may be more than just the cost of electric cars which signal social status. Future research could consider examining the social status of all forms of sustainable transportation to confirm the social status of electric cars compared to other forms of sustainable transport.

The Impact of Individual Characteristics on the Amount of Social Status PEBs are Perceived to Signal

Synthesis three further explored what determines the amount of social status PEBs are perceived to signal, examining whether individual characteristics of the person evaluating the PEB may influence their perceptions of how much social status it signals. There was a positive relationship between age and perceived social status of public transport among those ages 19-30, where higher social status scores indicate a perception that public transport signals low social status (Nayum & Nordfjaern, 2021). This means younger people tended to grant more social status to public transportation. This result is surprising, as age was not related to subjective norms, attitudes or use of public transport within this study (Nayum & Nordfjaern, 2021). While a meta-analysis found there is limited evidence for age differences in most environmental variables (Wiernik et al., 2013), more recent evidence indicates that those in Generation Z (born between 1996 and 2010) more strongly feel negative emotions about the climate crisis compared to other generations (Poortinga et al., 2023). It is possible this emotional reaction leads these younger people to strongly value behaviours which may mitigate the climate crisis, and thus attribute more social status to PEBs. Further research is needed to assess whether these negative emotions or other factors explain why younger people within this age group perceive public transport as higher in social status.

There were mixed findings regarding the impact that gender had on perceived social status of PEBs. One study found that women perceived public transport to be significantly higher social status than men did (Nayum & Nordfjaern, 2021). One potential explanation for this is the perception of public transport as feminine compared to private car use (Kawgan-Kagan, 2020). Research has indicated that violations of masculine norms can result in negative social consequences, such as a loss of social status, for men (Moss-Racusin et al., 2010; Reidy et al., 2014). Therefore, men may perceive PEBs as lower in social status because they view them as feminine and engaging in such behaviour would be a violation of masculine norms. In contrast, the second study exploring gender and the perceived social status of PEBs found that there were no gender differences in the perceived social status of paper recycling and composting (Welte & Anastasio, 2010). This result is surprising, as previous research suggests these behaviours are gendered (Desrochers & Zelenski, 2022; Rastegari Kopaei et al., 2021). Therefore, it is possible that while composting and paper recycling are gendered, there are other factors that are more important for determining the attribution of social status for these behaviours. It is also possible these behaviours are less strongly gendered than public transportation, resulting in no gender differences in perceived social status. Additionally, as composting and paper recycling were incorporated as part of a time diary, it is possible the time

diary as a whole did not have the same gendered connotations as the behaviours alone would have done.

There was a positive relationship between materialism and perceived social status of lab grown leather, with those who scored higher in materialism tending to rate lab grown leather as higher status than those who scored lower in materialism (Keech et al., 2020, study 3). This is likely because those high in materialism tend to seek status through consumption (Goldsmith & Clark, 2012), and this relationship extends to green consumption. This suggests that the social status signals of visible green consumption may be most appealing to those high in materialism and therefore interventions highlighting the social status of green consumption may be most effective for this group. However, as there is only one study examining this relationship, future research should investigate whether this relationship applies to other PEBs and whether this only applied to green consumption.

Eliciting a collectivist versus individualistic goal (i.e., where an actor was described as performing a PEB in private/public, a manipulation which was shown to elicit individualistic and collectivist goals respectively) did not have a main effect on the perceived social status of green buying and recycling, however a significant interaction suggests that there may be a significant difference when looking at each behaviour in isolation (Pinto et al., 2019, study 2). This suggests micro collectivism and individualism may impact engagement in some PEBs. Prior research indicates that macro (national culture) and micro (individual self-construct) collectivism and individualism influence PEB (Saracevic et al., 2022; X. Wang et al., 2021), and further understanding how this relationship interacts with social status perceptions may increase understanding of within and between culture differences in PEB engagement. Future research could explore the impact of collectivist/individualistic goals on a wider range of PEBs to determine if there are any instances where there is a relationship, what direction this relationship is in and whether such a relationship exists at the macro level as well as the micro level.

There was a positive relationship between environmental identity and perceived social status of curtailment, efficiency and activism PEBs (Uren et al., 2021). This could be because those with an environmental identity see PEBs as a virtuous behaviour and therefore perceive such behaviour as high status, in line with the moral virtue theory of status attainment (Bai, 2017). Alternatively, individuals could perceive that this signals access to resources which are of value to them (such as the time and willingness to engage in PEB, which may not be seen as valuable to those with lower environmental identity), and according to costly signalling theory (Grafen, 1990; Zahavi, 1975) perceive them as higher social status. Interestingly, environmental orientation did not predict the social status of PEBs (Brooks & Wilson, 2015, study 1). It is possible this is because environmentally

orientated college majors were used as a proxy for environmental orientation. This may not be an adequate measure of environmental orientation, as research has indicated that more comprehensive measures are needed to capture this concept (Sparks et al., 2022). Prior research has found that whether participants had an environmentally orientated college major only predicts four out of 11 PEBs (Meyer, 2016), suggesting this is not be an accurate reflection of environmental orientation. Future research using other measures of environmental orientation may find different effects on the perceived social status of PEBs.

Liberal participants showed no difference in social status ratings of reduced consumption compared to no PEB, while conservative participants grant less social status to reduced consumption compared to no PEB (Kennedy & Horne, 2019, study 1). It is possible this relationship is explained by environmental identity, as liberals are more likely to hold an environmental identity than conservatives (Brick et al., 2017) and as previously mentioned those with higher environmental identity are more likely to perceive PEBs as higher social status. This could also be explained by the moral virtue theory of status attainment, as liberals are more likely to view PEBs as moral compared to conservatives (Currie & Choma, 2018) and the moral virtue theory suggests that moral behaviours signal social status (Bai, 2017). Therefore, liberals may be more likely to perceived PEBs as signalling social status as they are more likely to perceive such behaviours as moral.

When Does the Social Status of PEBs Relate to Engagement With PEBs?

The final synthesis showed that none of the included studies found the social status of PEBs consistently predicted engagement with PEBs. Most of the included studies found that the social status of PEBs was positively related to engagement with PEB, but only when combined with other conditions. One key finding was that social status of PEBs is positively related to PEB engagement when paired with an injunctive norm message (i.e., a message stating how the individual should perform the behaviour) but is negatively related to PEB engagement when paired with a descriptive norm message (i.e., a message stating how other people are engaging in the behaviour) (Hao He et al., 2019). This suggests that social status can predict engagement with PEB, but only when an individual believes this is a behaviour they should engage in, not when they believe it is something that most people are engaging in. These studies did not include a control condition without any normative message, so future research should include such a condition to determine the impact this social status manipulation alone would have on engagement with PEB.

A further finding suggests that the relationship between social status of a PEB and engagement with that PEB may vary based on whether a confederate chose a PEB or non-PEB option, but this relationship was not analysed to determine the direction of any effect (Liao et al., 2022). This

suggests the social status of a PEB may influence engagement with PEB under certain conditions. Previous literature in areas such as herd mentality (Loxton et al., 2020), social norms (McDonald & Crandall, 2015) and role models (Herrmann et al., 2016) has explored the impact other people's behaviour can have on an individual. It may be beneficial to consider the way social status may interact with these processes to better understand how social influences impact decision making and behaviour.

These studies provide initial evidence that social status perceptions of PEBs can increase engagement with PEB, but more research is needed to determine the consistency of this effect, which PEBs it applies to and under what conditions this relationship holds. It is also worth considering that there may be other circumstances that have not been studied under which increasing perceived social status does not increase engagement with PEB, such as having to engage in PEBs under time pressure (Dogan et al., 2011). Future research considering the circumstances under which the social status of PEBs increases/decreases engagement with PEB is needed. Any interventions aiming to increase engagement with PEBs through social status should consider running pilot studies to check the effectiveness of social status interventions.

Contributions

This thesis set out to understand the relationships between social status and PEB. This overarching aim was met through the careful definition of the broad concept of social status with clarity and precision for application in research, and by conducting a systematic review to explore the existing literature with rigour to provide top tier evidence for the field. The systematic review conducted herein is the first to consolidate literature exploring the social status signals of PEBs. This will provide a useful resource to those considering researching this topic as it provides an overview of what is currently known, and where there are gaps and limitations of the current literature. A further contribution of this work is providing a comprehensive definition of social status, a concept that has had multiple definitions in its application in experimental research, and with implications for behavioural science. This definition should be used in future research to aid consistency in the definition and subsequent operationalisation of social status.

Additionally, this review has implications for interventions utilising social status to PEB. See Table 12 for an overview of when different interventions are likely to be most effective. Interventions that are using a social status priming strategy may be most effective when focused on green consumption/efficiency PEBs, highly visible PEBs, or PEB which are high in cost as these are the PEBs which tend to signal the most social status. These interventions may be especially effective for those who are younger (within the range of 18-30), those who are liberal and those with a high

Table 12. *Circumstances Under Which Social Status Priming and Social Status Increasing Interventions are Likely to be Most Effective*

	Priming strategies	Social status increasing strategies
PEB characteristics	Green consumption PEBs, efficiency PEBs, highly visible PEBs, financially costly PEBs	Reduced consumption PEBs, curtailment PEBs, PEBs with low financial cost, sustainable transportation (excluding electric cars)
Groups of people	Younger people, those with a high environmental identity, liberals	Older people, those with low environmental identity, conservatives

environmental identity as this population tend to view PEBs as higher in social status (Kennedy & Horne, 2019, study 1; Nayum & Nordfjaern, 2021; Uren et al., 2021). Interventions which are aiming to increase the social status of PEBs may be most beneficially targeted towards reduced consumption/curtailments PEBs, low cost PEBs and forms of sustainable transportation (excluding electric car purchases), as these PEBs are generally viewed to be lower in social status and therefore may benefit from status increasing interventions (De Nardo et al., 2017; Kennedy & Horne, 2019, study 1; study 2; Kohlová & Urban, 2020; Ton et al., 2020). Additionally, interventions should be mindful of the masculine/feminine associations with the PEBs they are targeting. Such interventions may be most limited in effectiveness for men when feminine PEBs are targeted or vice versa. It is also important to note that increased social status is not always associated with increased PEB engagement (Yeoh & Paladino, 2013) and interventions should conduct pilot studies to ensure the effectiveness of interventions and avoid pairing social status interventions with an injunctive norm message.

As social status has the potential to be utilised in behaviour change interventions, it may add value to existing behaviour change frameworks. For example, the COM-B model is frequently used to understand barriers to behaviour and encourage behaviour change (Michie et al., 2011; Willmott et al., 2021), including encouraging PEB (Smaliukiene et al., 2020). One element included in the COM-B is whether there is the social opportunity to engage in a behaviour. Social status may be a form of social opportunity, as individuals are motivated to engage in behaviours which increase their social status and refrain from engaging in behaviours which lower their social status due to the social repercussions (Anderson et al., 2015; Blader & Chen, 2014; Brooks & Wilson, 2015). This means that the social status associated with a behaviour may be a social barrier or facilitator of the behaviour,

making it a component of social opportunity. Including social status within the COM-B framework and developing interventions that apply that framework to some of the more high impact but low-uptake PEBs may help further understand and encourage PEB and other behaviour.

A further contribution of this review is that it demonstrates the value of both costly signalling theory (Grafen, 1990; Zahavi, 1975) and the moral virtue theory of status attainment (Bai, 2017) in understanding and explaining the link between social status and PEB. The review highlights how there are instances where costly PEBs appear to signal more social status than less costly behaviours, supporting costly signalling theory as an explanation to understand the circumstances under which PEBs signal social status (Grafen, 1990; Zahavi, 1975). However, costly signalling theory cannot explain all the findings; for example, not all studies found that more financially expensive PEBs signal more social status than less financially expensive PEBs, suggesting factors other than the cost of a PEB also influence its perceived social status. There are also instances where the moral virtue theory of status attainment can explain findings, such as why those high in environmental identity and those who are politically liberal tend to perceive PEBs as higher in social status than those low in environmental identity and those who are politically conservative. This demonstrates that both whether a PEB is perceived as costly and whether it is perceived as virtuous can both influence the perceived social status of the PEB, suggesting both theories have value in understanding the circumstances under which PEBs signal social status. However, there are some findings which cannot be easily explained by either theory. For example, the present study found mixed findings about whether perceived social status of PEBs is related to engagement with those PEBs, and neither costly signalling theory nor the moral virtue theory attempt to explain the circumstances under which perceived social status related to engagement a behaviour. For this reason, future research should expand the theoretical understanding of social status by exploring the circumstances under which perceived social status is related to engagement with behaviour.

Limitations and Future Research

There is substantial variability in the measurements and manipulations of social status utilised by the included studies. This makes comparing results across studies difficult. As studies are using different measures, and these measures are rarely validated, it is questionable whether all of these studies are actually measuring social status in its strictest definition. This problem likely stems from the lack of a consistent definition of social status across the included studies. While no studies were excluded based on their definitions of social status, 18 of the included studies did not provide a definition. Of those that did provide a definition, none included all five components of the definition formed in this thesis. This could mean that different researchers have different ideas about what social status is

and are attempting to measure different concepts or different aspects of social status. For example, while Brooks and Wilson (2015, study 2) were studying status, they asked participants to rate the appropriateness of various behaviours to signal that they were above average socioeconomic status as their measure of social status. This is further complicated when considering participants' conceptualisation of social status and whether this aligns with that of the researchers. Many of the included studies use direct measures of social status, simply asking participants to rate an actor's/PEB's social status, without providing a definition (e.g., Berger, 2019; Brooks & Wilson, 2015; Keech et al., 2020; Kohlová & Urban, 2020; Ton et al., 2020; Welte & Anastasio, 2010). De Nardo et al. (2017) examined participants' conceptualisation of social status and found while there were some common similarities in conceptualisations of social status, there was also substantial diversity in some characterisations. Twelve indicators of high status were identified by participants, ranging from 75% of participants suggesting money was an indicator, to 7% suggesting group affiliation was an indicator. This means that when using direct measures of social status there may not be consistency among participants in what they are rating PEBs on. For example, some participants may be rating whether an individual is perceived as prosocial, while others may be rating the same individual based on whether they are perceived as a good leader.

To overcome these limitations, future research should create a measure based on the definition provided in this report. As the majority of included articles used a scale to measure social status, developing a comprehensive scale should be the priority for this research. This would likely need to be a multi-item scale to measure all facets of the definition. As social status is conferred by observers, this scale should be designed to rate another person's social status, rather than a measure where individuals rate their own social status. Validity for such an other-report measure can largely be assessed using the same methods as those used to validate a self-report measure (see Boateng et al. (2018) for an overview of this process). It is important to note that achieving consistency in a measure of social status may be difficult, as perceptions of social status are likely to be inherently influenced by contextual and rater factors. This is because social status is conferred based on perceived social value, and what is seen as valuable will vary between raters and the context they are making the rating in. Therefore, creating a measure which is robust to such variations may be difficult to achieve and unrepresentative of real-world social status perceptions. For this reason, in developing a measure of social status it may be more important to understand which factors influence social status ratings (e.g., mood, social influences, rater personality) so these can be controlled in future studies, rather than developing a measure which is robust to such variations.

There was substantial heterogeneity between included studies. It is possible that only including experimentally designed studies could have increased homogeneity, making the relationship between social status and pro-environmental clearer. However, the aim of this review was to gain an understanding of the social status signal association with PEB, and the inclusion of cross sectional, descriptive and longitudinal studies provided valuable insights which would have otherwise been missed. For example, a third of studies included in synthesis four were non-experimental and without these studies this synthesis would have been less complete.

It is possible that only focusing on social status without considering other variables may have limited understanding of the relationship between social status and PEB, As considered in analysis two and three, contextual factors likely impacted this relationship. It is possible that a review with more consideration of these contextual variables may reveal valuable insight into how social status and PEB relate to one another. However, such an analysis would invariably bring more heterogeneity. For this reason, future reviews may want to have a more specific focus (e.g., in terms of methodology or specific PEB reviewed), but consider more variables that may interaction with the social status-PEB relationship. Additionally, future primary research should be conducted exploring the interactions between social status, PEB and other variables (e.g., COM-B).

A further limitation is that most of the included studies comparing the social status of PEBs to engagement with PEBs do not measure actual behaviour, instead measuring simulated or intended behaviour. This may limit the generalisability of these findings to real world settings as they do not account for the intention-behaviour gap (Yuriev et al., 2020). This refers to the phenomena where self-reported behavioural intentions do not align with actual behaviour. This means when studies only use intended behaviour measures, they may overestimate the influence social status has on behaviour. This limits the usefulness of these studies, as to minimise the impacts of the climate crisis, we need to understand the determinants of actual behaviour, rather than intended behaviour. Further research could consider measuring actual behaviour using methods similar to Liao et al. (2022), who gave participants the opportunity to reuse paper or use new paper, providing a measure of actual PEB.

Another limitation of the available literature is the low number of studies examining each PEB feature and individual characteristic that may influence the social status of PEBs. In many cases only one or two studies explored each characteristic. Additional research is needed to confirm the consistency of the findings for each of these characteristics. Further, there are many PEBs that have not been studied in the literature included in this review. Specifically, there were not studied exploring flying behaviour or meat-eating behaviour. Refraining for flying and reducing meat

consumption are some of the most impactful ways to reduce individual carbon footprint (Wynes & Nicholas, 2017). This is reflective of a wider trend in psychology to focus on intent orientated PEBs over impact orientated PEBs (Moser & Kleinhückelkotten, 2018). Future research should focus on impact orientated PEBs, such as reducing flying and meat consumption.

Further, within each synthesis there were considerable concerns regarding the quality of included studies, ranging from sampling method, which likely introduced bias, to inappropriate use or reporting of data cleaning and management procedures. This raises concerns regarding the reliability and validity of the results of included studies. Future research investigating the social status signals associated with PEB should seek to improve the quality of included studies, such as by conducting studies in a controlled environment, utilising appropriate sampling methods, and appropriately reporting sample characteristics and data management procedures.

Another consideration is potential cultural difference in the social status signals of PEBs. Included studies come from a range of countries and there are not obvious differences by country. However, the methodological and statistical heterogeneity may be too substantial to make differences by country noticeable. There is a lack of cross-cultural studies included in the review where comparable designs were used in multiple countries. As what is of value and what is virtuous can vary by culture (Anderson et al., 2015; Bai, 2017), both costly signalling theory and moral virtue theory would lead to the assumption that there would be cultural differences. Additionally, studies were only included in the review if they were published in English. Including studies published in non-English languages may have resulted in better representation of countries and cultures in the Global South. As countries in the global south are experiencing more severe impacts of the climate crisis (Ngcamu, 2023), they may well have different perceptions of PEBs. For this reason, future research may want to consider using samples from different countries to examine whether the amount of social status PEBs signals, what determines that amount of social status PEBs signal and whether the social status signals of PEB relates to engagement with PEB vary by country/culture. Future reviews should consider including studies published in non-English languages to increase global representation. It is possible that some relevant studies were not included in this review, meaning it may not give a fully comprehensive overview of the literature. This could have arisen due to studies which refer to “status” rather than “social status” or prestige, as it was not feasible to include a search for “status” due to the many other ways this term is used. While backward and forward citation searching was used in an attempt to locate these articles, some relevant studies may not have cited any of the studies that were initially included in the review nor have been cited by any of these studies. This means that some relevant studies may not have been included in this systematic review. Future systematic reviews on this topic may want to consider a broader search to ensure all such articles

are located. Additionally, this review did not include concepts more specific than social status (e.g., prosocial status or admiration) or broader concepts (e.g., rank, occupational prestige). These concepts may provide valuable insight into social status and future research should consider the insights that research using these concepts could provide.

Conclusion

This thesis, through the rigorous implementation of a systematic review using a precise and considered definition of the concept of social status, shows there is mixed evidence regarding the amount of social status PEBs signal compared to non-PEBs. Both PEB features and individual characteristics can influence the amount of social status PEBs are perceived to signal, but these results are often mixed or lack support from multiple studies. The social status of PEBs is sometimes related to engagement with PEB, but this relationship appears to be dependent on contextual factors. There was a high level of heterogeneity among included studies, making it difficult to compare studies. One contribution of this thesis is the inclusion of a comprehensive definition of social status which may aid homogeneity in future studies. Both costly signalling theory and the moral virtue theory of status attainment provide explanations for results, suggesting both the costliness of a PEB and the perceived morality of a PEB may relate to how much social status it signals. Recommendations for future research include using a consistent definition and measurement of social status, as well as further considering the influence of PEB features and individual characteristics on the social status signals of PEBs. Recommendations for interventions utilising social status are made, but due to the inconsistent relationship between social status of PEBs and engagement with PEBs any interventions should be pilot tested to ensure any effects are in the desired direction.

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1

Appendix A

2

PRISMA Checklist

Section and topic	Item #	Checklist item	Location where item is reported
Title			
Title	1	Identify the report as a systematic review.	1
Abstract			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2
Introduction			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	8-28
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	28
Methods			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	30, 32
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	29
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	29, 88
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	31
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	31
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	31, 89
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	89
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	32
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	n/a
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	32

	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	32
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	32, 33, 35, 37
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	31
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	31
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	32
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
Results			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	33, 34
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	33
Study characteristics	17	Cite each included study and present its characteristics.	35-38
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	40-43
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	45-61
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	44-62
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	n/a
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	44-62
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	n/a
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	n/a
Discussion			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	63-69
	23b	Discuss any limitations of the evidence included in the review.	71-74
	23c	Discuss any limitations of the review processes used.	73-74
	23d	Discuss implications of the results for practice, policy, and future research.	69-71

Other information			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	29
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	29
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	31, 44
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	n/a
Competing interests	26	Declare any competing interests of review authors.	n/a
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	n/a

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: <http://www.prisma-statement.org/>

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Appendix B

Full search queries for each interface

Web of science

(pro-environmental behaviour) OR (environmentally significant behaviour) OR (environmental practice) OR (sustainable behaviour) OR (environmentally friendly behaviour) OR (green consumer behaviour) (Topic) and ("social status") OR (prestige) (Topic)

EBSCOhost

((pro-environmental behaviour) OR (environmentally significant behaviour) OR (environmental practice) OR (sustainable behaviour) OR (environmentally friendly behaviour) OR (green consumer behaviour)) AND (("social status") OR (prestige))

Proquest

noft((pro-environmental behaviour) OR (environmentally significant behaviour) OR (environmental practice) OR (sustainable behaviour) OR (environmentally friendly behaviour) OR (green consumer behaviour)) AND noft(("social status") OR (prestige))

25

26

Appendix C

27

Data Extraction Form

28

Data extraction V1

29

Complete for each relevant study. If an article reports multiple relevant studies, please complete the form once per study.

30

31

This contains all items needed for synthesis, as well as all but one item of the Generic Riskof-Bias Measure for Systematic Reviews of Surveys.

32

33

* This form will record your name, please fill your name.

34

35

1. Please select your initials

36 ☐ RG

37 ☐ RS

38 ☐ MS

39

2. Date completed

40

Please input date (dd/MM/yyyy)



41 3. Article reference

42 4. Study number (e.g. single study, experiment 1, study 1)

43

44 5. Study aims/research questions/hypotheses (please list all)

45

46 6. Study location (country or countries)

47

48 7. Study design

49 ☐ Observational

50 ☐ Experimental/quasi-experimental

51 ☐ Cross-sectional

52 ☐ Longitudinal

53 ☐ Secondary data analysis

54 ☐ Other

55 8. Number and age of participants (please provide total sample N and mean, standard
56 deviation and range for age available)

57

58
59

9. Gender/sex of participants. Please list as detailed in study. List frequency (N) and percentage of sample per group.

60

61

10. Any other relevant demographic information

62

63
64

11. Definition of social status (if given) (if this is the second/third/fourth study you can leave this blank)

65

66
67

12. Definition of PEB (or synonymous term) (if given) (if this is the second/third/fourth study you can leave this blank)

68

69 13. Is the sampling frame largely representative of the studies population?

70 ☐ Yes = they are identical or the sampling frame is representative to a great extent
71 (e.g., telephone directory)

72 ☐ No = the sampling frame represents a much more specific group than the studied population
73 or not reported

74 ☐ Other

75 14. Were appropriate methods utilized for participant recruitment?

76 ☐ Yes = relatively low sampling bias (e.g., random selection or randomly addressing participants)

77 ☐ No = high potential for sampling bias (e.g., convenience sample) or not reported

78 ☐ Other

79 15. Is the exclusion rate of participants acceptable?

80 ☐ Yes = below 20%

81 ☐ No = more than 20% or not reported

82 ☐ Other

83 16. Are the characteristics of the sample reported (demographic variables)?

84 ☐ Yes = both age and gender are reported

85 ☐ No = one or both of them not reported

86 ☐ Other

87 17. Do the relevant measures (social status, PEB and any individual characteristics related to
88 predicted analysis three) have adequate reliability?

89 ☐ Yes = all measures have acceptable reliability (e.g., $\alpha > 0.7$ for a scale with 7 or more items)

90 ☐ No = reliability of one measure or more is less than the chosen criterion or not reported

91 ☐ Other

92 18. Were the procedures included in the study conducted in a controlled setting?

93 ☐ Yes = controlled environment (e.g., laboratory or university settings)

94 ☐ No = uncontrolled environment (e.g., online) or not reported

95 ☐ Other

96 19. Are data cleaning and management procedures reported and/or acceptable?

97 ☐ Yes = Reporting of either missing data, outliers, or invalid responses

98 ☐ No = all unreported or unusual procedures utilized (e.g. irregular imputations)

99 ☐ Other

100 20. Does this study compare social status perceptions of PEBs to the social status perceptions
101 of non-PEBs?

102 ☒ Yes

103 ☐ No

104 21. Measurement/manipulation of social status

105

106

107

106 22. Measurement/manipulation of PEB

107

108 23. Measurement/manipulation of non-PEB

109

110 24. What were the statistical findings? Include direction of effects, p values and effect sizes

111

112 25. Please provide a summary of the main findings and the conclusion of these findings

113

114 26. What statistical analysis was used?

115

116 27. Is this analysis appropriate for the research question/hypothesis?

117 ☐ Yes

118 ☐ No

119 ☐ Other

120 28. Does the study compare the perceived social status of different PEB?

121 ☐ Yes

122 ☐ No

123 29. Measurement/manipulation of social status

124

125 30. PEBs used

126

127 31. What were the statistical findings? Please include direction of effect, p value and effect size

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129 32. Please provide a summary of the main findings and the conclusion of these findings

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33. What statistical analysis was used?

131

132 34. Is this analysis appropriate for the research question/hypothesis?

133 ☒ Yes

134 ☐ No

135 ☐ Other

136 35. Does the study measure the influence of individual characteristics (e.g.
137 environmental identity, gender) on perceived social status of PEBs?

138 ☐ Yes

139 ☐ No

140 36. Individual characteristics measured/manipulated

141

142 37. Social status measurement/manipulation

143

144 38. What were the statistical findings? Please include direction of effect, p value and effect
145 size

146

147 39. Please provide a summary of the main findings and the conclusion of these findings

148

40. What statistical analysis was used?

149

150 41. Is this analysis appropriate for the research question/hypothesis?

151 ☐ Yes

152 ☐ No

153 ☐ Other

154 42. Does the study compare perceived social status of PEBs to performance/intended
155 performance of PEBs?

156 ☐ Yes

157 ☐ No

158 43. Social status measure/manipulation

159

160 44. Pro-environmental measure/manipulation

161

162 45. What were the statistical findings? Please include direction of effect, p value and effect
163 size

164

165 46. What statistical analysis was used?

166

167 47. Is this analysis appropriate for the research question/hypothesis?

168 ☐ Yes

169 ☐ No

170 ☐ Other

171 48. Provide the limitations listed by the authors

172

173 49. Please list any further limitations that are not listed but that you feel are relevant

174

50. Any other information

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Appendix D

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Overall Risk of Bias

179 **ROBIS: Tool to assess risk of bias in systematic reviews****DOMAIN 1: STUDY ELIGIBILITY CRITERIA**

1.1 Did the review adhere to pre-defined objectives and eligibility criteria?	Y
1.2 Were the eligibility criteria appropriate for the review question?	Y
1.3 Were eligibility criteria unambiguous?	PN
1.4 Were any restrictions in eligibility criteria based on study characteristics appropriate (e.g. date, sample size, study quality, outcomes measured)?	Y
1.5 Were any restrictions in eligibility criteria based on sources of information appropriate (e.g. publication status or format, language, availability of data)?	Y

Concerns regarding specification of study eligibility criteria: LOW

Rationale for concern: There is some lack of clarity regarding what is classed as a pro-environmental behaviour, but all other elements are clearly outlined and appropriate.

180

DOMAIN 2: IDENTIFICATION AND SELECTION OF STUDIES

2.1 Did the search include an appropriate range of databases/electronic sources for published and unpublished reports?	Y
2.2 Were methods additional to database searching used to identify relevant reports?	Y
2.3 Were the terms and structure of the search strategy likely to retrieve as many eligible studies as possible?	PN
2.4 Were restrictions based on date, publication format, or language appropriate?	Y
2.5 Were efforts made to minimise error in selection of studies?	PY

Concerns regarding methods used to identify and/or select studies: LOW

Rationale for concern: As the term "status" is not included in the search strategy which may have resulted in some eligible studies not being included. At least 10% of records were second screened, but had this been 100% this would have further minimised any error in study selection. All other elements are appropriate.

181

DOMAIN 3: DATA COLLECTION AND STUDY APPRAISAL

3.1 Were efforts made to minimise error in data collection?	Y
3.2 Were sufficient study characteristics available for both review authors and readers to be able to interpret the results?	PY
3.3 Were all relevant study results collected for use in the synthesis?	PY

3.4 Was risk of bias (or methodological quality) formally assessed using appropriate criteria?	Y
3.5 Were efforts made to minimise error in risk of bias assessment?	Y
Concerns regarding methods used to collect data and appraise studies: LOW Rationale for concern: Some study characteristics of included studies were not reported in sufficient detail (e.g. missing information about measures) which made interpretation of results less clear. Some included studies did not report effect sizes and did not report enough information for the reviewer to calculate effect sizes. All other elements are appropriate.	

182

DOMAIN 4: SYNTHESIS AND FINDINGS	
4.1 Did the synthesis include all studies that it should?	Y
4.2 Were all pre-defined analyses reported or departures explained?	Y
4.3 Was the synthesis appropriate given the nature and similarity in the research questions, study designs and outcomes across included studies?	Y
4.4 Was between-study variation (heterogeneity) minimal or addressed in the synthesis?	Y
4.5 Were the findings robust, e.g. as demonstrated through funnel plot or sensitivity analyses?	NI
4.6 Were biases in primary studies minimal or addressed in the synthesis?	Y
Concerns regarding the synthesis and findings LOW Rationale for concern: As included studies shows high heterogeneity a funnel plot of sensitivity analysis was not appropriate. All other elements were appropriately managed in the synthesis.	

183 Y=YES, PY=PROBABLY YES, PN=PROBABLY NO, N=NO, NI=NO INFORMATION

184

RISK OF BIAS IN THE REVIEW	
A. Did the interpretation of findings address all of the concerns identified in Domains 1 to 4?	Y
B. Was the relevance of identified studies to the review's research question appropriately considered?	Y
C. Did the reviewers avoid emphasizing results on the basis of their statistical significance?	PY
Risk of bias in the review RISK: LOW Rationale for risk: Low risk of bias in all four domains, and those that were not low (e.g. 2.3) were addressed in the review.	

185 Y=YES, PY=PROBABLY YES, PN=PROBABLY NO, N=NO, NI=NO INFORMATION

186